4

BSc

Syllabuses and Regulations
(4-year curriculum)

2015-16

Faculty of Science
The University of Hong Kong

General Information

SCIENCE

This booklet includes information on:

- ***BSc Degree curriculum and graduation requirements***

- ***List of courses and descriptions***

  A full list of Science courses and descriptions include information on course code, title, credit value, contents, semester offered, teaching and learning activities, assessment methods and grade descriptors.

- ***Majors & Minors***

  Details of the Science Majors and Minors available for students.

- ***Degree regulations***

  Rules that cover curriculum requirements and progression in curriculum, selection of courses, assessment, advanced standing, grading system and degree honours classification.

- ***Teaching weeks***

  Teaching weeks show the dates of semesters, University holidays, revision and examination periods.

Further Information detailing instructions on the selection of courses, grading, graduation requirements, honours classification, application for advanced standing and exemption, etc, can be found in the *Handbook for BSc Students* available at http://www.scifac.hku.hk/ug/current

Updates on BSc Syllabuses and Regulations can be found at http://webapp.science.hku.hk/sr4/servlet/enquiry

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SECTION I

BSc Degree Curriculum and Graduation Requirements

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SECTION I   BSc Degree Curriculum and Graduation Requirements

1. A BSc Degree Curriculum

The Faculty of Science offers a number of Science majors leading to the award of a BSc degree.

All students admitted to the 6901 BSc programme under the 4-year curriculum are required to complete at least one Science major out of the 16 Science majors as the primary major for the award of the BSc degree. In addition to the primary Science major, students may take a second major or a minor in a Science or non-Science discipline. Students should note that some non-Science majors and minors may require students to have achieved a minimum academic result before they are allowed to enroll in them.

(a) A typical BSc curriculum for students admitted under the 4-year ‘2012 curriculum’ in 2012-13 or thereafter

To complete the BSc degree curriculum, you have to pass at least 240 credits, equivalent to 40 6-credit courses, normally spread over 4-years of full-time study. A BSc curriculum typically comprises:

- 16 courses for the Science major including 2 Science Foundation courses, Disciplinary courses and capstone courses (96 credits)
- 2 English courses and 1 Chinese course for university language requirements (18 credits)
- 6 common core courses in 4 Areas of Inquiry (36 credits)
- A choice of 15 courses as elective courses, or to fulfill the requirements of a minor or a second major (90 credits)

Curriculum requirements (240 credits)

Option A	**Option B**	**Option C**
Students taking one Science major	**Students taking one Science major and one minor**	**Students taking double majors (one Science major and a 2nd major)**

Primary Science Major: 96 credits
2 Science Foundation courses (SCNC1111 & SCNC1112, taken in Year 1),
13 Disciplinary courses
and 1 Capstone course

+

Common Core Courses: 36 credits #
6 courses in 4 Areas of Inquiry
(at least 1 and not more than 2 courses from each AoI)

+

Language Courses: 18 credits
English: 12 credits [6 credits in Core University English (CAES1000△, taken in Year 1) and
6 credits in English in the Discipline(CAES9820, taken in Year 2)]
Chinese: 6 credits (CSCI9001⊕, taken in Year 3)

Option A	Option B	Option C
+	+	+
Electives: 90 credits To make up the 240 total credits	**Minor**^: 36 – 48 credits + **Electives**: 42 – 54 credits To make up the 240 total credits	**2nd Major** ^*: 72 – 96 credits

Notes:

\# Student must select not more than one course from the same Area of Inquiry within one academic year and at least one and not more than two courses from each Area of Inquiry during the whole period of study. Common Core courses should be completed normally within the first three years of study.

△ Students who have been admitted to Year 1 in 2015-16 and have achieved the following qualifications shall be exempted from taking CAES1000 Core University English and should take a 6-credit elective course in lieu:

5** on the HKDSE English Language Paper
tested by CAES to be of a native English speaker standard
holder of Bachelor's degree from an English-medium university
achieved an overall IELTS score of no less than a 7.5 and no less than a 7 on the Reading, Speaking, Listening and Writing Tests
achieved an overall TOEFL Internet Based Test score of no less than 102 and no less than 27 on the writing and speaking sections and no less than 24 on the listening and reading sections
achieved a level of no less than 5 in the HL English Language A: Literature or English Language A: Language and Literature paper or no less than 6 in the SL English Language A: Literature or English Language A: Language and Literature paper in the International Baccalaureate Diploma
achieved a Scholastic Aptitude Test (SAT) essay score of no less than 10 and no less than 700 on the Critical Reading and Writing Tests
achieved a score of no less than 5 on the Advanced Placement English Language and Composition Test or the Literature and Composition Test
achieved an A* in the English Language, English Literature or English Language and Literature GCE English A level paper (including specification A or B, if given)

Exempted students will not be able to enroll CAES1000 via Self Service enrollment.

⌖ To satisfy the Chinese language enhancement requirement, Students are required to successfully complete the 6-credit Faculty-specific Chinese language enhancement course, except for:
(a) Putonghua-speaking students who should take CUND9002 (Practical Chinese and Hong Kong Society) or CUND9003 (Cantonese for Non-Cantonese Speaking Students). They may take the course in Year 1 or 2 if they so wish; and
(b) students who have not studied Chinese language during their secondary education or who have not attained the requisite level of competence in the Chinese language to take the Chinese language enhancement course should write to the Faculty Office to apply
  (i) to take a 6-credit Cantonese or Putonghua language course offered by the School of Chinese especially for international and exchange students; OR
  (ii) to be exempted from the Chinese language requirement. If exempted, students should take an elective course in lieu.

^ Credit requirement for different majors or minors may vary.

* Students having a second major in Science are allowed to double-count the two Science Foundation Courses. The 12 credits can be made up by selecting any courses.

(b) Common Core Curriculum

The Common Core Curriculum is designed to provide key common learning experience for all HKU students and to broaden their horizons beyond their chosen disciplinary fields of study. It focuses on issues that have been, and continue to be, of deeply profound significance to mankind, the core intellectual skills that all HKU undergraduates should acquire and the core values that they should uphold. The Common Core Curriculum is divided into four Areas of Inquiry (AoIs): (1) Scientific and Technological Literacy; (2) Humanities; (3) Global Issues; (4) China: Culture, State and Society. Students have to pass 36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and not more than two courses from each Area of Inquiry during the whole period of study. Common Core courses should be completed normally within the first three years of the BSc study.

2. BSc Graduation Requirements and Honours Classification *(for students admitted under the 4-year '2012 curriculum' in 2012-13 or thereafter)*

(a) Award of a BSc degree

To be eligible for the award of the degree of Bachelor of Science, students must fulfill the following requirements:

(i) Satisfied the requirements in UG5 of the Regulations for First Degree Curricula[#];

(ii) Passed not fewer than 240 credits, comprising 96 credits of the required courses as prescribed in the major programme of the BSc degree curriculum.

UG5 specifies that students have to successfully complete:

(a) 12 credits in English language enhancement, including 6 credits in Core University English[1] (i.e. CAES1000) and 6 credits in an English in the Discipline course[2] (i.e. CAES9820 Academic English for Science Students);

(b) 6 credits in Chinese language enhancement[3] (i.e. CSCI9001 Practical Chinese for Science Students);

(c) For 2012 & 2013 cohorts:
36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and not more than two courses from each Area of Inquiry during the whole period of study; and

For 2014 cohorts or thereafter:
36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry with not more than one course from the same Area of Inquiry being selected within one academic year except where candidates are required to make up for failed credits; and

(d) a capstone experience as specified in the syllabuses of the degree curriculum.

(b) Honours Classification

Classification of honours are calculated using the cumulative grade point average CGPA as below:

	CGPA range
First Class Honours	3.60 – 4.30
Second Class Honours Division I	3.00 – 3.59
Second Class Honours Division II	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

Credits granted for advanced standing in recognition of studies completed successfully elsewhere before admission to the University and credits transfer in recognition of studies completed on exchange during candidature at HKU are not included in the calculation of GPA.

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[1] Candidates with the following qualifications shall be exempted from this requirement and should take a 6-credit elective course in lieu, see *Regulation UG6*:

5** on the HKDSE English Language Paper
tested by CAES to be of a native English speaker standard
holder of Bachelor's degree from an English-medium university
achieved an overall IELTS score of no less than a 7.5 and no less than a 7 on the Reading, Speaking, Listening and Writing Tests
achieved an overall TOEFL Internet Based Test score of no less than 102 and no less than 27 on the writing and speaking sections and no less than 24 on the listening and reading sections
achieved a level of no less than 5 in the HL English Language A: Literature or English Language A: Language and Literature paper or no less than 6 in the SL English Language A: Literature or English Language A: Language and Literature paper in the International Baccalaureate Diploma
achieved a Scholastic Aptitude Test (SAT) essay score of no less than 10 and no less than 700 on the Critical Reading and Writing Tests
achieved a score of no less than 5 on the Advanced Placement English Language and Composition Test or the Literature and Composition Test
achieved an A* in the English Language, English Literature or English Language and Literature GCE English A level paper (including specification A or B, if given)

Exempted students will not be able to enroll CAES1000 via Self Service enrollment.

[2] (a) To satisfy the English in the Discipline (ED) requirement, candidates who have passed the ED course for a Major but subsequently change that Major are required to pass the ED course for the new Major, or either of the double Majors finally declared upon graduation irrespective of whether the second Major is offered within or outside of the candidates' home Faculty.

(b) Candidates declaring double Majors can, if they fail in the ED course for one of the Majors, either (i) re-take and successfully complete that failed ED course, or (ii) successfully complete the ED course for the other Major, irrespective of whether the Major is offered within or outside of the candidates' home Faculty.

(c) Candidates who undertake studies in double Majors or double degrees are not required to take a second ED course but may be advised by the Faculty to do so.

[3] Candidates who have not studied Chinese language during their secondary education may be exempted from this requirement and should take a 6-credit elective course in lieu, see *Regulation UG6*.

SECTION II

Capstone Requirements for Science Students

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SECTION II Capstone Requirement for Science Students

Capstone experience is an integral part of the major programme which focuses on integration and application of knowledge and skills gained in the early years of study. The capstone course carries a minimum of 6 credits and students must complete this for fulfillment of the graduation requirements. Capstone course is normally taken in the senior years (year 3 or 4) of study. The earliest that a student is allowed to take a capstone course is their year 3 study. The capstone courses in each Science major may be different but a range of courses (e.g. research project, seminar, field work, internship and capstone project) is offered to suit individual student's needs and interests. The following courses are currently recognized as capstone courses in the different majors:

BSc - Major	**Recognized Capstone Courses**
1. Biochemistry	1. BIOC3999 Directed studies in biochemistry (6) 2. BIOC4966 Biochemistry internship (6) 3. BIOC4999 Biochemistry project (12)
2. Biological Sciences	1. BIOL3994 Directed studies in biological sciences (6) 2. BIOL4964 Biological sciences internship (6) 3. BIOL4994 Biological sciences project (12)
3. Chemistry	1. CHEM3999 Directed studies in chemistry (6) 2. CHEM4910 Chemistry literacy and research (6) 3. CHEM4911 Capstone experience for chemistry undergraduates: HKUtopia (6) 4. CHEM4966 Chemistry internship (6) 5. CHEM4999 Chemistry project (12)
4. Earth System Science	1. EASC4911 Earth system: contemporary issues (6)
5. Ecology & Biodiversity	1. BIOL3951 Ecology & biodiversity field course (6) 2. BIOL3991 Directed studies in ecology & biodiversity (6) 3. BIOL4911 Conservation science in practice (6) 4. BIOL4991 Ecology & biodiversity project (12)
6. Environmental Science	1. ENVS3999 Directed studies in environmental science (6) 2. ENVS4955 Environmental science in practice (6) 3. ENVS4966 Environmental science internship (6) 4. ENVS4999 Environmental science project (12)
7. Food & Nutritional Science	1. BIOL3992 Directed studies in food & nutritional science (6) 2. BIOL4912 Sensory evaluation of food (6) 3. BIOL4962 Food & nutritional science internship (6) 4. BIOL4992 Food & nutritional science project (12)
8. Geology	1. EASC4955 Integrated field studies (6)
9. Mathematics	1. MATH3999 Directed studies in mathematics (6) 2. MATH4910 Senior mathematics seminar (6) 3. MATH4911 Mathematics capstone project (6) 4. MATH4966 Mathematics internship (6) 5. MATH4999 Mathematics project (12)
10. Mathematics / Physics	1. MATH3999 Directed studies in mathematics (6) 2. MATH4910 Senior mathematics seminar (6) 3. MATH4911 Mathematics capstone project (6) 4. MATH4966 Mathematics internship (6) 5. MATH4999 Mathematics project (12) 6. PHYS3999 Directed studies in physics (6) 7. PHYS4966 Physics internship (6) 8. PHYS4999 Physics project (12)
11. Molecular Biology & Biotechnology	1. BIOL3993 Directed studies in molecular biology & biotechnology (6) 2. BIOL4963 Molecular biology & biotechnology internship (6) 3. BIOL4993 Molecular biology & biotechnology project (12)
12. Astronomy 13. Physics	1. PHYS3999 Directed studies in physics (6) 2. PHYS4966 Physics internship (6) 3. PHYS4999 Physics project (12)
14. Decision Analytics 15. Risk Management 16. Statistics	1. STAT3799 Directed studies in statistics (6) 2. STAT4710 Capstone experience for statistics undergraduates (6) 3. STAT4766 Statistics internship (6) 4. STAT4799 Statistics project (12)

SECTION III

Credit Unit Statement of

BSc Degree Curriculum

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SECTION III Credit Unit Statement of the BSc Degree Curriculum (4-year)

1. General guideline for contact hours requirement in the BSc Degree Curriculum

(a) A 6-credit course has around 120-180 total study hours, including contact hours, study time, assignment and assessment.
(b) About 30% of the total study hours are actual contact hours in the form of a class, e.g. lecture hours.
(c) A 6-credit course has around 36 to 45 lecture hours.
(d) For lecture-based courses, normally there will be tutorial/discussion sessions.
(e) For courses employing a non-lecture or lab-based approach, e.g. field camp, IT-based or project-based courses, students are expected to devote about 120-180 hours for a 6-credit course and 240-360 hours for a 12-credit course.

2. Credit Unit Statement of the BSc Degree Curriculum

The BSc degree curriculum consists of six major types of courses based on the learning activities. The majority of courses in the programmes are 6 credits. Examples of the contact hours requirements for the six categories of courses are described as follows.

(a) Lecture-based courses (6 credits)
Contact hours for 6-credit course: 36 hours of lectures and 12 hours of tutorial/discussion
These courses are taught predominantly by lectures and tutorials. Assessment is by a combination of examination (0-80%) and continuous assessment (20-100%). Continuous assessment tasks include written assignments (totaling no more than 8,000 words) such as essays and project reports, and oral presentations. Details of the assessment tasks can be found in the description of individual courses.

(b) Lecture with laboratory component courses (6 credits)
Contact hours for 6-credit course: 24 hours of lectures, 24 hours of laboratory and 6 hours of tutorial
These courses are taught by a combination of lectures and laboratory/practical sessions. Assessment is by a combination of examination (0-70%) and continuous assessment (30-100%). Continuous assessment tasks include written assignments (totaling no more than 8,000 words) such as essays, laboratory reports, and project reports, and oral presentations. Details of the assessment tasks can be found in the description of individual courses.

(c) Laboratory and Workshop courses (6 credits)
Contact hours: 48 hours of laboratory or workshop and 12 hours of tutorial
These courses aim at enriching the student's research skills and encourage group work through hands-on activities in which science research is introduced. Students are expected to spend an additional 100 hours on self-study, preparation work for the laboratory, and writing reports. Continuous assessment tasks (100%) include written assignments (totaling no more than 8,000 words) such as laboratory report for each experiment (normally no more than 10 experiments) and essays. Details of the assessment tasks can be found in the description of individual courses.

(d) Project-based courses (6 and 12 credits)
These courses aim at providing students with an opportunity to pursue their own research interest under the supervision of a teacher. The teacher normally meets with the student weekly to discuss project progress. Assessment task is normally through research reports or a dissertation (totaling no more than 10,000 words for a 6-credit course and 20,000 words for a 12-credit course). Oral presentation will form part of the assessment. Details of the assessment tasks can be found in the description of individual courses.

(e) Field camps (6 credits)
Contact hours: at least 72 hours in the field
These courses aim at giving practical experience in a variety of contexts. Fieldwork may be conducted locally or overseas during reading week or summer. Fieldwork courses have a small number of lecture hours but are predominately practical in nature. Assessment tasks (100%) normally include the following outputs (totaling no more than 8,000 words): field assignments and reports (normally no more than 10 field assignments). Details of the assessment tasks can be found in the description of individual courses.

(f) Internship (6 credits)
Students have to undertake at least 160 hours of internship work
Internships aim to offer students the opportunity to gain work experience related to their major of study. The teacher meets with the student regularly to discuss work progress. Students have to undertake at least 160 hours of internship work arranged formally. Assessment tasks (100%) normally include the following outputs: a written report of no more than 2000 words and feedback from the internship supervisor and an oral presentation on students' internship experience. Details of the assessment tasks can be found in the description of individual courses.

3. The types of courses in the 16 Science Majors and 16 Science Minors are as follows:

Majors/Minors	**Type of Courses**					
	Lecture-based	Lecture with laboratory component	Laboratory & Workshop	Project-based	Field camps	Internship
Actuarial Studies (Minor)	✓	✓	✓	✓		✓
Astronomy (Major & Minor)	✓	✓	✓	✓		✓
Biochemistry (Major & Minor)	✓	✓	✓	✓		✓
Biological Sciences (Major)	✓	✓	✓	✓		✓
Chemistry (Major & Minor)	✓	✓	✓	✓		✓
Computational & Financial Mathematics (Minor)	✓	✓	✓	✓		✓
Decision Analytics (Major)	✓	✓	✓	✓		✓
Earth Sciences (Minor)	✓	✓	✓	✓	✓	✓
Earth System Science (Major)	✓	✓	✓	✓	✓	✓
Ecology & Biodiversity (Major & Minor)	✓	✓	✓	✓	✓	✓
Environmental Science (Major & Minor)	✓	✓	✓	✓	✓	✓
Food & Nutritional Science (Major & Minor)	✓	✓	✓	✓		✓
Geology (Major)	✓	✓	✓	✓	✓	✓
Marine Biology (Minor)	✓	✓	✓	✓	✓	✓
Mathematics (Major & Minor)	✓	✓	✓	✓		✓
Mathematics / Physics (Major)	✓	✓	✓	✓		✓
Molecular Biology & Biotechnology (Major & Minor)	✓	✓	✓	✓		✓
Physics (Major & Minor)	✓	✓	✓	✓		✓
Plant Science (Minor)	✓	✓	✓	✓		✓
Risk Management (Major & Minor)	✓	✓	✓	✓		✓
Statistics (Major & Minor)	✓	✓	✓	✓		✓

The above different categories of courses follow the unified Credit Unit Statement of the BSc curriculum.

SECTION IV

Equivalency of HKDSE and other qualifications

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SECTION IV Equivalency of HKDSE and other qualifications

Table of Equivalence between HKDSE and Other Qualifications

HKDSE	Grade	Equivalent Qualification to HKDSE				
		IB	GCE	SATII	AP	Gao Kao (高考)
Biology	3 or above	Biology (SL/HL)	Biology (AL)	Biology	Biology	Equivalent to fulfillment of all HKDSE requirements
Chemistry	3 or above	Chemistry (SL/HL)	Chemistry (AL)	Chemistry	Chemistry	
Physics	3 or above	Physics (SL/HL)	Physics (AL)	Physics	Physics B or C	
Mathematics	2 or above	Mathematics (SL)/Mathematical Studies (SL)	Mathematics (AL)	Mathematics Level 1 or 2		
Mathematics + (M1 or M2)	2 or above	Mathematics (HL)/Mathematical Studies (HL)	Pure Mathematics (AL) Further Mathematics (AL)		Calculus AB or BC	

Note:
HL: Higher Level
SL: Standard Level
AL: Advanced Level

Remarks:

For science students admitted through non-JUPAS scheme, the equivalent subject qualification(s) to HKDSE, if possessed, can be identified by the SIS for on-line course selection.

For other non-science students admitted through non-JUPAS scheme, they are still required to obtain the written approval from the Course Selection Adviser of the course offering department even they have possessed the equivalent HKDSE subject qualification(s) to meet the course prerequisite requirement. Once approval is given, they need to forward it to their home faculties to add the course on-line.

SECTION V

Science Majors on offer in 2015-16

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SECTION V Science Majors on offer in 2015/16

Majors offered by Science Faculty

Majors (16)

Astronomy
Biochemistry
Biological Sciences
Chemistry
Decision Analytics
Earth System Science
Ecology & Biodiversity
Environmental Science
Food & Nutritional Science
Geology
Mathematics
Mathematics/Physics
Molecular Biology & Biotechnology
Physics
Risk Management
Statistics

Major Title	Major in Astronomy
Offered to students admitted to Year 1 in	**2015**

Objectives:
The 21st century is the golden age for astronomy as space-based telescopes are being used to explore the Universe in all parts of the electromagnetic spectrum, including X-ray, ultraviolet, and infrared. The Major in Astronomy is intended for the students who would like to acquire a solid foundation on the subject. A large selection of elective courses is provided for students to pursue their interested specialization in the subject, including observational astronomy, planetary science, stellar physics, and interstellar medium. Students will attain professional knowledge in astronomy, research experience and the training of analytical thinking and quantitative reasoning during their studies. In addition to preparing students for postgraduate studies as professional astronomers, astronomy training can lead to local careers in museums, weather services, and the education sectors. Beyond Hong Kong, astronomy graduates have challenging careers in aerospace, communications, energy, and computer industries, as well as in astronomical observatories and space research centers.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and frequent opportunities in field activities in the curriculum)

PLO 3 : analyze astrophysical problems qualitatively and quantitatively, and recognize moral and ethical issues related to the discipline (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Minor in Astronomy

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
EASC2408	Planetary geology (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)

Disciplinary Electives (24 credits)

At least 12 credits selected from courses in List A:

List A

PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Plus at least 12 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List B and those courses not selected to fulfill the requirements in List A and the capstone requirement.

List B

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4654	General relativity (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)

PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Astronomy
Offered to students admitted to Year 1 in	**2014**

Objectives:
The 21st century is the golden age for astronomy as space-based telescopes are being used to explore the Universe in all parts of the electromagnetic spectrum, including X-ray, ultraviolet, and infrared. The Major in Astronomy is intended for the students who would like to acquire a solid foundation on the subject. A large selection of elective courses is provided for students to pursue their interested specialization in the subject, including observational astronomy, planetary science, stellar physics, and interstellar medium. Students will attain professional knowledge in astronomy, research experience and the training of analytical thinking and quantitative reasoning during their studies. In addition to preparing students for postgraduate studies as professional astronomers, astronomy training can lead to local careers in museums, weather services, and the education sectors. Beyond Hong Kong, astronomy graduates have challenging careers in aerospace, communications, energy, and computer industries, as well as in astronomical observatories and space research centers.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and frequent opportunities in field activities in the curriculum)

PLO 3 : analyze astrophysical problems qualitatively and quantitatively, and recognize moral and ethical issues related to the discipline (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Minor in Astronomy

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
EASC2408	Planetary geology (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)

Disciplinary Electives (24 credits)

At least 12 credits selected from courses in List A:

List A

PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Plus at least 12 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List B and those courses not selected to fulfill the requirements in List A and the capstone requirement.

List B

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4654	General relativity (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)

PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Astronomy
Offered to students admitted to Year 1 in	**2013**

Objectives:
The 21st century is the golden age for astronomy as space-based telescopes are being used to explore the Universe in all parts of the electromagnetic spectrum, including X-ray, ultraviolet, and infrared. The Major in Astronomy is intended for the students who would like to acquire a solid foundation on the subject. A large selection of elective courses is provided for students to pursue their interested specialization in the subject, including observational astronomy, planetary science, stellar physics, and interstellar medium. Students will attain professional knowledge in astronomy, research experience and the training of analytical thinking and quantitative reasoning during their studies. In addition to preparing students for postgraduate studies as professional astronomers, astronomy training can lead to local careers in museums, weather services, and the education sectors. Beyond Hong Kong, astronomy graduates have challenging careers in aerospace, communications, energy, and computer industries, as well as in astronomical observatories and space research centers.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and frequent opportunities in field activities in the curriculum)

PLO 3 : analyze astrophysical problems qualitatively and quantitatively, and recognize moral and ethical issues related to the discipline (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Minor in Astronomy

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
EASC2408	Planetary geology (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)

Disciplinary Electives (24 credits)

At least 12 credits selected from courses in List A:

List A

PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Plus at least 12 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List B and those courses not selected to fulfill the requirements in List A and the capstone requirement.

List B

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4654	General relativity (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)

PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Astronomy
Offered to students admitted to Year 1 in	**2012**

Objectives:
The 21st century is the golden age for astronomy as space-based telescopes are being used to explore the Universe in all parts of the electromagnetic spectrum, including X-ray, ultraviolet, and infrared. The Major in Astronomy is intended for the students who would like to acquire a solid foundation on the subject. A large selection of elective courses is provided for students to pursue their interested specialization in the subject, including observational astronomy, planetary science, stellar physics, and interstellar medium. Students will attain professional knowledge in astronomy, research experience and the training of analytical thinking and quantitative reasoning during their studies. In addition to preparing students for postgraduate studies as professional astronomers, astronomy training can lead to local careers in museums, weather services, and the education sectors. Beyond Hong Kong, astronomy graduates have challenging careers in aerospace, communications, energy, and computer industries, as well as in astronomical observatories and space research centers.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and frequent opportunities in field activities in the curriculum)

PLO 3 : analyze astrophysical problems qualitatively and quantitatively, and recognize moral and ethical issues related to the discipline (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Minor in Astronomy

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
EASC2408	Planetary geology (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)

Disciplinary Electives (24 credits)

At least 12 credits selected from courses in List A:

List A

PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Plus at least 12 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List B and those courses not selected to fulfill the requirements in List A and the capstone requirement.

List B

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4654	General relativity (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)

PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biochemistry
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Biochemistry aims to provide students with both basic and advanced knowledge in contemporary biochemistry and molecular biology. Core courses in the curriculum emphasize equipping students with a general understanding of the fundamental ideas, principles and theories of biochemistry with particular focus on the relevance of biochemistry, molecular biology and genomics to biology, human health and disease. Elective courses extend this core knowledge to provide students with specialized insight into both basic and applied scientific endeavour in biochemistry, bioinformatics, molecular biology and molecular genetics. Throughout the curriculum there is an emphasis on experiential learning through laboratory practicals, problem-solving exercises, group-based learning, industrial experience, overseas exchange and research-based projects. These experiences are designed to develop students' ability to read and interpret scientific data, to integrate knowledge with wider scientific theory, and to improve logical thinking and communication skills. The ultimate goal is to provide a comprehensive degree-level biochemistry education that equips students with the critical thinking, communication and analytical skills essential for them to play a leading role in society in the future.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the principles of biomolecular structure, metabolism, molecular interactions, molecular processes and their regulation, genetics and systems biology critical to contemporary biochemistry and molecular biology (by means of coursework and experiential learning)

PLO 2 : apply biochemical, bioinformatics and molecular genetics technologies for new observations, measurements and analyses; and to design experiments that bring discovery and insight into the unknown (by means of laboratory-based and research project-based learning)

PLO 3 : interpret and communicate scientific data and literature using appropriate scientific language (by means of literature-based coursework and debate)

PLO 4 : work effectively as a team and synergize with their colleagues in a supportive manner (by means of group-based learning and by group-based problem solving)

PLO 5 : recognize the interconnections of biochemistry with other disciplines in science, medicine and engineering, humanities and ethics, which are relevant for diverse working environment in the society (by means of multidisciplinary-based research projects, internship and debate)

Impermissible Combination:
Minor in Biochemistry

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (24 credits)

CHEM1042	General chemistry I (6)	
CHEM1043	General chemistry II (6)	
BIOC2600	Basic biochemistry (6)	
CHEM2441	Organic chemistry I (6)	

Disciplinary Electives (6 credits)

BIOC1600	Perspectives in biochemistry (6)	Take either BIOC1600 or BIOL1110 to fulfill this 6 credits requirement, but not both.

BIOL1110	From molecules to cells (6)	Take either BIOC1600 or BIOL1110 to fulfill this 6 credits requirement, but not both.

2. Advanced level courses (48 credits)

Disciplinary Core Courses (30 credits)

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOL3401	Molecular biology (6)
BIOC4610	Advanced biochemistry (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3408	Genetics (6)
CHEM3441	Organic chemistry II (6)
BIOC4612	Molecular biology of the gene (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4145	Medicinal chemistry (6)
CHEM4444	Chemical biology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOC3999	Directed studies in biochemistry (6)
BIOC4966	Biochemistry internship (6)
BIOC4999	Biochemistry project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits

above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biochemistry
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Biochemistry aims to provide students with both basic and advanced knowledge in contemporary biochemistry and molecular biology. Core courses in the curriculum emphasize equipping students with a general understanding of the fundamental ideas, principles and theories of biochemistry with particular focus on the relevance of biochemistry, molecular biology and genomics to biology, human health and disease. Elective courses extend this core knowledge to provide students with specialized insight into both basic and applied scientific endeavour in biochemistry, bioinformatics, molecular biology and molecular genetics. Throughout the curriculum there is an emphasis on experiential learning through laboratory practicals, problem-solving exercises, group-based learning, industrial experience, overseas exchange and research-based projects. These experiences are designed to develop students' ability to read and interpret scientific data, to integrate knowledge with wider scientific theory, and to improve logical thinking and communication skills. The ultimate goal is to provide a comprehensive degree-level biochemistry education that equips students with the critical thinking, communication and analytical skills essential for them to play a leading role in society in the future.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the principles of biomolecular structure, metabolism, molecular interactions, molecular processes and their regulation, genetics and systems biology critical to contemporary biochemistry and molecular biology (by means of coursework and experiential learning)

PLO 2 : apply biochemical, bioinformatics and molecular genetics technologies for new observations, measurements and analyses; and to design experiments that bring discovery and insight into the unknown (by means of laboratory-based and research project-based learning)

PLO 3 : interpret and communicate scientific data and literature using appropriate scientific language (by means of literature-based coursework and debate)

PLO 4 : work effectively as a team and synergize with their colleagues in a supportive manner (by means of group-based learning and by group-based problem solving)

PLO 5 : recognize the interconnections of biochemistry with other disciplines in science, medicine and engineering, humanities and ethics, which are relevant for diverse working environment in the society (by means of multidisciplinary-based research projects, internship and debate)

Impermissible Combination:
Minor in Biochemistry

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (30 credits)

BIOC1600	Perspectives in biochemistry (6)	
BIOL1110	From molecules to cells (6)	
CHEM1042	General chemistry I (6)	
BIOC2600	Basic biochemistry (6)	
CHEM2441	Organic chemistry I (6)	

Disciplinary Electives (6 credits)

CHEM1043	General chemistry II (6)	Take either CHEM1043 or CHEM2541 to fulfill this 6

		cerdits requirement, but not both.
CHEM2541	Introductory physical chemistry (6)	Take either CHEM1043 or CHEM2541 to fulfill this 6 cerdits requirement, but not both.

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOL3401	Molecular biology (6)
BIOC4610	Advanced biochemistry (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3408	Genetics (6)
CHEM3441	Organic chemistry II (6)
BIOC4612	Molecular biology of the gene (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4145	Medicinal chemistry (6)
CHEM4444	Chemical biology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOC3999	Directed studies in biochemistry (6)
BIOC4966	Biochemistry internship (6)
BIOC4999	Biochemistry project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biochemistry
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Biochemistry aims to provide students with both basic and advanced knowledge in contemporary biochemistry and molecular biology. Core courses in the curriculum emphasize equipping students with a general understanding of the fundamental ideas, principles and theories of biochemistry with particular focus on the relevance of biochemistry, molecular biology and genomics to biology, human health and disease. Elective courses extend this core knowledge to provide students with specialized insight into both basic and applied scientific endeavour in biochemistry, bioinformatics, molecular biology and molecular genetics. Throughout the curriculum there is an emphasis on experiential learning through laboratory practicals, problem-solving exercises, group-based learning, industrial experience, overseas exchange and research-based projects. These experiences are designed to develop students' ability to read and interpret scientific data, to integrate knowledge with wider scientific theory, and to improve logical thinking and communication skills. The ultimate goal is to provide a comprehensive degree-level biochemistry education that equips students with the critical thinking, communication and analytical skills essential for them to play a leading role in society in the future.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the principles of biomolecular structure, metabolism, molecular interactions, molecular processes and their regulation, genetics and systems biology critical to contemporary biochemistry and molecular biology (by means of coursework and experiential learning)

PLO 2 : apply biochemical, bioinformatics and molecular genetics technologies for new observations, measurements and analyses; and to design experiments that bring discovery and insight into the unknown (by means of laboratory-based and research project-based learning)

PLO 3 : interpret and communicate scientific data and literature using appropriate scientific language (by means of literature-based coursework and debate)

PLO 4 : work effectively as a team and synergize with their colleagues in a supportive manner (by means of group-based learning and by group-based problem solving)

PLO 5 : recognize the interconnections of biochemistry with other disciplines in science, medicine and engineering, humanities and ethics, which are relevant for diverse working environment in the society (by means of multidisciplinary-based research projects, internship and debate)

Impermissible Combination:
Minor in Biochemistry

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (30 credits)

BIOC1600	Perspectives in biochemistry (6)	
BIOL1110	From molecules to cells (6)	
CHEM1042	General chemistry I (6)	
BIOC2600	Basic biochemistry (6)	
CHEM2441	Organic chemistry I (6)	

Disciplinary Electives (6 credits)

CHEM1043	General chemistry II (6)	Take either CHEM1043 or CHEM2541 to fulfill this 6

		cerdits requirement, but not both.
CHEM2541	Introductory physical chemistry (6)	Take either CHEM1043 or CHEM2541 to fulfill this 6 cerdits requirement, but not both.

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOL3401	Molecular biology (6)
BIOC4610	Advanced biochemistry (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3408	Genetics (6)
CHEM3441	Organic chemistry II (6)
BIOC4612	Molecular biology of the gene (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4145	Medicinal chemistry (6)
CHEM4444	Chemical biology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOC3999	Directed studies in biochemistry (6)
BIOC4966	Biochemistry internship (6)
BIOC4999	Biochemistry project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biochemistry
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Biochemistry aims to provide students with both basic and advanced knowledge in contemporary biochemistry and molecular biology. Core courses in the curriculum emphasize equipping students with a general understanding of the fundamental ideas, principles and theories of biochemistry with particular focus on the relevance of biochemistry, molecular biology and genomics to biology, human health and disease. Elective courses extend this core knowledge to provide students with specialized insight into both basic and applied scientific endeavour in biochemistry, bioinformatics, molecular biology and molecular genetics. Throughout the curriculum there is an emphasis on experiential learning through laboratory practicals, problem-solving exercises, group-based learning, industrial experience, overseas exchange and research-based projects. These experiences are designed to develop students' ability to read and interpret scientific data, to integrate knowledge with wider scientific theory, and to improve logical thinking and communication skills. The ultimate goal is to provide a comprehensive degree-level biochemistry education that equips students with the critical thinking, communication and analytical skills essential for them to play a leading role in society in the future.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the principles of biomolecular structure, metabolism, molecular interactions, molecular processes and their regulation, genetics and systems biology critical to contemporary biochemistry and molecular biology (by means of coursework and experiential learning)

PLO 2 : apply biochemical, bioinformatics and molecular genetics technologies for new observations, measurements and analyses; and to design experiments that bring discovery and insight into the unknown (by means of laboratory-based and research project-based learning)

PLO 3 : interpret and communicate scientific data and literature using appropriate scientific language (by means of literature-based coursework and debate)

PLO 4 : work effectively as a team and synergize with their colleagues in a supportive manner (by means of group-based learning and by group-based problem solving)

PLO 5 : recognize the interconnections of biochemistry with other disciplines in science, medicine and engineering, humanities and ethics, which are relevant for diverse working environment in the society (by means of multidisciplinary-based research projects, internship and debate)

Impermissible Combination:
Minor in Biochemistry

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (30 credits)

BIOC1600	Perspectives in biochemistry (6)	
BIOL1110	From molecules to cells (6)	
CHEM1042	General chemistry I (6)	
BIOC2600	Basic biochemistry (6)	
CHEM2441	Organic chemistry I (6)	

Disciplinary Electives (6 credits)

CHEM1043	General chemistry II (6)	Take either CHEM1043 or CHEM2541 to fulfill this 6

		cerdits requirement, but not both.
CHEM2541	Introductory physical chemistry (6)	Take either CHEM1043 or CHEM2541 to fulfill this 6 cerdits requirement, but not both.

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOL3401	Molecular biology (6)
BIOC4610	Advanced biochemistry (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3408	Genetics (6)
CHEM3441	Organic chemistry II (6)
BIOC4612	Molecular biology of the gene (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4145	Medicinal chemistry (6)
CHEM4444	Chemical biology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOC3999	Directed studies in biochemistry (6)
BIOC4966	Biochemistry internship (6)
BIOC4999	Biochemistry project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biological Sciences
Offered to students admitted to Year 1 in	**2015**

Objectives:
This Major is designed for students seeking a broad-based training in modern biology. Students are guided in an inquiry-driven learning environment to appreciate the major biological systems at different levels of biological organization. Teaching emphasizes both core concepts and applied aspects in biological sciences. The programme is highly flexible as students can select courses according to their own interests from a wide spectrum of elective courses. At the advanced level, students are further allowed to specialize in areas such as microbiology, genetics & cytology, physiology & homeostasis, or diversity of life & environmental biology and undertake experiential learning activities. The diverse learning experience exposes students to problem-based learning, and an exciting array of laboratory and field techniques. Students will also be able to acquire valuable transferable skills in analysis, organization and communication. The Biological Sciences Major applies modern scientific inquiry to prepare graduates for employment as professionals in a variety of careers or for postgraduate study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand concepts underpinning advances in cell biology and genetics, physiology and systems biology, diversity of life and environmental biology, and applied biology (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : evaluate diverse threads of enquiry in science, and identify the value of datasets and written output (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : interpret scientific data from a range of sources and explain trends observed (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : demonstrate independent and critical thinking and appreciate moral and ethical issues related to biological sciences (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : communicate in a professional capacity with educators, business, media and the scientific community (by means of coursework, tutorial classes, project-based and presentation opportunities in the curriculum)

PLO 6 : be prepared to enter employment as professional scientists, educators and managers (by means of coursework, tutorial classes, laboratory-based, project-based and capstone learning in the curriculum)

Impermissible Combination:
NIL

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1111	Introductory microbiology (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (at least 42 credits)

Disciplinary Electives (42 credits)

Students must select at least 1 course from each of the following area A, B, C & D:

(A) Genetics and cell biology

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3408	Genetics (6)

(B) Physiology and systems biology

BIOL3105	Animal physiology and environmental adaptation (6)
BIOL3107	Plant physiology (6)
BIOL3108	Microbial physiology (6)
BIOL3205	Human physiology (6)

(C) Diversity of life and environmental biology

BIOL3109	Environmental microbiology (6)
BIOL3110	Environmental toxicology (6)
BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)

(D) Applied biology

BIOL3303	Conservation ecology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4301	Fish and fisheries (6)
BIOL4401	Medical microbiology and applied immunology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3994	Directed studies in biological sciences (6)
BIOL4964	Biological sciences internship (6)
BIOL4994	Biological sciences project (12)

Notes:

1. BIOL1111 Introductory Microbiology is not offered from 2015-16. Students should take BIOL2220 Principles of Biochemistry as a replacement.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits

above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biological Sciences
Offered to students admitted to Year 1 in	**2014**

Objectives:
This Major is designed for students seeking a broad-based training in modern biology. Students are guided in an inquiry-driven learning environment to appreciate the major biological systems at different levels of biological organization. Teaching emphasizes both core concepts and applied aspects in biological sciences. The programme is highly flexible as students can select courses according to their own interests from a wide spectrum of elective courses. At the advanced level, students are further allowed to specialize in areas such as microbiology, genetics & cytology, physiology & homeostasis, or diversity of life & environmental biology and undertake experiential learning activities. The diverse learning experience exposes students to problem-based learning, and an exciting array of laboratory and field techniques. Students will also be able to acquire valuable transferable skills in analysis, organization and communication. The Biological Sciences Major applies modern scientific inquiry to prepare graduates for employment as professionals in a variety of careers or for postgraduate study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand concepts underpinning advances in cell biology and genetics, physiology and systems biology, diversity of life and environmental biology, and applied biology (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : evaluate diverse threads of enquiry in science, and identify the value of datasets and written output (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : interpret scientific data from a range of sources and explain trends observed (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : demonstrate independent and critical thinking and appreciate moral and ethical issues related to biological sciences (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : communicate in a professional capacity with educators, business, media and the scientific community (by means of coursework, tutorial classes, project-based and presentation opportunities in the curriculum)

PLO 6 : be prepared to enter employment as professional scientists, educators and managers (by means of coursework, tutorial classes, laboratory-based, project-based and capstone learning in the curriculum)

Impermissible Combination:
NIL

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1111	Introductory microbiology (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (at least 42 credits)

Disciplinary Electives (42 credits)

Students must select at least 1 course from each of the following area A, B, C & D:

(A) Genetics and cell biology

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3408	Genetics (6)

(B) Physiology and systems biology

BIOL3105	Animal physiology and environmental adaptation (6)
BIOL3107	Plant physiology (6)
BIOL3108	Microbial physiology (6)
BIOL3205	Human physiology (6)

(C) Diversity of life and environmental biology

BIOL3109	Environmental microbiology (6)
BIOL3110	Environmental toxicology (6)
BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)

(D) Applied biology

BIOL3303	Conservation ecology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4301	Fish and fisheries (6)
BIOL4401	Medical microbiology and applied immunology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3994	Directed studies in biological sciences (6)
BIOL4964	Biological sciences internship (6)
BIOL4994	Biological sciences project (12)

Notes:
1. BIOL1111 Introductory Microbiology is not offered from 2015-16. Students should take BIOL2220 Principles of Biochemistry as a replacement.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits

above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biological Sciences
Offered to students admitted to Year 1 in	**2013**

Objectives:
This Major is designed for students seeking a broad-based training in modern biology. Students are guided in an inquiry-driven learning environment to appreciate the major biological systems at different levels of biological organization. Teaching emphasizes both core concepts and applied aspects in biological sciences. The programme is highly flexible as students can select courses according to their own interests from a wide spectrum of elective courses. At the advanced level, students are further allowed to specialize in areas such as microbiology, genetics & cytology, physiology & homeostasis, or diversity of life & environmental biology and undertake experiential learning activities. The diverse learning experience exposes students to problem-based learning, and an exciting array of laboratory and field techniques. Students will also be able to acquire valuable transferable skills in analysis, organization and communication. The Biological Sciences Major applies modern scientific inquiry to prepare graduates for employment as professionals in a variety of careers or for postgraduate study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand concepts underpinning advances in cell biology and genetics, physiology and systems biology, diversity of life and environmental biology, and applied biology (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : evaluate diverse threads of enquiry in science, and identify the value of datasets and written output (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : interpret scientific data from a range of sources and explain trends observed (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : demonstrate independent and critical thinking and appreciate moral and ethical issues related to biological sciences (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : communicate in a professional capacity with educators, business, media and the scientific community (by means of coursework, tutorial classes, project-based and presentation opportunities in the curriculum)

PLO 6 : be prepared to enter employment as professional scientists, educators and managers (by means of coursework, tutorial classes, laboratory-based, project-based and capstone learning in the curriculum)

Impermissible Combination:
NIL

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1111	Introductory microbiology (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (at least 42 credits)

Disciplinary Electives (42 credits)

Students must select at least 1 course from each of the following area A, B, C & D:

(A) Genetics and cell biology

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3408	Genetics (6)

(B) Physiology and systems biology

BIOL3105	Animal physiology and environmental adaptation (6)
BIOL3107	Plant physiology (6)
BIOL3108	Microbial physiology (6)
BIOL3205	Human physiology (6)

(C) Diversity of life and environmental biology

BIOL3109	Environmental microbiology (6)
BIOL3110	Environmental toxicology (6)
BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)

(D) Applied biology

BIOL3303	Conservation ecology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4301	Fish and fisheries (6)
BIOL4401	Medical microbiology and applied immunology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3994	Directed studies in biological sciences (6)
BIOL4964	Biological sciences internship (6)
BIOL4994	Biological sciences project (12)

Notes:

1. BIOL1111 Introductory Microbiology is not offered from 2015-16. Students should take BIOL2220 Principles of Biochemistry as a replacement.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits

above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Biological Sciences
Offered to students admitted to Year 1 in	**2012**

Objectives:
This Major is designed for students seeking a broad-based training in modern biology. Students are guided in an inquiry-driven learning environment to appreciate the major biological systems at different levels of biological organization. Teaching emphasizes both core concepts and applied aspects in biological sciences. The programme is highly flexible as students can select courses according to their own interests from a wide spectrum of elective courses. At the advanced level, students are further allowed to specialize in areas such as microbiology, genetics & cytology, physiology & homeostasis, or diversity of life & environmental biology and undertake experiential learning activities. The diverse learning experience exposes students to problem-based learning, and an exciting array of laboratory and field techniques. Students will also be able to acquire valuable transferable skills in analysis, organization and communication. The Biological Sciences Major applies modern scientific inquiry to prepare graduates for employment as professionals in a variety of careers or for postgraduate study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand concepts underpinning advances in cell biology and genetics, physiology and systems biology, diversity of life and environmental biology, and applied biology (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : evaluate diverse threads of enquiry in science, and identify the value of datasets and written output (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : interpret scientific data from a range of sources and explain trends observed (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : demonstrate independent and critical thinking and appreciate moral and ethical issues related to biological sciences (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : communicate in a professional capacity with educators, business, media and the scientific community (by means of coursework, tutorial classes, project-based and presentation opportunities in the curriculum)

PLO 6 : be prepared to enter employment as professional scientists, educators and managers (by means of coursework, tutorial classes, laboratory-based, project-based and capstone learning in the curriculum)

Impermissible Combination:
NIL

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1111	Introductory microbiology (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (at least 42 credits)

Disciplinary Electives (42 credits)

Students must select at least 1 course from each of the following area A, B, C & D:

(A) Genetics and cell biology

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3408	Genetics (6)

(B) Physiology and systems biology

BIOL3105	Animal physiology and environmental adaptation (6)
BIOL3107	Plant physiology (6)
BIOL3108	Microbial physiology (6)
BIOL3205	Human physiology (6)

(C) Diversity of life and environmental biology

BIOL3109	Environmental microbiology (6)
BIOL3110	Environmental toxicology (6)
BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)

(D) Applied biology

BIOL3303	Conservation ecology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4301	Fish and fisheries (6)
BIOL4401	Medical microbiology and applied immunology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3994	Directed studies in biological sciences (6)
BIOL4964	Biological sciences internship (6)
BIOL4994	Biological sciences project (12)

Notes:

1. BIOL1111 Introductory Microbiology is not offered from 2015-16. Students should take BIOL2220 Principles of Biochemistry as a replacement.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits

above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Chemistry
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Chemistry aims to provide students with a solid training in major areas of chemistry. The curriculum includes core courses covering topics in physical, inorganic, organic, and analytical chemistry. A wide selection of elective courses in chemical biology, chemical analysis, computational chemistry, environmental chemistry, industrial chemistry, interfacial science, material, and medicinal chemistry, is also available to provide students with knowledge and training to help them meet the dynamic and ever-changing challenges in science and technology. Graduates of the Chemistry Major programme will be proficient in the principles and experimental skills of chemistry. The programme will also equip students with transferable skills in both theoretical and experimental investigations in sciences that are crucial for their future careers in a knowledge-based economy. It is expected that our graduates will be able to meet local and regional requirements in the industrial, commercial, government or education sectors and will become future leaders of these sectors.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 2 : demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 3 : have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 4 : have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions (by requiring of no less than 100 hours of laboratory classes in the curriculum)

PLO 5 : demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member (by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)

PLO 6 : gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills (by arrangement for student internship opportunities or directed studies of no less than three weeks with chemistry-related companies or research laboratories)

Impermissible Combination:
Minor in Chemistry

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

CHEM1042	General chemistry I (6)
CHEM1043	General chemistry II (6)
CHEM2241	Analytical chemistry I (6)
CHEM2341	Inorganic chemistry I (6)

CHEM2441	Organic chemistry I (6)
CHEM2541	Introductory physical chemistry (6)

2. Advanced level courses (42 credits)

Disciplinary Core Course (30 credits)

CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3341	Inorganic chemistry II (6)
CHEM3441	Organic chemistry II (6)
CHEM3443	Organic chemistry laboratory (6)
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)

Disciplinary Electives (12 credits)

At least 12 credits of any level 4 Chemistry (CHEM4XXX) courses. The current list include courses in List A.

List A

CHEM4142	Symmetry, group theory and applications (6)
CHEM4143	Interfacial science and technology (6)
CHEM4144	Advanced materials (6)
CHEM4145	Medicinal chemistry (6)
CHEM4241	Modern chemical instrumentation and applications (6)
CHEM4242	Analytical chemistry (6)
CHEM4341	Advanced inorganic chemistry (6)
CHEM4342	Organometallic chemistry (6)
CHEM4441	Advanced organic chemistry (6)
CHEM4443	Integrated organic synthesis (6)
CHEM4444	Chemical biology (6)
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)
CHEM4542	Computational chemistry (6)
CHEM4543	Advanced physical chemistry (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

CHEM3999	Directed studies in chemistry (6)
CHEM4910	Chemistry literacy and research (6)
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)
CHEM4966	Chemistry internship (6)
CHEM4999	Chemistry project (12)

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Chemistry
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Chemistry aims to provide students with a solid training in major areas of chemistry. The curriculum includes core courses covering topics in physical, inorganic, organic, and analytical chemistry. A wide selection of elective courses in chemical biology, chemical analysis, computational chemistry, environmental chemistry, industrial chemistry, interfacial science, material, and medicinal chemistry, is also available to provide students with knowledge and training to help them meet the dynamic and ever-changing challenges in science and technology. Graduates of the Chemistry Major programme will be proficient in the principles and experimental skills of chemistry. The programme will also equip students with transferable skills in both theoretical and experimental investigations in sciences that are crucial for their future careers in a knowledge-based economy. It is expected that our graduates will be able to meet local and regional requirements in the industrial, commercial, government or education sectors and will become future leaders of these sectors.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 2 : demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 3 : have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 4 : have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions (by requiring of no less than 100 hours of laboratory classes in the curriculum)

PLO 5 : demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member (by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)

PLO 6 : gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills (by arrangement for student internship opportunities or directed studies of no less than three weeks with chemistry-related companies or research laboratories)

Impermissible Combination:
Minor in Chemistry

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (30 credits)

CHEM1042	General chemistry I (6)	[previous title: General chemistry (6)]
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	

CHEM2541	Introductory physical chemistry (6)	[previous title: Physical chemistry I (6)]

2. Advanced level courses (48 credits)

Disciplinary Core Course (30 credits)

CHEM3146	Principles and applications of spectroscopic and analytical techniques (6)	
CHEM3241	Analytical chemistry II: chemical instrumentation (6)	
CHEM3341	Inorganic chemistry II (6)	
CHEM3441	Organic chemistry II (6)	
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)	[previous title: Physical chemistry II: Introduction to quantum chemistry (6)]

Disciplinary Electives (12 credits)

At least 12 credits selected from the following 18 credits of courses in two different areas in List A:

List A

CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)	
CHEM4341	Advanced inorganic chemistry (6)	
CHEM4441	Advanced organic chemistry (6)	Take either CHEM4443 or CHEM4441 to fulfill this 12 credits requirement, but not both.
CHEM4443	Integrated organic synthesis (6)	Take either CHEM4443 or CHEM4441 to fulfill this 12 credits requirement, but not both.

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level, excluding CHEM3999 Directed studies in chemistry, CHEM4910 Chemistry literacy and research, CHEM4911 Capstone experience for chemistry undergraduates: HKUtopia, CHEM4966 Chemistry internship and CHEM4999 Chemistry project), subject to pre-requisite requirements. The current list inlcude courses in List B and those course not selected to fulfill the requirements in List A.

List B

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3242	Food and water analysis (6)
CHEM3243	Introductory instrumental chemical analysis (6)
CHEM3244	Analytical techniques for pharmacy students (6)
CHEM3342	Bioinorganic chemistry (6)
CHEM3442	Organic chemistry of biomolecules (6)

CHEM3443	Organic chemistry laboratory (6)
CHEM4142	Symmetry, group theory and applications (6)
CHEM4143	Interfacial science and technology (6)
CHEM4144	Advanced materials (6)
CHEM4145	Medicinal chemistry (6)
CHEM4241	Modern chemical instrumentation and applications (6)
CHEM4242	Analytical chemistry (6)
CHEM4342	Organometallic chemistry (6)
CHEM4444	Chemical biology (6)
CHEM4542	Computational chemistry (6)
CHEM4543	Advanced physical chemistry (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

CHEM3999	Directed studies in chemistry (6)
CHEM4910	Chemistry literacy and research (6)
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)
CHEM4966	Chemistry internship (6)
CHEM4999	Chemistry project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Chemistry
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Chemistry aims to provide students with a solid training in major areas of chemistry. The curriculum includes core courses covering topics in physical, inorganic, organic, and analytical chemistry. A wide selection of elective courses in chemical biology, chemical analysis, computational chemistry, environmental chemistry, industrial chemistry, interfacial science, material, and medicinal chemistry, is also available to provide students with knowledge and training to help them meet the dynamic and ever-changing challenges in science and technology. Graduates of the Chemistry Major programme will be proficient in the principles and experimental skills of chemistry. The programme will also equip students with transferable skills in both theoretical and experimental investigations in sciences that are crucial for their future careers in a knowledge-based economy. It is expected that our graduates will be able to meet local and regional requirements in the industrial, commercial, government or education sectors and will become future leaders of these sectors.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 2 : demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 3 : have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 4 : have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions (by requiring of no less than 100 hours of laboratory classes in the curriculum)

PLO 5 : demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member (by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)

PLO 6 : gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills (by arrangement for student internship opportunities or directed studies of no less than three weeks with chemistry-related companies or research laboratories)

Impermissible Combination:
Minor in Chemistry

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (30 credits)

CHEM1042	General chemistry I (6)	[previous title: General chemistry (6)]
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	

CHEM2541	Introductory physical chemistry (6)	[previous title: Physical chemistry I (6)]

2. Advanced level courses (48 credits)

Disciplinary Core Courses (30 credits)

CHEM3146	Principles and applications of spectroscopic and analytical techniques (6)	
CHEM3241	Analytical chemistry II: chemical instrumentation (6)	
CHEM3341	Inorganic chemistry II (6)	
CHEM3441	Organic chemistry II (6)	
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)	[previous title: Physical chemistry II: Introduction to quantum chemistry (6)]

Disciplinary Electives (12 credits)

At least 12 credits selected from the following 18 credits of courses in two different areas in List A:

List A

CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)	Take either CHEM3542 or CHEM4541 to fulfill this 12 credits requirement, but not both.
CHEM4341	Advanced inorganic chemistry (6)	
CHEM4441	Advanced organic chemistry (6)	Take either CHEM4443 or CHEM4441 to fulfill this 12 credits requirement, but not both.
CHEM4443	Integrated organic synthesis (6)	Take either CHEM4443 or CHEM4441 to fulfill this 12 credits requirement, but not both.
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)	Take either CHEM3542 or CHEM4541 to fulfill this 12 credits requirement, but not both.

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level, excluding CHEM3999 Directed studies in chemistry, CHEM4910 Chemistry literacy and research, CHEM4911 Capstone experience for chemistry undergraduates: HKUtopia, CHEM4966 Chemistry internship and CHEM4999 Chemistry project), subject to pre-requisite requirements. The current list inlcude courses in List B and those courses not selected to fulfill the requirements in List A.

List B

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3242	Food and water analysis (6)
CHEM3243	Introductory instrumental chemical analysis (6)
CHEM3244	Analytical techniques for pharmacy students (6)

CHEM3342	Bioinorganic chemistry (6)
CHEM3442	Organic chemistry of biomolecules (6)
CHEM3443	Organic chemistry laboratory (6)
CHEM4142	Symmetry, group theory and applications (6)
CHEM4143	Interfacial science and technology (6)
CHEM4144	Advanced materials (6)
CHEM4145	Medicinal chemistry (6)
CHEM4241	Modern chemical instrumentation and applications (6)
CHEM4242	Analytical chemistry (6)
CHEM4342	Organometallic chemistry (6)
CHEM4444	Chemical biology (6)
CHEM4542	Computational chemistry (6)
CHEM4543	Advanced physical chemistry (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

CHEM3999	Directed studies in chemistry (6)
CHEM4910	Chemistry literacy and research (6)
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)
CHEM4966	Chemistry internship (6)
CHEM4999	Chemistry project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Chemistry
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Chemistry aims to provide students with a solid training in major areas of chemistry. The curriculum includes core courses covering topics in physical, inorganic, organic, and analytical chemistry. A wide selection of elective courses in chemical biology, chemical analysis, computational chemistry, environmental chemistry, industrial chemistry, interfacial science, material, and medicinal chemistry, is also available to provide students with knowledge and training to help them meet the dynamic and ever-changing challenges in science and technology. Graduates of the Chemistry Major programme will be proficient in the principles and experimental skills of chemistry. The programme will also equip students with transferable skills in both theoretical and experimental investigations in sciences that are crucial for their future careers in a knowledge-based economy. It is expected that our graduates will be able to meet local and regional requirements in the industrial, commercial, government or education sectors and will become future leaders of these sectors.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 2 : demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 3 : have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world (by means of coursework, laboratory-based and/or research-based learning in the curriculum)

PLO 4 : have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions (by requiring of no less than 100 hours of laboratory classes in the curriculum)

PLO 5 : demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member (by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)

PLO 6 : gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills (by arrangement for student internship opportunities or directed studies of no less than three weeks with chemistry-related companies or research laboratories)

Impermissible Combination:
Minor in Chemistry

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (30 credits)

CHEM1042	General chemistry I (6)	[previous title: General chemistry (6)]
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	

CHEM2541	Introductory physical chemistry (6)	[previous title: Physical chemistry I (6)]

2. Advanced level courses (48 credits)

Disciplinary Core Courses (30 credits)

CHEM3146	Principles and applications of spectroscopic and analytical techniques (6)	
CHEM3241	Analytical chemistry II: chemical instrumentation (6)	
CHEM3341	Inorganic chemistry II (6)	
CHEM3441	Organic chemistry II (6)	
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)	[previous title: Physical chemistry II: Introduction to quantum chemistry (6)]

Disciplinary Electives (12 credits)

At least 12 credits selected from the following 18 credits of courses in two different areas in List A:

List A

CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)	Take either CHEM3542 or CHEM4541 to fulfill this 12 credits requirement, but not both.
CHEM4341	Advanced inorganic chemistry (6)	
CHEM4441	Advanced organic chemistry (6)	Take either CHEM4443 or CHEM4441 to fulfill this 12 credits requirement, but not both.
CHEM4443	Integrated organic synthesis (6)	Take either CHEM4443 or CHEM4441 to fulfill this 12 credits requirement, but not both.
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)	Take either CHEM3542 or CHEM4541 to fulfill this 12 credits requirement, but not both.

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level, excluding CHEM3999 Directed studies in chemistry, CHEM4910 Chemistry literacy and research, CHEM4911 Capstone experience for chemistry undergraduates: HKUtopia, CHEM4966 Chemistry internship and CHEM4999 Chemistry project), subject to pre-requisite requirements. The current list inlcude courses in List B and those courses not selected to fulfill the requirements in List A.

List B

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3242	Food and water analysis (6)
CHEM3243	Introductory instrumental chemical analysis (6)
CHEM3244	Analytical techniques for pharmacy students (6)

CHEM3342	Bioinorganic chemistry (6)
CHEM3442	Organic chemistry of biomolecules (6)
CHEM3443	Organic chemistry laboratory (6)
CHEM4142	Symmetry, group theory and applications (6)
CHEM4143	Interfacial science and technology (6)
CHEM4144	Advanced materials (6)
CHEM4145	Medicinal chemistry (6)
CHEM4241	Modern chemical instrumentation and applications (6)
CHEM4242	Analytical chemistry (6)
CHEM4342	Organometallic chemistry (6)
CHEM4444	Chemical biology (6)
CHEM4542	Computational chemistry (6)
CHEM4543	Advanced physical chemistry (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

CHEM3999	Directed studies in chemistry (6)
CHEM4910	Chemistry literacy and research (6)
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)
CHEM4966	Chemistry internship (6)
CHEM4999	Chemistry project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fulfill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Decision Analytics
Offered to students admitted to Year 1 in	**2015**

Objectives:
Amidst an upsurge of digital data produced worldwide nowadays, the Major in Decision Analytics aims to equip students with the skills and expertise in leveraging and managing big data in real time, and provide them with solid training in making digitized information a strategic part of critical decision-making and resource allocation with greater clarity and accuracy. Core courses in the curriculum emphasize the fundamental concepts and methodologies of decision analytics which include but not limited to statistical analysis, data mining and data visualization, programming, data structuring, mathematical and statistical modelling and implementation of database systems. Elective courses focus on diverse and applied techniques of decision analytics in multidisciplinary fields.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : apprehend the concepts of decision analytics and its underlying theory in relation to a broad range of related disciplinary academic or professional areas (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : identify and adopt appropriate analytical techniques and tools to extract and classify critical information from structured or unstructured data (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : be proficient with the design and implementation of advanced modelling techniques and database management, and offer effective recommendations for analytic initiatives and solutions (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : evaluate the quality of information from different sources in support of critical decisionmaking, process streamlining and the optimization of resources, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate to people effectively and efficiently with professionalism and accuracy using interactive and dynamic tools to translate technical information and present collaborative and strategic ideas (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in decision analytics and confidence to solve real-life problems through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Computer Science
Minor in Computer Science
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

COMP1117	Computer programming (6)
COMP2119	Introduction to data structures and algorithms (6)
MATH1013	University mathematics II (6)
MATH2014	Multivariable calculus and linear algebra (6)

STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

COMP3278	Introduction to database management systems (6)
MATH3904	Introduction to optimization (6)
STAT3600	Linear statistical analysis (6)
STAT3612	Data mining (6)
STAT4609	Big data analytics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

COMP3250	Design and analysis of algorithms (6)
COMP3270	Artificial intelligence (6)
COMP3323	Advanced database systems (6)
COMP3407	Scientific computing (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3901	Operations research I (6)
STAT3616	Advanced SAS programming (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3622	Data visualization (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:
1. Students may consider taking the following courses if they wish to pursue a more focused study in the following areas:

a. Biomedical Analytics
BIOL4417 'Omics' and systems biology

STAT3607 Statistics in clinical medicine and bio-medical research
STAT3608 Statistical genetics
STAT3620 Modern nonparametric statistics
STAT3621 Statistical data analysis
STAT4602 Multivariate data analysis

b. Financial and Risk Analytics
STAT3616 Advanced SAS programming
STAT3621 Statistical data analysis
STAT4601 Time series analysis
Plus advanced level courses listed for the Major in Risk Management

c. Operational Analytics
COMP3250 Design and analysis of algorithms
MATH3600 Discrete mathematics
MATH3901 Operations research I
MATH3943 Network models in operations research
MATH4902 Operations research II
STAT3606 Business logistics

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Decision Analytics
Offered to students admitted to Year 1 in	**2014**

Objectives:
Amidst an upsurge of digital data produced worldwide nowadays, the Major in Decision Analytics aims to equip students with the skills and expertise in leveraging and managing big data in real time, and provide them with solid training in making digitized information a strategic part of critical decision-making and resource allocation with greater clarity and accuracy. Core courses in the curriculum emphasize the fundamental concepts and methodologies of decision analytics which include but not limited to statistical analysis, data mining and data visualization, programming, data structuring, mathematical and statistical modelling and implementation of database systems. Elective courses focus on diverse and applied techniques of decision analytics in multidisciplinary fields.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : apprehend the concepts of decision analytics and its underlying theory in relation to a broad range of related disciplinary academic or professional areas (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : identify and adopt appropriate analytical techniques and tools to extract and classify critical information from structured or unstructured data (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : be proficient with the design and implementation of advanced modelling techniques and database management, and offer effective recommendations for analytic initiatives and solutions (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : evaluate the quality of information from different sources in support of critical decisionmaking, process streamlining and the optimization of resources, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate to people effectively and efficiently with professionalism and accuracy using interactive and dynamic tools to translate technical information and present collaborative and strategic ideas (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in decision analytics and confidence to solve real-life problems through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Computer Science
Minor in Computer Science
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

COMP1117	Computer programming (6)
COMP2119	Introduction to data structures and algorithms (6)
MATH1013	University mathematics II (6)
MATH2014	Multivariable calculus and linear algebra (6)

STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

COMP3278	Introduction to database management systems (6)
MATH3904	Introduction to optimization (6)
STAT3600	Linear statistical analysis (6)
STAT3612	Data mining (6)
STAT4609	Big data analytics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

COMP3250	Design and analysis of algorithms (6)
COMP3270	Artificial intelligence (6)
COMP3323	Advanced database systems (6)
COMP3407	Scientific computing (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3901	Operations research I (6)
STAT3616	Advanced SAS programming (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3622	Data visualization (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:
1. Students may consider taking the following courses if they wish to pursue a more focused study in the following areas:

a. Biomedical Analytics
BIOL4417 'Omics' and systems biology

STAT3607 Statistics in clinical medicine and bio-medical research
STAT3608 Statistical genetics
STAT3620 Modern nonparametric statistics
STAT3621 Statistical data analysis
STAT4602 Multivariate data analysis

b. Financial and Risk Analytics
STAT3616 Advanced SAS programming
STAT3621 Statistical data analysis
STAT4601 Time series analysis
Plus advanced level courses listed for the Major in Risk Management

c. Operational Analytics
COMP3250 Design and analysis of algorithms
MATH3600 Discrete mathematics
MATH3901 Operations research I
MATH3943 Network models in operations research
MATH4902 Operations research II
STAT3606 Business logistics

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Decision Analytics
Offered to students admitted to Year 1 in	**2013**

Objectives:
Amidst an upsurge of digital data produced worldwide nowadays, the Major in Decision Analytics aims to equip students with the skills and expertise in leveraging and managing big data in real time, and provide them with solid training in making digitized information a strategic part of critical decision-making and resource allocation with greater clarity and accuracy. Core courses in the curriculum emphasize the fundamental concepts and methodologies of decision analytics which include but not limited to statistical analysis, data mining and data visualization, programming, data structuring, mathematical and statistical modelling and implementation of database systems. Elective courses focus on diverse and applied techniques of decision analytics in multidisciplinary fields.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : apprehend the concepts of decision analytics and its underlying theory in relation to a broad range of related disciplinary academic or professional areas (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : identify and adopt appropriate analytical techniques and tools to extract and classify critical information from structured or unstructured data (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : be proficient with the design and implementation of advanced modelling techniques and database management, and offer effective recommendations for analytic initiatives and solutions (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : evaluate the quality of information from different sources in support of critical decisionmaking, process streamlining and the optimization of resources, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate to people effectively and efficiently with professionalism and accuracy using interactive and dynamic tools to translate technical information and present collaborative and strategic ideas (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in decision analytics and confidence to solve real-life problems through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Computer Science
Minor in Computer Science
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

COMP1117	Computer programming (6)
COMP2119	Introduction to data structures and algorithms (6)
MATH1013	University mathematics II (6)
MATH2014	Multivariable calculus and linear algebra (6)

STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

COMP3278	Introduction to database management systems (6)
MATH3904	Introduction to optimization (6)
STAT3600	Linear statistical analysis (6)
STAT3612	Data mining (6)
STAT4609	Big data analytics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

COMP3250	Design and analysis of algorithms (6)
COMP3270	Artificial intelligence (6)
COMP3323	Advanced database systems (6)
COMP3407	Scientific computing (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3901	Operations research I (6)
STAT3616	Advanced SAS programming (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3622	Data visualization (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:
1. Students may consider taking the following courses if they wish to pursue a more focused study in the following areas:

a. Biomedical Analytics
BIOL4417 'Omics' and systems biology

STAT3607 Statistics in clinical medicine and bio-medical research
STAT3608 Statistical genetics
STAT3620 Modern nonparametric statistics
STAT3621 Statistical data analysis
STAT4602 Multivariate data analysis

b. Financial and Risk Analytics
STAT3616 Advanced SAS programming
STAT3621 Statistical data analysis
STAT4601 Time series analysis
Plus advanced level courses listed for the Major in Risk Management

c. Operational Analytics
COMP3250 Design and analysis of algorithms
MATH3600 Discrete mathematics
MATH3901 Operations research I
MATH3943 Network models in operations research
MATH4902 Operations research II
STAT3606 Business logistics

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Decision Analytics
Offered to students admitted to Year 1 in	**2012**

Objectives:
Amidst an upsurge of digital data produced worldwide nowadays, the Major in Decision Analytics aims to equip students with the skills and expertise in leveraging and managing big data in real time, and provide them with solid training in making digitized information a strategic part of critical decision-making and resource allocation with greater clarity and accuracy. Core courses in the curriculum emphasize the fundamental concepts and methodologies of decision analytics which include but not limited to statistical analysis, data mining and data visualization, programming, data structuring, mathematical and statistical modelling and implementation of database systems. Elective courses focus on diverse and applied techniques of decision analytics in multidisciplinary fields.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : apprehend the concepts of decision analytics and its underlying theory in relation to a broad range of related disciplinary academic or professional areas (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : identify and adopt appropriate analytical techniques and tools to extract and classify critical information from structured or unstructured data (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : be proficient with the design and implementation of advanced modelling techniques and database management, and offer effective recommendations for analytic initiatives and solutions (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : evaluate the quality of information from different sources in support of critical decisionmaking, process streamlining and the optimization of resources, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate to people effectively and efficiently with professionalism and accuracy using interactive and dynamic tools to translate technical information and present collaborative and strategic ideas (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in decision analytics and confidence to solve real-life problems through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Computer Science
Minor in Computer Science
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

COMP1117	Computer programming (6)
COMP2119	Introduction to data structures and algorithms (6)
MATH1013	University mathematics II (6)
MATH2014	Multivariable calculus and linear algebra (6)

STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (30 credits)

COMP3278	Introduction to database management systems (6)
MATH3904	Introduction to optimization (6)
STAT3600	Linear statistical analysis (6)
STAT3612	Data mining (6)
STAT4609	Big data analytics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

COMP3250	Design and analysis of algorithms (6)
COMP3270	Artificial intelligence (6)
COMP3323	Advanced database systems (6)
COMP3407	Scientific computing (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3901	Operations research I (6)
STAT3616	Advanced SAS programming (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3622	Data visualization (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:
1. Students may consider taking the following courses if they wish to pursue a more focused study in the following areas:

a. Biomedical Analytics
BIOL4417 'Omics' and systems biology

STAT3607 Statistics in clinical medicine and bio-medical research
STAT3608 Statistical genetics
STAT3620 Modern nonparametric statistics
STAT3621 Statistical data analysis
STAT4602 Multivariate data analysis

b. Financial and Risk Analytics
STAT3616 Advanced SAS programming
STAT3621 Statistical data analysis
STAT4601 Time series analysis
Plus advanced level courses listed for the Major in Risk Management

c. Operational Analytics
COMP3250 Design and analysis of algorithms
MATH3600 Discrete mathematics
MATH3901 Operations research I
MATH3943 Network models in operations research
MATH4902 Operations research II
STAT3606 Business logistics

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Earth System Science
Offered to students admitted to Year 1 in	**2015**

Objectives:
Earth System Science seeks to understand the Earth as an integrated system, including its past, present and future behaviour, from the environments where life evolves on the surface to the interactions between the crust and its fluid envelopes (atmosphere and hydrosphere), with interests extending to the Earth's interior. Core courses in the major focus on understanding the composition, structure and processes of the solid earth, the hydrosphere and the atmosphere, and their interactions. Students will be equipped with knowledge to help manage geological resources and natural hazards. Throughout the curriculum there is consistent emphasis on transferable skills, learning through fieldwork, laboratory studies and research based classes, designed to enhance students' ability to think critically, to communicate effectively and to develop solutions to complex problems. Graduates from the major can pursue further studies in the Earth Sciences and careers in a wide variety of geoscience-related areas including resource management, hazard mitigation, soil and water conservation and teaching.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the key concepts of the Earth System components and processes (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : have acquired the ability to observe, describe, measure and analyze principal phenomena of earth processes and the interactions between different earth components (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : provide expertise to maintain geological environments and prevent severe perturbations due to resource exploitation and water disposal (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : equip with the knowledge and skills to better predict and deal with geological and related hazards such as earthquakes, landslides, tsunamis, floods and volcanic eruptions, and recognize and appraise the related ethical issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : identify real life problems pertaining to the physical environment and find solutions to those problems (by means capstone learning experience in the form of internship, field learning, and project-based learning in the curriculum)

PLO 6 : work with other students and possess an adequate level of communication skills (by means of group project learning and presentation opportunities in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1309	Evolutionary diversity (6)
EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)

EASC2404	Introduction to atmosphere and hydrosphere (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

EASC4403	Biogeochemical cycles (6)

Disciplinary Electives (36 credits)

At least 36 credits selected from Lists A and B, among which at least 12 credits from List A:

List A

EASC3410	Hydrogeology (6)
EASC3415	Meteorology (6)
ENVS3313	Environmental oceanography (6)

List B

EASC3403	Sedimentary environments (6)
EASC3405	Environmental remote sensing (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3412	Earth resources (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4911	Earth system: contemporary issues (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this

Major. Students should consult the Faculty of Education for details.

5. Students are recommended to take additional chemistry and/or physics courses above the introductory level if they are interested in postgraduate research in Earth System Science.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Earth System Science
Offered to students admitted to Year 1 in	**2014**

Objectives:
Earth System Science seeks to understand the Earth as an integrated system, including its past, present and future behaviour, from the environments where life evolves on the surface to the interactions between the crust and its fluid envelopes (atmosphere and hydrosphere), with interests extending to the Earth's interior. Core courses in the major focus on understanding the composition, structure and processes of the solid earth, the hydrosphere and the atmosphere, and their interactions. Students will be equipped with knowledge to help manage geological resources and natural hazards. Throughout the curriculum there is consistent emphasis on transferable skills, learning through fieldwork, laboratory studies and research based classes, designed to enhance students' ability to think critically, to communicate effectively and to develop solutions to complex problems. Graduates from the major can pursue further studies in the Earth Sciences and careers in a wide variety of geoscience-related areas including resource management, hazard mitigation, soil and water conservation and teaching.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the key concepts of the Earth System components and processes (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : have acquired the ability to observe, describe, measure and analyze principal phenomena of earth processes and the interactions between different earth components (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : provide expertise to maintain geological environments and prevent severe perturbations due to resource exploitation and water disposal (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : equip with the knowledge and skills to better predict and deal with geological and related hazards such as earthquakes, landslides, tsunamis, floods and volcanic eruptions, and recognize and appraise the related ethical issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : identify real life problems pertaining to the physical environment and find solutions to those problems (by means capstone learning experience in the form of internship, field learning, and project-based learning in the curriculum)

PLO 6 : work with other students and possess an adequate level of communication skills (by means of group project learning and presentation opportunities in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1309	Evolutionary diversity (6)
EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)

EASC2404	Introduction to atmosphere and hydrosphere (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

EASC4403	Biogeochemical cycles (6)

Disciplinary Electives (36 credits)

At least 36 credits from Lists A and B, among which at least 12 credits from List A:

List A

EASC3410	Hydrogeology (6)
EASC3415	Meteorology (6)
ENVS3313	Environmental oceanography (6)

List B

EASC3403	Sedimentary environments (6)
EASC3405	Environmental remote sensing (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3412	Earth resources (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4911	Earth system: contemporary issues (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this

Major. Students should consult the Faculty of Education for details.

5. Students are recommended to take additional chemistry and/or physics courses above the introductory level if they are interested in postgraduate research in Earth System Science.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Earth System Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
Earth System Science seeks to understand the Earth as an integrated system, including its past, present and future behaviour, from the environments where life evolves on the surface to the interactions between the crust and its fluid envelopes (atmosphere and hydrosphere), with interests extending to the Earth's interior. Core courses in the major focus on understanding the composition, structure and processes of the solid earth, the hydrosphere and the atmosphere, and their interactions. Students will be equipped with knowledge to help manage geological resources and natural hazards. Throughout the curriculum there is consistent emphasis on transferable skills, learning through fieldwork, laboratory studies and research based classes, designed to enhance students' ability to think critically, to communicate effectively and to develop solutions to complex problems. Graduates from the major can pursue further studies in the Earth Sciences and careers in a wide variety of geoscience-related areas including resource management, hazard mitigation, soil and water conservation and teaching.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the key concepts of the Earth System components and processes (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : have acquired the ability to observe, describe, measure and analyze principal phenomena of earth processes and the interactions between different earth components (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : provide expertise to maintain geological environments and prevent severe perturbations due to resource exploitation and water disposal (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : equip with the knowledge and skills to better predict and deal with geological and related hazards such as earthquakes, landslides, tsunamis, floods and volcanic eruptions, and recognize and appraise the related ethical issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : identify real life problems pertaining to the physical environment and find solutions to those problems (by means capstone learning experience in the form of internship, field learning, and project-based learning in the curriculum)

PLO 6 : work with other students and possess an adequate level of communication skills (by means of group project learning and presentation opportunities in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1309	Evolutionary diversity (6)
EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)

EASC2404	Introduction to atmosphere and hydrosphere (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

EASC4403	Biogeochemical cycles (6)

Disciplinary Electives (36 credits)

At least 36 credits from Lists A and B, among which at least 12 credits from List A:

List A

EASC3410	Hydrogeology (6)
EASC3415	Meteorology (6)
ENVS3313	Environmental oceanography (6)

List B

EASC3403	Sedimentary environments (6)
EASC3405	Environmental remote sensing (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3412	Earth resources (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4911	Earth system: contemporary issues (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this

Major. Students should consult the Faculty of Education for details.

5. Students are recommended to take additional chemistry and/or physics courses above the introductory level if they are interested in postgraduate research in Earth System Science.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Earth System Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
Earth System Science seeks to understand the Earth as an integrated system, including its past, present and future behaviour, from the environments where life evolves on the surface to the interactions between the crust and its fluid envelopes (atmosphere and hydrosphere), with interests extending to the Earth's interior. Core courses in the major focus on understanding the composition, structure and processes of the solid earth, the hydrosphere and the atmosphere, and their interactions. Students will be equipped with knowledge to help manage geological resources and natural hazards. Throughout the curriculum there is consistent emphasis on transferable skills, learning through fieldwork, laboratory studies and research based classes, designed to enhance students' ability to think critically, to communicate effectively and to develop solutions to complex problems. Graduates from the major can pursue further studies in the Earth Sciences and careers in a wide variety of geoscience-related areas including resource management, hazard mitigation, soil and water conservation and teaching.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the key concepts of the Earth System components and processes (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : have acquired the ability to observe, describe, measure and analyze principal phenomena of earth processes and the interactions between different earth components (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : provide expertise to maintain geological environments and prevent severe perturbations due to resource exploitation and water disposal (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : equip with the knowledge and skills to better predict and deal with geological and related hazards such as earthquakes, landslides, tsunamis, floods and volcanic eruptions, and recognize and appraise the related ethical issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : identify real life problems pertaining to the physical environment and find solutions to those problems (by means capstone learning experience in the form of internship, field learning, and project-based learning in the curriculum)

PLO 6 : work with other students and possess an adequate level of communication skills (by means of group project learning and presentation opportunities in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1309	Evolutionary diversity (6)
EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)

EASC2404	Introduction to atmosphere and hydrosphere (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

EASC4403	Biogeochemical cycles (6)

Disciplinary Electives (36 credits)

At least 36 credits from Lists A and B, among which at least 12 credits from List A:

List A:

EASC3410	Hydrogeology (6)
EASC3415	Meteorology (6)
ENVS3313	Environmental oceanography (6)

List B:

EASC3403	Sedimentary environments (6)
EASC3405	Environmental remote sensing (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3412	Earth resources (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4911	Earth system: contemporary issues (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this

Major. Students should consult the Faculty of Education for details.

5. Students are recommended to take additional chemistry and/or physics courses above the introductory level if they are interested in postgraduate research in Earth System Science.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2015**

Objectives:
This major is directed at teaching students: (1) how organisms interact with each other and their environments, (2) how species are distributed throughout the world, and (3) key threats and approaches to conserving biodiversity. Special reference is made to Hong Kong and Asia; the ways in which humans have impacted upon natural environments; and, the approaches used to manage or ameliorate those impacts. This major is based around an introductory core, which emphasizes plant and animal biology and includes a compulsory week-long residential field trip. Advanced courses in the major teach students about the ecology and biodiversity of different ecosystems (e.g. marine, terrestrial and freshwater environments) with an emphasis on field work, introduces the use of statistical and molecular techniques in ecology, and focuses on certain applied topics such as environmental impact assessment, ecotoxicology, fisheries and mariculture, and biodiversity conservation. Students have an opportunity to conduct independent research in ecology and biodiversity as a final year project or a dissertation under the close supervision of an individual staff member. Apart from the fundamental knowledge and skills in understanding and managing biodiversity offered in the core courses of this major, strong emphasis is placed upon experiential learning such as overseas field expedition and work placement in the environmental sector. Biodiversity conservation requires scientific input as well as passion. Through the range of formal field-based courses as well as extra-curricular activities offered, students taking this major will have opportunities to participate in research, field conservation and education projects both locally and internationally. Assistance will be provided so that students can develop expertise in one or a few groups of plants or animals, as familiarity with species identification is an essential prerequisite for biodiversity scientists or conservation biologists.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and appreciate the major living and non-living components of the regional and global environment, and how they interact; identify threats to them; and know how these threats can be mitigated (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to understand, study, manage and protect that diversity, and appraise the related moral and ethical issues (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : demonstrate original, independent and critical thinking, with mastery of a range of communication skills (by means of coursework, project-based and presentation opportunities in the curriculum)

PLO 6 : have the skill and knowledge to pursue postgraduate ecological research or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China (by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)

PLO 7 : be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems (by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)

Impermissible Combination:
Minor in Ecology & Biodiversity

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111 Scientific method and reasoning (6)

SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (12 credits)

BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

BIOL3109	Environmental microbiology (6)
BIOL3301	Marine biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL3419	Insect ecology: the little things that run the world (6)
ENVS3019	Urban ecology (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4861	Ecology & biodiversity internship (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3951	Ecology & biodiversity field course (6)
BIOL3991	Directed studies in ecology & biodiversity (6)
BIOL4911	Conservation science in practice (6)
BIOL4991	Ecology & biodiversity project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific

method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2014**

Objectives:
This major is directed at teaching students: (1) how organisms interact with each other and their environments, (2) how species are distributed throughout the world, and (3) key threats and approaches to conserving biodiversity. Special reference is made to Hong Kong and Asia; the ways in which humans have impacted upon natural environments; and, the approaches used to manage or ameliorate those impacts. This major is based around an introductory core, which emphasizes plant and animal biology and includes a compulsory week-long residential field trip. Advanced courses in the major teach students about the ecology and biodiversity of different ecosystems (e.g. marine, terrestrial and freshwater environments) with an emphasis on field work, introduces the use of statistical and molecular techniques in ecology, and focuses on certain applied topics such as environmental impact assessment, ecotoxicology, fisheries and mariculture, and biodiversity conservation. Students have an opportunity to conduct independent research in ecology and biodiversity as a final year project or a dissertation under the close supervision of an individual staff member. Apart from the fundamental knowledge and skills in understanding and managing biodiversity offered in the core courses of this major, strong emphasis is placed upon experiential learning such as overseas field expedition and work placement in the environmental sector. Biodiversity conservation requires scientific input as well as passion. Through the range of formal field-based courses as well as extra-curricular activities offered, students taking this major will have opportunities to participate in research, field conservation and education projects both locally and internationally. Assistance will be provided so that students can develop expertise in one or a few groups of plants or animals, as familiarity with species identification is an essential prerequisite for biodiversity scientists or conservation biologists.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and appreciate the major living and non-living components of the regional and global environment, and how they interact; identify threats to them; and know how these threats can be mitigated (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to understand, study, manage and protect that diversity, and appraise the related moral and ethical issues (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : demonstrate original, independent and critical thinking, with mastery of a range of communication skills (by means of coursework, project-based and presentation opportunities in the curriculum)

PLO 6 : have the skill and knowledge to pursue postgraduate ecological research or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China (by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)

PLO 7 : be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems (by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)

Impermissible Combination:
Minor in Ecology & Biodiversity

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111 Scientific method and reasoning (6)

SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (12 credits)

BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

BIOL3109	Environmental microbiology (6)
BIOL3301	Marine biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL3419	Insect ecology: the little things that run the world (6)
ENVS3019	Urban ecology (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4861	Ecology & biodiversity internship (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3951	Ecology & biodiversity field course (6)
BIOL3991	Directed studies in ecology & biodiversity (6)
BIOL4911	Conservation science in practice (6)
BIOL4991	Ecology & biodiversity project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific

method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2013**

Objectives:
This major is directed at teaching students: (1) how organisms interact with each other and their environments, (2) how species are distributed throughout the world, and (3) key threats and approaches to conserving biodiversity. Special reference is made to Hong Kong and Asia; the ways in which humans have impacted upon natural environments; and, the approaches used to manage or ameliorate those impacts. This major is based around an introductory core, which emphasizes plant and animal biology and includes a compulsory week-long residential field trip. Advanced courses in the major teach students about the ecology and biodiversity of different ecosystems (e.g. marine, terrestrial and freshwater environments) with an emphasis on field work, introduces the use of statistical and molecular techniques in ecology, and focuses on certain applied topics such as environmental impact assessment, ecotoxicology, fisheries and mariculture, and biodiversity conservation. Students have an opportunity to conduct independent research in ecology and biodiversity as a final year project or a dissertation under the close supervision of an individual staff member. Apart from the fundamental knowledge and skills in understanding and managing biodiversity offered in the core courses of this major, strong emphasis is placed upon experiential learning such as overseas field expedition and work placement in the environmental sector. Biodiversity conservation requires scientific input as well as passion. Through the range of formal field-based courses as well as extra-curricular activities offered, students taking this major will have opportunities to participate in research, field conservation and education projects both locally and internationally. Assistance will be provided so that students can develop expertise in one or a few groups of plants or animals, as familiarity with species identification is an essential prerequisite for biodiversity scientists or conservation biologists.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and appreciate the major living and non-living components of the regional and global environment, and how they interact; identify threats to them; and know how these threats can be mitigated (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to understand, study, manage and protect that diversity, and appraise the related moral and ethical issues (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : demonstrate original, independent and critical thinking, with mastery of a range of communication skills (by means of coursework, project-based and presentation opportunities in the curriculum)

PLO 6 : have the skill and knowledge to pursue postgraduate ecological research or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China (by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)

PLO 7 : be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems (by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)

Impermissible Combination:
Minor in Ecology & Biodiversity

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111 Scientific method and reasoning (6)

SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (12 credits)

BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

BIOL3109	Environmental microbiology (6)
BIOL3301	Marine biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL3419	Insect ecology: the little things that run the world (6)
ENVS3019	Urban ecology (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4861	Ecology & biodiversity internship (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3951	Ecology & biodiversity field course (6)
BIOL3991	Directed studies in ecology & biodiversity (6)
BIOL4911	Conservation science in practice (6)
BIOL4991	Ecology & biodiversity project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific

method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2012**

Objectives:
This major is directed at teaching students: (1) how organisms interact with each other and their environments, (2) how species are distributed throughout the world, and (3) key threats and approaches to conserving biodiversity. Special reference is made to Hong Kong and Asia; the ways in which humans have impacted upon natural environments; and, the approaches used to manage or ameliorate those impacts. This major is based around an introductory core, which emphasizes plant and animal biology and includes a compulsory week-long residential field trip. Advanced courses in the major teach students about the ecology and biodiversity of different ecosystems (e.g. marine, terrestrial and freshwater environments) with an emphasis on field work, introduces the use of statistical and molecular techniques in ecology, and focuses on certain applied topics such as environmental impact assessment, ecotoxicology, fisheries and mariculture, and biodiversity conservation. Students have an opportunity to conduct independent research in ecology and biodiversity as a final year project or a dissertation under the close supervision of an individual staff member. Apart from the fundamental knowledge and skills in understanding and managing biodiversity offered in the core courses of this major, strong emphasis is placed upon experiential learning such as overseas field expedition and work placement in the environmental sector. Biodiversity conservation requires scientific input as well as passion. Through the range of formal field-based courses as well as extra-curricular activities offered, students taking this major will have opportunities to participate in research, field conservation and education projects both locally and internationally. Assistance will be provided so that students can develop expertise in one or a few groups of plants or animals, as familiarity with species identification is an essential prerequisite for biodiversity scientists or conservation biologists.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and appreciate the major living and non-living components of the regional and global environment, and how they interact; identify threats to them; and know how these threats can be mitigated (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to understand, study, manage and protect that diversity, and appraise the related moral and ethical issues (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet (by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : demonstrate original, independent and critical thinking, with mastery of a range of communication skills (by means of coursework, project-based and presentation opportunities in the curriculum)

PLO 6 : have the skill and knowledge to pursue postgraduate ecological research or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China (by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)

PLO 7 : be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems (by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)

Impermissible Combination:
Minor in Ecology & Biodiversity

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)

SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (12 credits)

BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)

Disciplinary Electives (36 credits)

At least 36 credits selected from the following courses:

BIOL3109	Environmental microbiology (6)
BIOL3301	Marine biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL3419	Insect ecology: the little things that run the world (6)
ENVS3019	Urban ecology (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4861	Ecology & biodiversity internship (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3951	Ecology & biodiversity field course (6)
BIOL3991	Directed studies in ecology & biodiversity (6)
BIOL4911	Conservation science in practice (6)
BIOL4991	Ecology & biodiversity project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less

double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Environmental Science
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Environmental Science aims to provide students with a strong scientific and technological background for understanding and addressing the environmental issues faced by humankind. This includes a flexible teaching and learning programme so that students can explore environmental issues from a range of aspects. Core courses in the curriculum emphasize fundamental knowledge in life and environment, physical and sustainable environment, pollution, monitoring and management. Throughout the curriculum, students are encouraged to undertake their own independent study from primary and secondary sources to incorporate critical thinking, field and laboratory work, documentary and archive scholarship, as integrated elements of relevant courses. By completing the curriculum, students are expected to have enhanced their knowledge in environmental science and have improved their problem-solving ability, communication and social skills. Students will be prepared to work in industries and government agencies, where they will help manage wisely the resources for which they are responsible.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 2 : observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 3 : appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 4 : gain an advanced level of skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods and appreciation of the related ethical issues (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Minor in Environmental Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (18 credits)

ENVS1401	Introduction to environmental science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses (Level 1 & 2):

CHEM1042	General chemistry I (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue Planet (6)

ENVS1301	Environmental life science (6)	
STAT1601	Elementary statistical methods (6)	May take either STAT1601 or STAT1603 to fulfill this 18 credits requirement, but not both.
STAT1603	Introductory statistics (6)	May take either STAT1601 or STAT1603 to fulfill this 18 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2306	Ecology and evolution (6)	
CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2442	Fundamentals of organic chemistry (6)	

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (36 credits)

At least 36 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
MATH3408	Computational methods and differential equations with applications (6)
STAT3611	Computer-aided data analysis (6)
BIOL4302	Environmental impact assessment (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

ENVS3999	Directed studies in environmental science (6)
ENVS4955	Environmental science in practice (6)
ENVS4966	Environmental science internship (6)
ENVS4999	Environmental science project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Environmental Science
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Environmental Science aims to provide students with a strong scientific and technological background for understanding and addressing the environmental issues faced by humankind. This includes a flexible teaching and learning programme so that students can explore environmental issues from a range of aspects. Core courses in the curriculum emphasize fundamental knowledge in life and environment, physical and sustainable environment, pollution, monitoring and management. Throughout the curriculum, students are encouraged to undertake their own independent study from primary and secondary sources to incorporate critical thinking, field and laboratory work, documentary and archive scholarship, as integrated elements of relevant courses. By completing the curriculum, students are expected to have enhanced their knowledge in environmental science and have improved their problem-solving ability, communication and social skills. Students will be prepared to work in industries and government agencies, where they will help manage wisely the resources for which they are responsible.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 2 : observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 3 : appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 4 : gain an advanced level of skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods and appreciation of the related ethical issues (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Minor in Environmental Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (18 credits)

ENVS1401	Introduction to environmental science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses (Level 1 & 2):

CHEM1042	General chemistry I (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue Planet (6)

ENVS1301	Environmental life science (6)	
STAT1601	Elementary statistical methods (6)	May take either STAT1601 or STAT1603 to fulfill this 18 credits requirement, but not both.
STAT1603	Introductory statistics (6)	May take either STAT1601 or STAT1603 to fulfill this 18 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2306	Ecology and evolution (6)	
CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2442	Fundamentals of organic chemistry (6)	

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (36 credits)

At least 36 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
MATH3408	Computational methods and differential equations with applications (6)
STAT3611	Computer-aided data analysis (6)
BIOL4302	Environmental impact assessment (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

ENVS3999	Directed studies in environmental science (6)
ENVS4955	Environmental science in practice (6)
ENVS4966	Environmental science internship (6)
ENVS4999	Environmental science project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Environmental Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Environmental Science aims to provide students with a strong scientific and technological background for understanding and addressing the environmental issues faced by humankind. This includes a flexible teaching and learning programme so that students can explore environmental issues from a range of aspects. Core courses in the curriculum emphasize fundamental knowledge in life and environment, physical and sustainable environment, pollution, monitoring and management. Throughout the curriculum, students are encouraged to undertake their own independent study from primary and secondary sources to incorporate critical thinking, field and laboratory work, documentary and archive scholarship, as integrated elements of relevant courses. By completing the curriculum, students are expected to have enhanced their knowledge in environmental science and have improved their problem-solving ability, communication and social skills. Students will be prepared to work in industries and government agencies, where they will help manage wisely the resources for which they are responsible.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 2 : observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 3 : appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 4 : gain an advanced level of skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods and appreciation of the related ethical issues (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Minor in Environmental Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (18 credits)

ENVS1401	Introduction to environmental science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses (Level 1 & 2):

CHEM1042	General chemistry I (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue Planet (6)

ENVS1301	Environmental life science (6)	
STAT1601	Elementary statistical methods (6)	May take either STAT1601 or STAT1603 to fulfill this 18 credits requirement, but not both.
STAT1603	Introductory statistics (6)	May take either STAT1601 or STAT1603 to fulfill this 18 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2306	Ecology and evolution (6)	
CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2442	Fundamentals of organic chemistry (6)	

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (36 credits)

At least 36 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
MATH3408	Computational methods and differential equations with applications (6)
STAT3611	Computer-aided data analysis (6)
BIOL4302	Environmental impact assessment (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

ENVS3999	Directed studies in environmental science (6)
ENVS4955	Environmental science in practice (6)
ENVS4966	Environmental science internship (6)
ENVS4999	Environmental science project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Environmental Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Environmental Science aims to provide students with a strong scientific and technological background for understanding and addressing the environmental issues faced by humankind. This includes a flexible teaching and learning programme so that students can explore environmental issues from a range of aspects. Core courses in the curriculum emphasize fundamental knowledge in life and environment, physical and sustainable environment, pollution, monitoring and management. Throughout the curriculum, students are encouraged to undertake their own independent study from primary and secondary sources to incorporate critical thinking, field and laboratory work, documentary and archive scholarship, as integrated elements of relevant courses. By completing the curriculum, students are expected to have enhanced their knowledge in environmental science and have improved their problem-solving ability, communication and social skills. Students will be prepared to work in industries and government agencies, where they will help manage wisely the resources for which they are responsible.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 2 : observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 3 : appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 4 : gain an advanced level of skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods and appreciation of the related ethical issues (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Minor in Environmental Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (12 credits)

ENVS1401	Introduction to environmental science (6)	
STAT1601	Elementary statistical methods (6)	May take either STAT1601 or STAT1603 to fulfill this 12 credits requirement, but not both.
STAT1603	Introductory statistics (6)	May take either STAT1601 or STAT1603 to fulfill this 12 credits requirement, but not both.

Disciplinary Electives (24 credits)

At least 12 credits selected from the following courses (Level 1) in List A:

List A

CHEM1042	General chemistry I (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue Planet (6)
ENVS1301	Environmental life science (6)

At least 12 credits selected from the following courses (Level 2) in List B:

List B

BIOL2102	Biostatistics (6)
BIOL2306	Ecology and evolution (6)
CHEM2041	Principles of chemistry (6)
CHEM2241	Analytical chemistry I (6)
CHEM2442	Fundamentals of organic chemistry (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (36 credits)

At least 36 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
MATH3408	Computational methods and differential equations with applications (6)

STAT3611	Computer-aided data analysis (6)
BIOL4302	Environmental impact assessment (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

ENVS3999	Directed studies in environmental science (6)
ENVS4955	Environmental science in practice (6)
ENVS4966	Environmental science internship (6)
ENVS4999	Environmental science project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Food and Nutritional Science aims to offer an exciting, dynamic, and challenging environment to prepare the students for career opportunities in food and nutritional science. The goals of the programme are to provide the students with: (a) critical knowledge and understanding of the theoretical and practical aspects of food science and technology and nutrition and their relationship to human health; (b) critical knowledge and understanding on the relationship between food safety and a wide range of social, legal, technological and environmental factors; (c) a curriculum meeting the requirements for higher degree in MPhil and PhD and or the taught Master of Science degrees in the field of Food industry: Management and Marketing, Food Safety and Toxicology and the postgraduate diploma in dietetics.

The mission is to provide a progressive and effective programme that integrates theoretical and experiential learning to better prepare students for the challenges of the workplace. Throughout the curriculum, there is consistent emphasis on experiential learning through laboratory studies, internship training, research-based learning, debate and presentations, which are designed to enhance students' critical thinking, communication and collaboration, tackling of ill-defined problems, development of individual learning objectives and self-evaluation of performance. Internship experiences can be gained in medical centers, schools, industries, government and community setting. Students graduated from this programme are prepared for diverse careers in the food industry, government or private-sector food and nutrition agencies, and scientific research laboratories, health-care and fitness facilities, hospitals, nutrition edition and communication enterprises.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand the science underpinning food and nutrition as applied to diet and health, and to commercial food production (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : analyze controversial food related issues such as GM foods, nutritional labeling and food security (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand ethical perspectives and practice in all areas of food product development, food safety and public health nutrition, and appreciate and identify the need for ethical standards and professional codes of conduct (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : apply and disseminate scientific knowledge obtained from food, nutrition and related biosciences for the understanding of the influences of nutrition in health and disease, using a range of formats and approaches (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : apply independent thinking and the principles of scientific enquiry to conduct a small research project to test a food- and/or nutrition-related hypothesis (by means of coursework, tutorial classes, laboratory-based and project-based learning in the curriculum)

PLO 6 : demonstrate communication and teamwork skills necessary to working in a multi-disciplinary environment (by means of coursework and group-project learning in the curriculum)

Impermissible Combination:
Minor in Food & Nutritional Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)

BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)
BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3992	Directed studies in food & nutritional science (6)
BIOL4912	Sensory evaluation of food (6)
BIOL4962	Food & nutritional science internship (6)
BIOL4992	Food & nutritional science project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less

double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students who wish to specialize in a certain area may choose to emphasize selection of courses from the following lists:
(a) Food Science and Technology: BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3209 Food and nutrient analysis; BIOL3210 Grain production and utilization; BIOL4205 Food processing and engineering; BIOL4207 Meat and dairy sciences; BIOL4209 Functional foods; BIOL4210 Food product development; BIOL4411 Plant and food biotechnology.
(b) Nutrition and Health Science: BIOL3204 Nutrition and the life cycle, BIOL3205 Human physiology; BIOL3206 Clinical nutrition; BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3211 Nutrigenomics; BIOL4201 Public health nutrition.

6. Students who may wish to pursue postgraduate study in dietetics are strongly advised to consult their academic and course selection advisors regarding additional courses in Physiology and Biochemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Food and Nutritional Science aims to offer an exciting, dynamic, and challenging environment to prepare the students for career opportunities in food and nutritional science. The goals of the programme are to provide the students with: (a) critical knowledge and understanding of the theoretical and practical aspects of food science and technology and nutrition and their relationship to human health; (b) critical knowledge and understanding on the relationship between food safety and a wide range of social, legal, technological and environmental factors; (c) a curriculum meeting the requirements for higher degree in MPhil and PhD and or the taught Master of Science degrees in the field of Food industry: Management and Marketing, Food Safety and Toxicology and the postgraduate diploma in dietetics.

The mission is to provide a progressive and effective programme that integrates theoretical and experiential learning to better prepare students for the challenges of the workplace. Throughout the curriculum, there is consistent emphasis on experiential learning through laboratory studies, internship training, research-based learning, debate and presentations, which are designed to enhance students' critical thinking, communication and collaboration, tackling of ill-defined problems, development of individual learning objectives and self-evaluation of performance. Internship experiences can be gained in medical centers, schools, industries, government and community setting. Students graduated from this programme are prepared for diverse careers in the food industry, government or private-sector food and nutrition agencies, and scientific research laboratories, health-care and fitness facilities, hospitals, nutrition edition and communication enterprises.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand the science underpinning food and nutrition as applied to diet and health, and to commercial food production (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : analyze controversial food related issues such as GM foods, nutritional labeling and food security (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand ethical perspectives and practice in all areas of food product development, food safety and public health nutrition, and appreciate and identify the need for ethical standards and professional codes of conduct (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : apply and disseminate scientific knowledge obtained from food, nutrition and related biosciences for the understanding of the influences of nutrition in health and disease, using a range of formats and approaches (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : apply independent thinking and the principles of scientific enquiry to conduct a small research project to test a food- and/or nutrition-related hypothesis (by means of coursework, tutorial classes, laboratory-based and project-based learning in the curriculum)

PLO 6 : demonstrate communication and teamwork skills necessary to working in a multi-disciplinary environment (by means of coursework and group-project learning in the curriculum)

Impermissible Combination:
Minor in Food & Nutritional Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)

BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)
BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3992	Directed studies in food & nutritional science (6)
BIOL4912	Sensory evaluation of food (6)
BIOL4962	Food & nutritional science internship (6)
BIOL4992	Food & nutritional science project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less

double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students who wish to specialize in a certain area may choose to emphasize selection of courses from the following lists:
(a) Food Science and Technology: BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3209 Food and nutrient analysis; BIOL3210 Grain production and utilization; BIOL4205 Food processing and engineering; BIOL4207 Meat and dairy sciences; BIOL4209 Functional foods; BIOL4210 Food product development; BIOL4411 Plant and food biotechnology.
(b) Nutrition and Health Science: BIOL3204 Nutrition and the life cycle, BIOL3205 Human physiology; BIOL3206 Clinical nutrition; BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3211 Nutrigenomics; BIOL4201 Public health nutrition.

6. Students who may wish to pursue postgraduate study in dietetics are strongly advised to consult their academic and course selection advisors regarding additional courses in Physiology and Biochemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Food and Nutritional Science aims to offer an exciting, dynamic, and challenging environment to prepare the students for career opportunities in food and nutritional science. The goals of the programme are to provide the students with: (a) critical knowledge and understanding of the theoretical and practical aspects of food science and technology and nutrition and their relationship to human health; (b) critical knowledge and understanding on the relationship between food safety and a wide range of social, legal, technological and environmental factors; (c) a curriculum meeting the requirements for higher degree in MPhil and PhD and or the taught Master of Science degrees in the field of Food industry: Management and Marketing, Food Safety and Toxicology and the postgraduate diploma in dietetics.

The mission is to provide a progressive and effective programme that integrates theoretical and experiential learning to better prepare students for the challenges of the workplace. Throughout the curriculum, there is consistent emphasis on experiential learning through laboratory studies, internship training, research-based learning, debate and presentations, which are designed to enhance students' critical thinking, communication and collaboration, tackling of ill-defined problems, development of individual learning objectives and self-evaluation of performance. Internship experiences can be gained in medical centers, schools, industries, government and community setting. Students graduated from this programme are prepared for diverse careers in the food industry, government or private-sector food and nutrition agencies, and scientific research laboratories, health-care and fitness facilities, hospitals, nutrition edition and communication enterprises.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand the science underpinning food and nutrition as applied to diet and health, and to commercial food production (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : analyze controversial food related issues such as GM foods, nutritional labeling and food security (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand ethical perspectives and practice in all areas of food product development, food safety and public health nutrition, and appreciate and identify the need for ethical standards and professional codes of conduct (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : apply and disseminate scientific knowledge obtained from food, nutrition and related biosciences for the understanding of the influences of nutrition in health and disease, using a range of formats and approaches (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : apply independent thinking and the principles of scientific enquiry to conduct a small research project to test a food- and/or nutrition-related hypothesis (by means of coursework, tutorial classes, laboratory-based and project-based learning in the curriculum)

PLO 6 : demonstrate communication and teamwork skills necessary to working in a multi-disciplinary environment (by means of coursework and group-project learning in the curriculum)

Impermissible Combination:
Minor in Food & Nutritional Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)

BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2220	Principles of biochemistry (6)	

Disciplinary Electives (6 credits)

BIOL1309	Evolutionary diversity (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.
BIOL2306	Ecology and evolution (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)
BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3992	Directed studies in food & nutritional science (6)
BIOL4912	Sensory evaluation of food (6)
BIOL4962	Food & nutritional science internship (6)

BIOL4992	Food & nutritional science project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students who wish to specialize in a certain area may choose to emphasize selection of courses from the following lists:
(a) Food Science and Technology: BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3209 Food and nutrient analysis; BIOL3210 Grain production and utilization; BIOL4205 Food processing and engineering; BIOL4207 Meat and dairy sciences; BIOL4209 Functional foods; BIOL4210 Food product development; BIOL4411 Plant and food biotechnology.
(b) Nutrition and Health Science: BIOL3204 Nutrition and the life cycle, BIOL3205 Human physiology; BIOL3206 Clinical nutrition; BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3211 Nutrigenomics; BIOL4201 Public health nutrition.

6. Students who may wish to pursue postgraduate study in dietetics are strongly advised to consult their academic and course selection advisors regarding additional courses in Physiology and Biochemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Food and Nutritional Science aims to offer an exciting, dynamic, and challenging environment to prepare the students for career opportunities in food and nutritional science. The goals of the programme are to provide the students with: (a) critical knowledge and understanding of the theoretical and practical aspects of food science and technology and nutrition and their relationship to human health; (b) critical knowledge and understanding on the relationship between food safety and a wide range of social, legal, technological and environmental factors; (c) a curriculum meeting the requirements for higher degree in MPhil and PhD and or the taught Master of Science degrees in the field of Food industry: Management and Marketing, Food Safety and Toxicology and the postgraduate diploma in dietetics.

The mission is to provide a progressive and effective programme that integrates theoretical and experiential learning to better prepare students for the challenges of the workplace. Throughout the curriculum, there is consistent emphasis on experiential learning through laboratory studies, internship training, research-based learning, debate and presentations, which are designed to enhance students' critical thinking, communication and collaboration, tackling of ill-defined problems, development of individual learning objectives and self-evaluation of performance. Internship experiences can be gained in medical centers, schools, industries, government and community setting. Students graduated from this programme are prepared for diverse careers in the food industry, government or private-sector food and nutrition agencies, and scientific research laboratories, health-care and fitness facilities, hospitals, nutrition edition and communication enterprises.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand the science underpinning food and nutrition as applied to diet and health, and to commercial food production (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : analyze controversial food related issues such as GM foods, nutritional labeling and food security (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand ethical perspectives and practice in all areas of food product development, food safety and public health nutrition, and appreciate and identify the need for ethical standards and professional codes of conduct (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : apply and disseminate scientific knowledge obtained from food, nutrition and related biosciences for the understanding of the influences of nutrition in health and disease, using a range of formats and approaches (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 5 : apply independent thinking and the principles of scientific enquiry to conduct a small research project to test a food- and/or nutrition-related hypothesis (by means of coursework, tutorial classes, laboratory-based and project-based learning in the curriculum)

PLO 6 : demonstrate communication and teamwork skills necessary to working in a multi-disciplinary environment (by means of coursework and group-project learning in the curriculum)

Impermissible Combination:
Minor in Food & Nutritional Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)

BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)
BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3992	Directed studies in food & nutritional science (6)
BIOL4912	Sensory evaluation of food (6)
BIOL4962	Food & nutritional science internship (6)
BIOL4992	Food & nutritional science project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less

double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students who wish to specialize in a certain area may choose to emphasize selection of courses from the following lists:
(a) Food Science and Technology: BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3209 Food and nutrient analysis; BIOL3210 Grain production and utilization; BIOL4205 Food processing and engineering; BIOL4207 Meat and dairy sciences; BIOL4209 Functional foods; BIOL4210 Food product development; BIOL4411 Plant and food biotechnology.
(b) Nutrition and Health Science: BIOL3204 Nutrition and the life cycle, BIOL3205 Human physiology; BIOL3206 Clinical nutrition; BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3211 Nutrigenomics; BIOL4201 Public health nutrition.

6. Students who may wish to pursue postgraduate study in dietetics are strongly advised to consult their academic and course selection advisors regarding additional courses in Physiology and Biochemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Geology
Offered to students admitted to Year 1 in	**2015**

Objectives:
Geology concerns with the scientific study of the Earth's structure, processes, material and history. Geologists apply knowledge of chemistry, biology, physics and mathematics to solve Earth problems. The Geology Major aims to give students a sound foundation of the geological sciences and enable them to pursue postgraduate studies or careers in the geosciences. The curriculum emphasizes the development of knowledge and skills, and practical experience in the field. The core courses are designed to give students a well-rounded understanding of the geological disciplines including petrology, paleontology, geophysics, geochemistry, geochronology and the applications of geological knowledge to resource development, natural hazard management, and geotechnical and environmental engineering. Students who wish to become a professional geologist may take additional designated courses designed to meet the pathway for accreditation as a chartered geologist.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources (by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)

PLO 2 : have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues (by means of both local and overseas residential field learning experience)

PLO 3 : communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources (by means of capstone, project-based learning and presentation opportunities in the curriculum)

PLO 4 : have gained some insight to the real-life industrial environment and developed connections within the geosciences profession (by means of internship opportunities in the curriculum)

PLO 5 : work with others in an effective manner and have learned to accept and appreciate different cultures (by means of group project learning, field learning experience in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2406	Geochemistry (6)
EASC2407	Mineralogy (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (36 credits)

EASC3402	Petrology (6)

EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)
EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC4406	Earth dynamics & global tectonics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC3406	Reconstruction of past climate (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4403	Biogeochemical cycles (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4955	Integrated field studies (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of

selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Geology
Offered to students admitted to Year 1 in	**2014**

Objectives:
Geology concerns with the scientific study of the Earth's structure, processes, material and history. Geologists apply knowledge of chemistry, biology, physics and mathematics to solve Earth problems. The Geology Major aims to give students a sound foundation of the geological sciences and enable them to pursue postgraduate studies or careers in the geosciences. The curriculum emphasizes the development of knowledge and skills, and practical experience in the field. The core courses are designed to give students a well-rounded understanding of the geological disciplines including petrology, paleontology, geophysics, geochemistry, geochronology and the applications of geological knowledge to resource development, natural hazard management, and geotechnical and environmental engineering. Students who wish to become a professional geologist may take additional designated courses designed to meet the pathway for accreditation as a chartered geologist.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources (by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)

PLO 2 : have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues (by means of both local and overseas residential field learning experience)

PLO 3 : communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources (by means of capstone, project-based learning and presentation opportunities in the curriculum)

PLO 4 : have gained some insight to the real-life industrial environment and developed connections within the geosciences profession (by means of internship opportunities in the curriculum)

PLO 5 : work with others in an effective manner and have learned to accept and appreciate different cultures (by means of group project learning, field learning experience in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2406	Geochemistry (6)
EASC2407	Mineralogy (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (36 credits)

EASC3402	Petrology (6)

EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)
EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC4406	Earth dynamics & global tectonics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC3406	Reconstruction of past climate (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4403	Biogeochemical cycles (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4955	Integrated field studies (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of

selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Geology
Offered to students admitted to Year 1 in	**2013**

Objectives:
Geology concerns with the scientific study of the Earth's structure, processes, material and history. Geologists apply knowledge of chemistry, biology, physics and mathematics to solve Earth problems. The Geology Major aims to give students a sound foundation of the geological sciences and enable them to pursue postgraduate studies or careers in the geosciences. The curriculum emphasizes the development of knowledge and skills, and practical experience in the field. The core courses are designed to give students a well-rounded understanding of the geological disciplines including petrology, paleontology, geophysics, geochemistry, geochronology and the applications of geological knowledge to resource development, natural hazard management, and geotechnical and environmental engineering. Students who wish to become a professional geologist may take additional designated courses designed to meet the pathway for accreditation as a chartered geologist.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources (by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)

PLO 2 : have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues (by means of both local and overseas residential field learning experience)

PLO 3 : communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources (by means of capstone, project-based learning and presentation opportunities in the curriculum)

PLO 4 : have gained some insight to the real-life industrial environment and developed connections within the geosciences profession (by means of internship opportunities in the curriculum)

PLO 5 : work with others in an effective manner and have learned to accept and appreciate different cultures (by means of group project learning, field learning experience in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2406	Geochemistry (6)
EASC2407	Mineralogy (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (36 credits)

EASC3402	Petrology (6)

EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)
EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC4406	Earth dynamics & global tectonics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC3406	Reconstruction of past climate (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4403	Biogeochemical cycles (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4955	Integrated field studies (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of

selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Geology
Offered to students admitted to Year 1 in	**2012**

Objectives:
Geology concerns with the scientific study of the Earth's structure, processes, material and history. Geologists apply knowledge of chemistry, biology, physics and mathematics to solve Earth problems. The Geology Major aims to give students a sound foundation of the geological sciences and enable them to pursue postgraduate studies or careers in the geosciences. The curriculum emphasizes the development of knowledge and skills, and practical experience in the field. The core courses are designed to give students a well-rounded understanding of the geological disciplines including petrology, paleontology, geophysics, geochemistry, geochronology and the applications of geological knowledge to resource development, natural hazard management, and geotechnical and environmental engineering. Students who wish to become a professional geologist may take additional designated courses designed to meet the pathway for accreditation as a chartered geologist.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources (by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)

PLO 2 : have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues (by means of both local and overseas residential field learning experience)

PLO 3 : communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources (by means of capstone, project-based learning and presentation opportunities in the curriculum)

PLO 4 : have gained some insight to the real-life industrial environment and developed connections within the geosciences profession (by means of internship opportunities in the curriculum)

PLO 5 : work with others in an effective manner and have learned to accept and appreciate different cultures (by means of group project learning, field learning experience in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2406	Geochemistry (6)
EASC2407	Mineralogy (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (36 credits)

EASC3402	Petrology (6)

EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)
EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC4406	Earth dynamics & global tectonics (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC3406	Reconstruction of past climate (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4403	Biogeochemical cycles (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4999	Earth sciences project (12)

3. Capstone requirement (6 credits)

EASC4955	Integrated field studies (6)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of

selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Mathematics provides students with a solid and comprehensive undergraduate education in the subject. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems. Core courses in the curriculum emphasize fundamental knowledge and concepts in Mathematics and elective courses provide training in both pure and applied aspects of Mathematics. Throughout the curriculum there is also emphasis on experiential learning through guided studies, projects, seminars and summer internships. With the diversity of courses offered in the major, various specializations are available. These will lead to careers in a wide range of sectors including education, economics and finance, logistics, management, research and further studies.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and present fundamental concepts in mathematics (by means of coursework and learning activities in the major or minor curriculum)

PLO 2 : apply mathematical theory and techniques to different areas of Sciences, and appraise the related ethical issues (by means of coursework and learning activities in the major or minor curriculum)

PLO 3 : communicate in mathematical language and present scientific arguments (by means of coursework, seminars, guided studies and projects)

PLO 4 : collaborate and work with other students in an effective manner (by means of guided studies, projects and seminars)

PLO 5 : appreciate the beauty and power of mathematics (by means of guided studies, projects and seminars)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics
Minor in Mathematics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2012	Fundamental concepts of mathematics (6)
MATH2101	Linear algebra I (6)
MATH2102	Linear algebra II (6)
MATH2211	Multivariable calculus (6)
MATH2241	Introduction to mathematical analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)

MATH3403	Functions of a complex variable (6)

Disciplinary Electives (24 credits)

At least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), of which at least 12 credits should be from MATH4XXX or MATH7XXX level, subject to pre-requisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)

MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Mathematics provides students with a solid and comprehensive undergraduate education in the subject. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems. Core courses in the curriculum emphasize fundamental knowledge and concepts in Mathematics and elective courses provide training in both pure and applied aspects of Mathematics. Throughout the curriculum there is also emphasis on experiential learning through guided studies, projects, seminars and summer internships. With the diversity of courses offered in the major, various specializations are available. These will lead to careers in a wide range of sectors including education, economics and finance, logistics, management, research and further studies.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and present fundamental concepts in mathematics (by means of coursework and learning activities in the major or minor curriculum)

PLO 2 : apply mathematical theory and techniques to different areas of Sciences, and appraise the related ethical issues (by means of coursework and learning activities in the major or minor curriculum)

PLO 3 : communicate in mathematical language and present scientific arguments (by means of coursework, seminars, guided studies and projects)

PLO 4 : collaborate and work with other students in an effective manner (by means of guided studies, projects and seminars)

PLO 5 : appreciate the beauty and power of mathematics (by means of guided studies, projects and seminars)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics
Minor in Mathematics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2012	Fundamental concepts of mathematics (6)
MATH2101	Linear algebra I (6)
MATH2102	Linear algebra II (6)
MATH2211	Multivariable calculus (6)
MATH2241	Introduction to mathematical analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)

MATH3403	Functions of a complex variable (6)

Disciplinary Electives (24 credits)

At least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), of which at least 12 credits should be from MATH4XXX or MATH7XXX level, subject to pre-requisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)

MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Mathematics provides students with a solid and comprehensive undergraduate education in the subject. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems. Core courses in the curriculum emphasize fundamental knowledge and concepts in Mathematics and elective courses provide training in both pure and applied aspects of Mathematics. Throughout the curriculum there is also emphasis on experiential learning through guided studies, projects, seminars and summer internships. With the diversity of courses offered in the major, various specializations are available. These will lead to careers in a wide range of sectors including education, economics and finance, logistics, management, research and further studies.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and present fundamental concepts in mathematics (by means of coursework and learning activities in the major or minor curriculum)

PLO 2 : apply mathematical theory and techniques to different areas of Sciences, and appraise the related ethical issues (by means of coursework and learning activities in the major or minor curriculum)

PLO 3 : communicate in mathematical language and present scientific arguments (by means of coursework, seminars, guided studies and projects)

PLO 4 : collaborate and work with other students in an effective manner (by means of guided studies, projects and seminars)

PLO 5 : appreciate the beauty and power of mathematics (by means of guided studies, projects and seminars)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics
Minor in Mathematics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2012	Fundamental concepts of mathematics (6)
MATH2101	Linear algebra I (6)
MATH2102	Linear algebra II (6)
MATH2211	Multivariable calculus (6)
MATH2241	Introduction to mathematical analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)

MATH3403	Functions of a complex variable (6)

Disciplinary Electives (24 credits)

At least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), of which at least 12 credits should be from MATH4XXX or MATH7XXX level, subject to pre-requisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)

MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Mathematics provides students with a solid and comprehensive undergraduate education in the subject. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems. Core courses in the curriculum emphasize fundamental knowledge and concepts in Mathematics and elective courses provide training in both pure and applied aspects of Mathematics. Throughout the curriculum there is also emphasis on experiential learning through guided studies, projects, seminars and summer internships. With the diversity of courses offered in the major, various specializations are available. These will lead to careers in a wide range of sectors including education, economics and finance, logistics, management, research and further studies.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe and present fundamental concepts in mathematics (by means of coursework and learning activities in the major or minor curriculum)

PLO 2 : apply mathematical theory and techniques to different areas of Sciences, and appraise the related ethical issues (by means of coursework and learning activities in the major or minor curriculum)

PLO 3 : communicate in mathematical language and present scientific arguments (by means of coursework, seminars, guided studies and projects)

PLO 4 : collaborate and work with other students in an effective manner (by means of guided studies, projects and seminars)

PLO 5 : appreciate the beauty and power of mathematics (by means of guided studies, projects and seminars)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics
Minor in Mathematics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2012	Fundamental concepts of mathematics (6)
MATH2101	Linear algebra I (6)
MATH2102	Linear algebra II (6)
MATH2211	Multivariable calculus (6)
MATH2241	Introduction to mathematical analysis (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (18 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)

MATH3403	Functions of a complex variable (6)

Disciplinary Electives (24 credits)

At least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), of which at least 12 credits should be from MATH4XXX or MATH7XXX level, subject to pre-requisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)

MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics/Physics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Mathematics/Physics aims to provide students with a solid foundation in both physics and mathematics. This major is catered especially for students interested in the more theoretical aspects of physics. It covers a wide range of core areas in both disciplines which form the blocks of fundamental knowledge for further specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics, electrodynamics, linear algebra, mathematical analysis, abstract algebra, complex variables, differential equations, modern differential geometry, etc. A large selection of elective courses is provided for students to pursue a broad spectrum of professional knowledge in mathematical and theoretical physics. Analytical thinking, quantitative reasoning and innovative ideas are fostered through the effective design of courses and research projects. The curriculum emphasizes experiential learning through internships, field studies and research projects supervised by experts. With the comprehensive training received, graduates are expected to be well-prepared for further studies and to pursue careers in many fields of science and engineering.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with a rigorous representation using their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle physical problems with intellectual rigor theoretically (by means of coursework, tutorial classes and assessments in the curriculum)

PLO 3 : apply mathematical theory and techniques to analyze physical problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics
Major in Physics
Minor in Mathematics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (36 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)
MATH4501	Geometry (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS4351	Advanced quantum mechanics (6)

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Mathematics or Physics courses (MATH3XXX or MATH4XXX or MATH7XXX or PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current list of courses include courses in List A and those courses not selected to fulfill the capstone requirement, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)

MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)
PHYS3150	Theoretical physics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)

PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. (a) Students must have level 3 or above in HKDSE Physics or HKDSE Combined Science with Physics component or equivalent to take this major. Students who do not fufill this requirement are advised to take PHYS1240 Physics by inquiry; and
(b) Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fufill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics/Physics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Mathematics/Physics aims to provide students with a solid foundation in both physics and mathematics. This major is catered especially for students interested in the more theoretical aspects of physics. It covers a wide range of core areas in both disciplines which form the blocks of fundamental knowledge for further specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics, electrodynamics, linear algebra, mathematical analysis, abstract algebra, complex variables, differential equations, modern differential geometry, etc. A large selection of elective courses is provided for students to pursue a broad spectrum of professional knowledge in mathematical and theoretical physics. Analytical thinking, quantitative reasoning and innovative ideas are fostered through the effective design of courses and research projects. The curriculum emphasizes experiential learning through internships, field studies and research projects supervised by experts. With the comprehensive training received, graduates are expected to be well-prepared for further studies and to pursue careers in many fields of science and engineering.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with a rigorous representation using their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle physical problems with intellectual rigor theoretically (by means of coursework, tutorial classes and assessments in the curriculum)

PLO 3 : apply mathematical theory and techniques to analyze physical problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics
Major in Physics
Minor in Mathematics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (36 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)
MATH4501	Geometry (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS4351	Advanced quantum mechanics (6)

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Mathematics or Physics courses (MATH3XXX or MATH4XXX or MATH7XXX or PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current list of courses include courses in List A and those courses not selected to fulfill the capstone requirement, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)

MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)
PHYS3150	Theoretical physics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)

PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

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5. (a) Students must have level 3 or above in HKDSE Physics or HKDSE Combined Science with Physics component or equivalent to take this major. Students who do not fufill this requirement are advised to take PHYS1240 Physics by inquiry; and
(b) Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fufill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics/Physics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Mathematics/Physics aims to provide students with a solid foundation in both physics and mathematics. This major is catered especially for students interested in the more theoretical aspects of physics. It covers a wide range of core areas in both disciplines which form the blocks of fundamental knowledge for further specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics, electrodynamics, linear algebra, mathematical analysis, abstract algebra, complex variables, differential equations, modern differential geometry, etc. A large selection of elective courses is provided for students to pursue a broad spectrum of professional knowledge in mathematical and theoretical physics. Analytical thinking, quantitative reasoning and innovative ideas are fostered through the effective design of courses and research projects. The curriculum emphasizes experiential learning through internships, field studies and research projects supervised by experts. With the comprehensive training received, graduates are expected to be well-prepared for further studies and to pursue careers in many fields of science and engineering.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with a rigorous representation using their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle physical problems with intellectual rigor theoretically (by means of coursework, tutorial classes and assessments in the curriculum)

PLO 3 : apply mathematical theory and techniques to analyze physical problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics
Major in Physics
Minor in Mathematics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (36 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)
MATH4501	Geometry (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS4351	Advanced quantum mechanics (6)

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Mathematics or Physics courses (MATH3XXX or MATH4XXX or MATH7XXX or PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current list of courses include courses in List A and those courses not selected to fulfill the capstone requirement, but excluding MATH4966 Mathematics Internship.

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MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)

MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)
PHYS3150	Theoretical physics (6)
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PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)

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PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

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4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. (a) Students must have level 3 or above in HKDSE Physics or HKDSE Combined Science with Physics component or equivalent to take this major. Students who do not fufill this requirement are advised to take PHYS1240 Physics by inquiry; and
(b) Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fufill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Mathematics/Physics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Mathematics/Physics aims to provide students with a solid foundation in both physics and mathematics. This major is catered especially for students interested in the more theoretical aspects of physics. It covers a wide range of core areas in both disciplines which form the blocks of fundamental knowledge for further specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics, electrodynamics, linear algebra, mathematical analysis, abstract algebra, complex variables, differential equations, modern differential geometry, etc. A large selection of elective courses is provided for students to pursue a broad spectrum of professional knowledge in mathematical and theoretical physics. Analytical thinking, quantitative reasoning and innovative ideas are fostered through the effective design of courses and research projects. The curriculum emphasizes experiential learning through internships, field studies and research projects supervised by experts. With the comprehensive training received, graduates are expected to be well-prepared for further studies and to pursue careers in many fields of science and engineering.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with a rigorous representation using their professional knowledge (by means of coursework and tutorial classes in the curriculum)

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PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-world setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics
Major in Physics
Minor in Mathematics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (36 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)
MATH4501	Geometry (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS4351	Advanced quantum mechanics (6)

Disciplinary Electives (6 credits)

At least 6 credits of advanced level Mathematics or Physics courses (MATH3XXX or MATH4XXX or MATH7XXX or PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current list of courses include courses in List A and those courses not selected to fulfill the capstone requirement, but excluding MATH4966 Mathematics Internship.

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)
MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)

MATH4907	Numerical methods for financial calculus (6)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)
PHYS3150	Theoretical physics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4150	Computational physics (6)
PHYS4750	Experimental physics (6)

PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3999	Directed studies in mathematics (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. (a) Students must have level 3 or above in HKDSE Physics or HKDSE Combined Science with Physics component or equivalent to take this major. Students who do not fufill this requirement are advised to take PHYS1240 Physics by inquiry; and
(b) Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fufill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2015**

Objectives:
Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major offers specialized training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop variousessential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 2 : apply laboratory techniques essential to modern molecular science (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 3 : communicate in written and oral communication skills and collaborate with other students effectively (by means of coursework, research-based learning and presentation opportunities in the curriculum)

PLO 4 : acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 5 : gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment (by means of coursework, laboratory-based and experiential learning in the curriculum)

Impermissible Combination:
Minor in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (24 credits)

BIOL1110	From molecules to cells (6)	
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2220	Principles of biochemistry (6)	Take either BIOL2220 or BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.
BIOC2600	Basic biochemistry (6)	Take either BIOL2220 or

		BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.
Disciplinary Electives (6 credits)		
BIOL1309	Evolutionary diversity (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.
BIOL2306	Ecology and evolution (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.
2. Advanced level courses (48 credits)		
Disciplinary Core Courses (30 credits)		
BIOL3401	Molecular biology (6)	
BIOL3402	Cell biology and cell technology (6)	
BIOL4402	Microbial biotechnology (6)	
BIOL4411	Plant and food biotechnology (6)	
BIOL4415	Healthcare biotechnology (6)	
Disciplinary Electives (18 credits)		
At least 18 credits selected from the following courses:		
BIOL3403	Immunology (6)	
BIOL3404	Protein structure and function (6)	
BIOL3405	Molecular microbiology (6)	
BIOL3406	Reproduction and reproductive biotechnology (6)	
BIOL3408	Genetics (6)	
BIOL3409	Business aspects of biotechnology (6)	
BIOL4401	Medical microbiology and applied immunology (6)	
BIOL4409	General virology (6)	
BIOL4416	Stem cells and regenerative biology (6)	
BIOL4417	'Omics' and systems biology (6)	
ENVS4110	Environmental remediation (6)	
3. Capstone requirement (6 credits)		
At least 6 credits selected from the following courses:		
BIOL3993	Directed studies in Molecular biology & biotechnology (6)	
BIOL4963	Molecular biology & biotechnology internship (6)	
BIOL4993	Molecular biology & biotechnology project (12)	

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2014**

Objectives:
Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major offers specialized training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop variousessential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 2 : apply laboratory techniques essential to modern molecular science (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 3 : communicate in written and oral communication skills and collaborate with other students effectively (by means of coursework, research-based learning and presentation opportunities in the curriculum)

PLO 4 : acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 5 : gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment (by means of coursework, laboratory-based and experiential learning in the curriculum)

Impermissible Combination:
Minor in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (24 credit)

BIOL1110	From molecules to cells (6)	
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2220	Principles of biochemistry (6)	Take either BIOL2220 or BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.
BIOC2600	Basic biochemistry (6)	Take either BIOL2220 or

		BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.

Disciplinary Electives (6 credits)

BIOL1309	Evolutionary diversity (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.
BIOL2306	Ecology and evolution (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.

2. Advanced level courses (48 credits)

Disciplinary Core Courses (30 credits)

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

Disciplinary Electives (18 credit)

At least 18 credits selected from the following courses:

BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3405	Molecular microbiology (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3408	Genetics (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4409	General virology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3993	Directed studies in Molecular biology & biotechnology (6)
BIOL4963	Molecular biology & biotechnology internship (6)
BIOL4993	Molecular biology & biotechnology project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2013**

Objectives:
Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major offers specialized training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop variousessential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 2 : apply laboratory techniques essential to modern molecular science (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 3 : communicate in written and oral communication skills and collaborate with other students effectively (by means of coursework, research-based learning and presentation opportunities in the curriculum)

PLO 4 : acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 5 : gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment (by means of coursework, laboratory-based and experiential learning in the curriculum)

Impermissible Combination:
Minor in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (24 credits)

BIOL1110	From molecules to cells (6)	
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2220	Principles of biochemistry (6)	Take either BIOL2220 or BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.
BIOC2600	Basic biochemistry (6)	Take either BIOL2220 or

		BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.

Disciplinary Electives (6 credits)

BIOL1309	Evolutionary diversity (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.
BIOL2306	Ecology and evolution (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.

2. Advanced level courses (48 credits)

Disciplinary Core Courses (30 credits)

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3405	Molecular microbiology (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3408	Genetics (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4409	General virology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3993	Directed studies in Molecular biology & biotechnology (6)
BIOL4963	Molecular biology & biotechnology internship (6)
BIOL4993	Molecular biology & biotechnology project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2012**

Objectives:
Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major offers specialized training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop variousessential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 2 : apply laboratory techniques essential to modern molecular science (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 3 : communicate in written and oral communication skills and collaborate with other students effectively (by means of coursework, research-based learning and presentation opportunities in the curriculum)

PLO 4 : acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

PLO 5 : gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment (by means of coursework, laboratory-based and experiential learning in the curriculum)

Impermissible Combination:
Minor in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	

Disciplinary Core Courses (24 credits)

BIOL1110	From molecules to cells (6)	
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2220	Principles of biochemistry (6)	Take either BIOL2220 or BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.
BIOC2600	Basic biochemistry (6)	Take either BIOL2220 or

		BIOC2600 to fulfill this 24 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive.

Disciplinary Electives (6 credits)

BIOL1309	Evolutionary diversity (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.
BIOL2306	Ecology and evolution (6)	Take either BIOL1309 or BIOL2306 to fulfill this 6 credits requirement, but not both.

2. Advanced level courses (48 credits)

Disciplinary Core Courses (30 credits)

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3405	Molecular microbiology (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3408	Genetics (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4409	General virology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3993	Directed studies in Molecular biology & biotechnology (6)
BIOL4963	Molecular biology & biotechnology internship (6)
BIOL4993	Molecular biology & biotechnology project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Physics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Physics aims to provide students with a solid foundation on the subject. Core courses form the blocks of fundamental knowledge to pursue learning in specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics and electrodynamics. A large selection of elective courses is provided for students to pursue a wide range of topics from the very small scale (i.e. subatomic particles) to the large scale (i.e. cosmology). Students will attain professional knowledge in physics, research experience and the training of analytical thinking and quantitative reasoning during their studies. Graduates are expected to have acquired the broad training which can equip them well for further studies in multiple science and technology disciplines and to work in their specialized area.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : analyze problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-word setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1150	Problem solving in physics (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2260	Heat and waves (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (24 credits)

PHYS3350	Classical mechanics (6)

PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements.

List A

PHYS3150	Theoretical physics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Physics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Physics aims to provide students with a solid foundation on the subject. Core courses form the blocks of fundamental knowledge to pursue learning in specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics and electrodynamics. A large selection of elective courses is provided for students to pursue a wide range of topics from the very small scale (i.e. subatomic particles) to the large scale (i.e. cosmology). Students will attain professional knowledge in physics, research experience and the training of analytical thinking and quantitative reasoning during their studies. Graduates are expected to have acquired the broad training which can equip them well for further studies in multiple science and technology disciplines and to work in their specialized area.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : analyze problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-word setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1150	Problem solving in physics (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2260	Heat and waves (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (24 credits)

PHYS3350	Classical mechanics (6)

PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements.

List A

PHYS3150	Theoretical physics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Physics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Physics aims to provide students with a solid foundation on the subject. Core courses form the blocks of fundamental knowledge to pursue learning in specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics and electrodynamics. A large selection of elective courses is provided for students to pursue a wide range of topics from the very small scale (i.e. subatomic particles) to the large scale (i.e. cosmology). Students will attain professional knowledge in physics, research experience and the training of analytical thinking and quantitative reasoning during their studies. Graduates are expected to have acquired the broad training which can equip them well for further studies in multiple science and technology disciplines and to work in their specialized area.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : analyze problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-word setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1150	Problem solving in physics (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2260	Heat and waves (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (24 credits)

PHYS3350	Classical mechanics (6)

PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements.

List A

PHYS3150	Theoretical physics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Physics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Physics aims to provide students with a solid foundation on the subject. Core courses form the blocks of fundamental knowledge to pursue learning in specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics and electrodynamics. A large selection of elective courses is provided for students to pursue a wide range of topics from the very small scale (i.e. subatomic particles) to the large scale (i.e. cosmology). Students will attain professional knowledge in physics, research experience and the training of analytical thinking and quantitative reasoning during their studies. Graduates are expected to have acquired the broad training which can equip them well for further studies in multiple science and technology disciplines and to work in their specialized area.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with their professional knowledge (by means of coursework and tutorial classes in the curriculum)

PLO 2 : have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : analyze problems qualitatively and quantitatively, and appraise the related ethical issues (by means of coursework, tutorial classes and research-based projects in the curriculum)

PLO 4 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

PLO 5 : apply scientific and quantitative methods in tackling problems in research or real-word setting (by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (36 credits)

PHYS1150	Problem solving in physics (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2260	Heat and waves (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

Disciplinary Core Courses (24 credits)

PHYS3350	Classical mechanics (6)

PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements.The current list includes courses in List A and those courses not selected to fulfill the capstone requirements.

List A

PHYS3150	Theoretical physics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)
PHYS3851	Atomic and nuclear physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3999	Directed studies in physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-credit advanced level course (disciplinary electives) in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Risk Management
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Risk Management aims to provide students with the skills and expertise in the theory and methodology behind the scientific process of risk management, with application to actuarial science, finance and other related areas of interest. It is designed to provide solid training in the concepts of the risk management process, statistical models and methods of risk management, and good risk management practice. Core courses in the curriculum emphasize fundamental concepts and nature of risk assessment, risk management and governance from different standpoints while elective courses provide either training in specific Risk Management disciplines or an extension of knowledge aiming to give students more modeling, technical and analytical skills in risk management, including data mining, stochastic calculus, and financial time series modeling.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and categorize the various risks faced by an organization and be able to demonstrate a critical understanding of generic risk management issues and techniques (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : analyze and assess risk management situations, and be able to deal with qualitative as well as quantitative aspects appropriate to the situation (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : critically evaluate and make effective use of models and techniques for risk assessment and management, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : make informed risk management decisions, employ any techniques necessary to acquire and interpret relevant data and information from different sources and the factors that influence their perceptions of risk identification, risk reduction, risk mitigation and risk transfer (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on risk management issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in risk management through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Decision Analytics
Major in Statistics
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
MATH2014	Multivariable calculus and linear algebra (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3609	The statistics of investment risk (6)
STAT3615	Practical mathematics for investment (6)
STAT4601	Time-series analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

STAT3603	Probability modelling (6)
STAT3610	Risk management and insurance (6)
STAT3612	Data mining (6)
STAT3618	Derivatives and risk management (6)
STAT3911	Financial economics II (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take

this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Risk Management
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Risk Management aims to provide students with the skills and expertise in the theory and methodology behind the scientific process of risk management, with application to actuarial science, finance and other related areas of interest. It is designed to provide solid training in the concepts of the risk management process, statistical models and methods of risk management, and good risk management practice. Core courses in the curriculum emphasize fundamental concepts and nature of risk assessment, risk management and governance from different standpoints while elective courses provide either training in specific Risk Management disciplines or an extension of knowledge aiming to give students more modeling, technical and analytical skills in risk management, including data mining, stochastic calculus, and financial time series modeling.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and categorize the various risks faced by an organization and be able to demonstrate a critical understanding of generic risk management issues and techniques (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : analyze and assess risk management situations, and be able to deal with qualitative as well as quantitative aspects appropriate to the situation (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : critically evaluate and make effective use of models and techniques for risk assessment and management, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : make informed risk management decisions, employ any techniques necessary to acquire and interpret relevant data and information from different sources and the factors that influence their perceptions of risk identification, risk reduction, risk mitigation and risk transfer (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on risk management issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in risk management through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Decision Analytics
Major in Statistics
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
MATH2014	Multivariable calculus and linear algebra (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3609	The statistics of investment risk (6)
STAT3615	Practical mathematics for investment (6)
STAT4601	Time-series analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

STAT3603	Probability modelling (6)
STAT3610	Risk management and insurance (6)
STAT3612	Data mining (6)
STAT3618	Derivatives and risk management (6)
STAT3911	Financial economics II (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take

this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Risk Management
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Risk Management aims to provide students with the skills and expertise in the theory and methodology behind the scientific process of risk management, with application to actuarial science, finance and other related areas of interest. It is designed to provide solid training in the concepts of the risk management process, statistical models and methods of risk management, and good risk management practice. Core courses in the curriculum emphasize fundamental concepts and nature of risk assessment, risk management and governance from different standpoints while elective courses provide either training in specific Risk Management disciplines or an extension of knowledge aiming to give students more modeling, technical and analytical skills in risk management, including data mining, stochastic calculus, and financial time series modeling.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and categorize the various risks faced by an organization and be able to demonstrate a critical understanding of generic risk management issues and techniques (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : analyze and assess risk management situations, and be able to deal with qualitative as well as quantitative aspects appropriate to the situation (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : critically evaluate and make effective use of models and techniques for risk assessment and management, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : make informed risk management decisions, employ any techniques necessary to acquire and interpret relevant data and information from different sources and the factors that influence their perceptions of risk identification, risk reduction, risk mitigation and risk transfer (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on risk management issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in risk management through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Decision Analytics
Major in Statistics
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3609	The statistics of investment risk (6)
STAT3615	Practical mathematics for investment (6)
STAT4601	Time-series analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

STAT3603	Probability modelling (6)
STAT3610	Risk management and insurance (6)
STAT3612	Data mining (6)
STAT3618	Derivatives and risk management (6)
STAT3911	Financial economics II (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take

this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Risk Management
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Risk Management aims to provide students with the skills and expertise in the theory and methodology behind the scientific process of risk management, with application to actuarial science, finance and other related areas of interest. It is designed to provide solid training in the concepts of the risk management process, statistical models and methods of risk management, and good risk management practice. Core courses in the curriculum emphasize fundamental concepts and nature of risk assessment, risk management and governance from different standpoints while elective courses provide either training in specific Risk Management disciplines or an extension of knowledge aiming to give students more modeling, technical and analytical skills in risk management, including data mining, stochastic calculus, and financial time series modeling.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and categorize the various risks faced by an organization and be able to demonstrate a critical understanding of generic risk management issues and techniques (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : analyze and assess risk management situations, and be able to deal with qualitative as well as quantitative aspects appropriate to the situation (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : critically evaluate and make effective use of models and techniques for risk assessment and management, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : make informed risk management decisions, employ any techniques necessary to acquire and interpret relevant data and information from different sources and the factors that influence their perceptions of risk identification, risk reduction, risk mitigation and risk transfer (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on risk management issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : gain insights into current advances in risk management through either project or industrial training (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Decision Analytics
Major in Statistics
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3609	The statistics of investment risk (6)
STAT3615	Practical mathematics for investment (6)
STAT4601	Time-series analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

STAT3603	Probability modelling (6)
STAT3610	Risk management and insurance (6)
STAT3612	Data mining (6)
STAT3618	Derivatives and risk management (6)
STAT3911	Financial economics II (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

4. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take

this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

6. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Statistics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Major in Statistics focuses on the study of statistics, a scientific discipline characterized by the development and applications of analytical and quantitative tools which involve logical thinking, problem formulation, probability reasoning and intensive data analyses. The programme aims to equip students with powerful mathematical, analytical and computational skills, which are in great demand in practical areas where data are obtained for the purpose of extracting information in support of decision making. It gives students a strong background in statistical concepts, and provides broad and solid training in applied statistical methodologies. The curriculum is constantly revised to meet a steadily rising demand for specialist statisticians or quantitative analysts in government, business, finance, industry, as well as in research and teaching in local and overseas institutions.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : receive solid training in probability and statistics, gain insight into their underlying theory and be acquainted with their state-of-the-art applications in the modern world (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : conduct meticulous data analyses, supported by rigorous statistical reasoning, to make informed decisions in the face of uncertainty that arises in all sorts of institutions and companies, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : equip with hands-on experience in data analysis using commercial statistical software, and be competent for data-analytic jobs which require advanced computational skills (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : be highly motivated to explore cross-disciplinary applications of statistics in a broad variety of academic or professional areas including, in particular, mathematics, natural sciences, economics, finance, business, risk management, actuarial work, social sciences and engineering (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on probability and statistical issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : through the understanding and application of statistical concepts and techniques, gain confidence to meet challenges posed by increasingly complicated real-life problems encountered in the modern era in a creative and rational manner (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Decision Analytics
Major in Risk Management
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
MATH2014	Multivariable calculus and linear algebra (6)

STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3603	Probability modelling (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits from Lists A and B, among which at least 6 credits from List A:

List A

STAT3602	Statistical inference (6)
STAT3604	Design and analysis of experiments (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)

List B

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3955	Survival analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:
1. Students who wish to specialize in the theme of data science are recommended to choose the combination of courses STAT3612, STAT3613, STAT3616 and STAT3621. Note that students who wish to take STAT3616 and STAT3621 are strongly recommended to take STAT2603 first.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major

opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Statistics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Major in Statistics focuses on the study of statistics, a scientific discipline characterized by the development and applications of analytical and quantitative tools which involve logical thinking, problem formulation, probability reasoning and intensive data analyses. The programme aims to equip students with powerful mathematical, analytical and computational skills, which are in great demand in practical areas where data are obtained for the purpose of extracting information in support of decision making. It gives students a strong background in statistical concepts, and provides broad and solid training in applied statistical methodologies. The curriculum is constantly revised to meet a steadily rising demand for specialist statisticians or quantitative analysts in government, business, finance, industry, as well as in research and teaching in local and overseas institutions.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : receive solid training in probability and statistics, gain insight into their underlying theory and be acquainted with their state-of-the-art applications in the modern world (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : conduct meticulous data analyses, supported by rigorous statistical reasoning, to make informed decisions in the face of uncertainty that arises in all sorts of institutions and companies, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : equip with hands-on experience in data analysis using commercial statistical software, and be competent for data-analytic jobs which require advanced computational skills (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : be highly motivated to explore cross-disciplinary applications of statistics in a broad variety of academic or professional areas including, in particular, mathematics, natural sciences, economics, finance, business, risk management, actuarial work, social sciences and engineering (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on probability and statistical issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : through the understanding and application of statistical concepts and techniques, gain confidence to meet challenges posed by increasingly complicated real-life problems encountered in the modern era in a creative and rational manner (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Decision Analytics
Major in Risk Management
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
MATH2014	Multivariable calculus and linear algebra (6)

STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3603	Probability modelling (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Disciplinary Electives (24 credit)

At least 24 credits from Lists A and B, among which at least 6 credits from List A:

List A

STAT3602	Statistical inference (6)
STAT3604	Design and analysis of experiments (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)

List B

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3955	Survival analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Students who wish to specialize in the theme of data science are recommended to choose the combination of courses STAT3612, STAT3613, STAT3616 and STAT3621. Note that students who wish to take STAT3616 and STAT3621 are strongly recommended to take STAT2603 first.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major

opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed equivalent to MATH1013 University mathematics II and MATH2014 Multivariable calculus and linear algebra. However, students have to take two extra MATH2XXX or above level courses to replace MATH1013 and MATH2014.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Statistics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Statistics focuses on the study of statistics, a scientific discipline characterized by the development and applications of analytical and quantitative tools which involve logical thinking, problem formulation, probability reasoning and intensive data analyses. The programme aims to equip students with powerful mathematical, analytical and computational skills, which are in great demand in practical areas where data are obtained for the purpose of extracting information in support of decision making. It gives students a strong background in statistical concepts, and provides broad and solid training in applied statistical methodologies. The curriculum is constantly revised to meet a steadily rising demand for specialist statisticians or quantitative analysts in government, business, finance, industry, as well as in research and teaching in local and overseas institutions.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : receive solid training in probability and statistics, gain insight into their underlying theory and be acquainted with their state-of-the-art applications in the modern world (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : conduct meticulous data analyses, supported by rigorous statistical reasoning, to make informed decisions in the face of uncertainty that arises in all sorts of institutions and companies, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : equip with hands-on experience in data analysis using commercial statistical software, and be competent for data-analytic jobs which require advanced computational skills (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : be highly motivated to explore cross-disciplinary applications of statistics in a broad variety of academic or professional areas including, in particular, mathematics, natural sciences, economics, finance, business, risk management, actuarial work, social sciences and engineering (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on probability and statistical issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : through the understanding and application of statistical concepts and techniques, gain confidence to meet challenges posed by increasingly complicated real-life problems encountered in the modern era in a creative and rational manner (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Decision Analytics
Major in Risk Management
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3603	Probability modelling (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits from Lists A and B, among which at least 6 credits from List A:

List A

STAT3602	Statistical inference (6)
STAT3604	Design and analysis of experiments (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)

List B

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3955	Survival analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Students who wish to specialize in the theme of data science are recommended to choose the combination of courses STAT3612, STAT3613, STAT3616 and STAT3621. Note that students who wish to take STAT3616 and STAT3621 are strongly recommended to take STAT2603 first.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits

to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Major Title	Major in Statistics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Statistics focuses on the study of statistics, a scientific discipline characterized by the development and applications of analytical and quantitative tools which involve logical thinking, problem formulation, probability reasoning and intensive data analyses. The programme aims to equip students with powerful mathematical, analytical and computational skills, which are in great demand in practical areas where data are obtained for the purpose of extracting information in support of decision making. It gives students a strong background in statistical concepts, and provides broad and solid training in applied statistical methodologies. The curriculum is constantly revised to meet a steadily rising demand for specialist statisticians or quantitative analysts in government, business, finance, industry, as well as in research and teaching in local and overseas institutions.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : receive solid training in probability and statistics, gain insight into their underlying theory and be acquainted with their state-of-the-art applications in the modern world (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 2 : conduct meticulous data analyses, supported by rigorous statistical reasoning, to make informed decisions in the face of uncertainty that arises in all sorts of institutions and companies, and appraise the related ethical issues (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 3 : equip with hands-on experience in data analysis using commercial statistical software, and be competent for data-analytic jobs which require advanced computational skills (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 4 : be highly motivated to explore cross-disciplinary applications of statistics in a broad variety of academic or professional areas including, in particular, mathematics, natural sciences, economics, finance, business, risk management, actuarial work, social sciences and engineering (by means of coursework, tutorial classes and/or project-based learning in the curriculum)

PLO 5 : communicate and collaborate with people effectively on probability and statistical issues (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

PLO 6 : through the understanding and application of statistical concepts and techniques, gain confidence to meet challenges posed by increasingly complicated real-life problems encountered in the modern era in a creative and rational manner (by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Decision Analytics
Major in Risk Management
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111	Scientific method and reasoning (6)
SCNC1112	Fundamentals of modern science (6)

Disciplinary Core Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

STAT3600	Linear statistical analysis (6)
STAT3603	Probability modelling (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Disciplinary Electives (24 credits)

At least 24 credits from Lists A and B, among which at least 6 credits from List A:

List A

STAT3602	Statistical inference (6)
STAT3604	Design and analysis of experiments (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)

List B

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3955	Survival analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT3799	Directed studies in statistics (6)
STAT4710	Capstone experience for statistics undergraduates (6)
STAT4766	Statistics internship (6)
STAT4799	Statistics project (12)

Notes:

1. Students who wish to specialize in the theme of data science are recommended to choose the combination of courses STAT3612, STAT3613, STAT3616 and STAT3621. Note that students who wish to take STAT3616 and STAT3621 are strongly recommended to take STAT2603 first.

2. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits

to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

3. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ("disciplinary core") in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) (disciplinary electives) in the second major. Double counting of credits is not permissible for major-minor or double-minors combinations. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

4. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major disciplines. If this is approved, a 6-credit advanced level course (disciplinary electives) in the second major must be taken to fulfill the credit requirement of the capstone experience.

5. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

6. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

7. The course MATH1821 Mathematical methods for actuarial science I is deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

SECTION VI

Science Minors on offer in 2015-16

SCIENCE

SECTION VI Science Minors on offer in 2015/16

Minors offered by Science Faculty

Minors (16)

Actuarial Studies
Astronomy
Biochemistry
Chemistry
Computational & Financial Mathematics
Earth Sciences
Ecology & Biodiversity
Environmental Science
Food & Nutritional Science
Marine Biology
Mathematics
Molecular Biology & Biotechnology
Physics
Plant Science
Risk Management
Statistics

Minor Title	Minor in Actuarial Studies
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Actuarial Studies aims to provide interested students with an introduction to the basic concepts and methodologies in Actuarial Science. The minor curriculum is designed particularly for students from different majors to enhance their interests in Actuarial Science and to strengthen their confidence and potential in solving mathematical, financial, economical and investment-related problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and apply the methods used by actuaries to solve problems of insurance, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : develop and apply problem-solving skills appropriate to the level of the preliminary education component specified by international actuarial bodies such as the Society of Actuaries (by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combination:
Bachelor of Science in Actuarial Science

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

FINA1310	Corporate finance (6)
MATH1013	University mathematics II (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2605	Demographic and socio-economic statistics (6)
STAT2901	Probability and statistics: foundations of actuarial science (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3615	Practical mathematics for investment (6)
STAT3901	Life contingencies (6)
STAT3904	Corporate finance for actuarial science (6)
STAT3906	Risk theory I (6)
STAT3908	Credibility theory and loss distributions (6)
STAT3910	Financial economics I (6)
STAT3911	Financial economics II (6)
STAT4903	Actuarial techniques for general insurance (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Actuarial Studies
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Actuarial Studies aims to provide interested students with an introduction to the basic concepts and methodologies in Actuarial Science. The minor curriculum is designed particularly for students from different majors to enhance their interests in Actuarial Science and to strengthen their confidence and potential in solving mathematical, financial, economical and investment-related problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and apply the methods used by actuaries to solve problems of insurance, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : develop and apply problem-solving skills appropriate to the level of the preliminary education component specified by international actuarial bodies such as the Society of Actuaries (by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combination:
Bachelor of Science in Actuarial Science

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

FINA1310	Corporate finance (6)
MATH1013	University mathematics II (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2605	Demographic and socio-economic statistics (6)
STAT2901	Probability and statistics: foundations of actuarial science (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3615	Practical mathematics for investment (6)
STAT3901	Life contingencies (6)
STAT3904	Corporate finance for actuarial science (6)
STAT3906	Risk theory I (6)
STAT3908	Credibility theory and loss distributions (6)
STAT3910	Financial economics I (6)
STAT3911	Financial economics II (6)
STAT4903	Actuarial techniques for general insurance (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Actuarial Studies
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Actuarial Studies aims to provide interested students with an introduction to the basic concepts and methodologies in Actuarial Science. The minor curriculum is designed particularly for students from different majors to enhance their interests in Actuarial Science and to strengthen their confidence and potential in solving mathematical, financial, economical and investment-related problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and apply the methods used by actuaries to solve problems of insurance, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : develop and apply problem-solving skills appropriate to the level of the preliminary education component specified by international actuarial bodies such as the Society of Actuaries (by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combination:
Bachelor of Science in Actuarial Science

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

FINA1310	Corporate finance (6)
MATH1013	University mathematics II (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2605	Demographic and socio-economic statistics (6)
STAT2901	Probability and statistics: foundations of actuarial science (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3615	Practical mathematics for investment (6)
STAT3901	Life contingencies (6)
STAT3904	Corporate finance for actuarial science (6)
STAT3906	Risk theory I (6)
STAT3908	Credibility theory and loss distributions (6)
STAT3910	Financial economics I (6)
STAT3911	Financial economics II (6)
STAT4903	Actuarial techniques for general insurance (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Actuarial Studies
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Actuarial Studies aims to provide interested students with an introduction to the basic concepts and methodologies in Actuarial Science. The minor curriculum is designed particularly for students from different majors to enhance their interests in Actuarial Science and to strengthen their confidence and potential in solving mathematical, financial, economical and investment-related problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and apply the methods used by actuaries to solve problems of insurance, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : develop and apply problem-solving skills appropriate to the level of the preliminary education component specified by international actuarial bodies such as the Society of Actuaries (by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combination:
Bachelor of Science in Actuarial Science

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

FINA1310	Corporate finance (6)
MATH1013	University mathematics II (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2605	Demographic and socio-economic statistics (6)
STAT2901	Probability and statistics: foundations of actuarial science (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3615	Practical mathematics for investment (6)
STAT3901	Life contingencies (6)
STAT3904	Corporate finance for actuarial science (6)
STAT3906	Risk theory I (6)
STAT3908	Credibility theory and loss distributions (6)
STAT3910	Financial economics I (6)
STAT3911	Financial economics II (6)
STAT4903	Actuarial techniques for general insurance (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Astronomy
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Astronomy is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses to allow them to pursue their interests in the subject and to establish connections between the field of astronomy and other science disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : develop their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and opportunities of field activities in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Astronomy

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the

credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Astronomy
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Astronomy is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses to allow them to pursue their interests in the subject and to establish connections between the field of astronomy and other science disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : develop their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and opportunities of field activities in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Astronomy

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the

credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Astronomy
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Astronomy is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses to allow them to pursue their interests in the subject and to establish connections between the field of astronomy and other science disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : develop their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and opportunities of field activities in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Astronomy

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the

credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Astronomy
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Astronomy is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses to allow them to pursue their interests in the subject and to establish connections between the field of astronomy and other science disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe astrophysical phenomena with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : develop their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature (by means of coursework, tutorial classes, and opportunities of field activities in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Astronomy

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS7650	Stellar atmospheres (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the

credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Biochemistry
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Biochemistry is designed to provide students from all backgrounds with a multidisciplinary perspective on contemporary biochemistry and molecular biology. This minor curriculum incorporates significant flexibility to allow students to select courses that will complement the individual student's Major.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the fundamentals of biochemistry and molecular biology, and apply biochemical knowledge appropriately and effectively (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : integrate knowledge regarding the structure and function of biological molecules and how they come together to form the systems that make up life (by means of coursework and laboratory-based learning in the curriculum)

PLO 3 : develop a general interest in biochemistry and recognize the inter-relationship of biochemistry with other disciplines (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Biochemistry

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
BIOC2600	Basic biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOC4610	Advanced biochemistry (6)
BIOC4612	Molecular biology of the gene (6)

BIOC4613	Advanced techniques in biochemistry & molecular biology (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4444	Chemical biology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Biochemistry
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Biochemistry is designed to provide students from all backgrounds with a multidisciplinary perspective on contemporary biochemistry and molecular biology. This minor curriculum incorporates significant flexibility to allow students to select courses that will complement the individual student's Major.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the fundamentals of biochemistry and molecular biology, and apply biochemical knowledge appropriately and effectively (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : integrate knowledge regarding the structure and function of biological molecules and how they come together to form the systems that make up life (by means of coursework and laboratory-based learning in the curriculum)

PLO 3 : develop a general interest in biochemistry and recognize the inter-relationship of biochemistry with other disciplines (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Biochemistry

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
BIOC2600	Basic biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOC4610	Advanced biochemistry (6)
BIOC4612	Molecular biology of the gene (6)

BIOC4613	Advanced techniques in biochemistry & molecular biology (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4444	Chemical biology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Biochemistry
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Biochemistry is designed to provide students from all backgrounds with a multidisciplinary perspective on contemporary biochemistry and molecular biology. This minor curriculum incorporates significant flexibility to allow students to select courses that will complement the individual student's Major.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	describe the fundamentals of biochemistry and molecular biology, and apply biochemical knowledge appropriately and effectively (by means of coursework and laboratory-based learning in the curriculum)
PLO 2 :	integrate knowledge regarding the structure and function of biological molecules and how they come together to form the systems that make up life (by means of coursework and laboratory-based learning in the curriculum)
PLO 3 :	develop a general interest in biochemistry and recognize the inter-relationship of biochemistry with other disciplines (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Biochemistry

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
BIOC2600	Basic biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOC3601	Basic metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOC4610	Advanced biochemistry (6)
BIOC4612	Molecular biology of the gene (6)

BIOC4613	Advanced techniques in biochemistry & molecular biology (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4444	Chemical biology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Biochemistry
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Biochemistry is designed to provide students from all backgrounds with a multidisciplinary perspective on contemporary biochemistry and molecular biology. This minor curriculum incorporates significant flexibility to allow students to select courses that will complement the individual student's Major.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : describe the fundamentals of biochemistry and molecular biology, and apply biochemical knowledge appropriately and effectively (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : integrate knowledge regarding the structure and function of biological molecules and how they come together to form the systems that make up life (by means of coursework and laboratory-based learning in the curriculum)

PLO 3 : develop a general interest in biochemistry and recognize the inter-relationship of biochemistry with other disciplines (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Biochemistry

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
BIOC2600	Basic biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOC3601	Basic metabolism (6)
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BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOC4610	Advanced biochemistry (6)
BIOC4612	Molecular biology of the gene (6)

BIOC4613	Advanced techniques in biochemistry & molecular biology (6)
BIOL4417	'Omics' and systems biology (6)
CHEM4444	Chemical biology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Chemistry
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Chemistry aims to provide students with fundamental knowledge and skills of chemistry. The minor curriculum is flexible. Students of different majors in science and other disciplines will be able to select courses that complement their major areas of study as well as enhance their knowledge in chemistry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and apply the basic concepts of chemistry (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : apply chemistry concepts in other subjects (by means of coursework and laboratory-based learning in the curriculum)

PLO 3 : transfer the basic concepts to complement their major area of study (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Chemistry

Required courses (42 credits)

1. Introductory level courses (24 credits)

Disciplinary Core Courses (12 credits)

CHEM1042	General chemistry I (6)
CHEM1043	General chemistry II (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2442	Fundamentals of organic chemistry (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2541	Introductory physical chemistry (6)	

2. Advanced level courses (18 credits)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3146	Principles and applications of spectroscopic

	and analytical techniques (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
CHEM3243	Introductory instrumental chemical analysis (6)
CHEM3244	Analytical techniques for pharmacy students (6)
CHEM3341	Inorganic chemistry II (6)
CHEM3342	Bioinorganic chemistry (6)
CHEM3441	Organic chemistry II (6)
CHEM3442	Organic chemistry of biomolecules (6)
CHEM3443	Organic chemistry laboratory (6)
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)
CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)
CHEM3999	Directed studies in chemistry (6)
CHEM4142	Symmetry, group theory and applications (6)
CHEM4143	Interfacial science and technology (6)
CHEM4144	Advanced materials (6)
CHEM4145	Medicinal chemistry (6)
CHEM4241	Modern chemical instrumentation and applications (6)
CHEM4242	Analytical chemistry (6)
CHEM4341	Advanced inorganic chemistry (6)
CHEM4342	Organometallic chemistry (6)
CHEM4441	Advanced organic chemistry (6)
CHEM4443	Integrated organic synthesis (6)
CHEM4444	Chemical biology (6)
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)
CHEM4542	Computational chemistry (6)
CHEM4543	Advanced physical chemistry (6)
CHEM4910	Chemistry literacy and research (6)
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)
CHEM4966	Chemistry internship (6)
CHEM4999	Chemistry project (12)

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fuifill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Chemistry
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Chemistry aims to provide students with fundamental knowledge and skills of chemistry. The minor curriculum is flexible. Students of different majors in science and other disciplines will be able to select courses that complement their major areas of study as well as enhance their knowledge in chemistry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and apply the basic concepts of chemistry (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : apply chemistry concepts in other subjects (by means of coursework and laboratory-based learning in the curriculum)

PLO 3 : transfer the basic concepts to complement their major area of study (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Chemistry

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (6 credits)

CHEM1042	General chemistry I (6)	[previous title: General chemistry (6)]

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2442	Fundamentals of organic chemistry (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2541	Introductory physical chemistry (6)	[previous title: Physical chemistry I (6)]

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3146	Principles and applications of spectroscopic and analytical techniques (6)

CHEM3241	Analytical chemistry II: chemical instrumentation (6)	
CHEM3242	Food and water analysis (6)	
CHEM3243	Introductory instrumental chemical analysis (6)	
CHEM3244	Analytical techniques for pharmacy students (6)	
CHEM3341	Inorganic chemistry II (6)	
CHEM3342	Bioinorganic chemistry (6)	
CHEM3441	Organic chemistry II (6)	
CHEM3442	Organic chemistry of biomolecules (6)	
CHEM3443	Organic chemistry laboratory (6)	
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)	[previous title: Physical chemistry II: Introduction to quantum chemistry (6)]
CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)	
CHEM3999	Directed studies in chemistry (6)	
CHEM4142	Symmetry, group theory and applications (6)	
CHEM4143	Interfacial science and technology (6)	
CHEM4144	Advanced materials (6)	
CHEM4145	Medicinal chemistry (6)	
CHEM4241	Modern chemical instrumentation and applications (6)	
CHEM4242	Analytical chemistry (6)	
CHEM4341	Advanced inorganic chemistry (6)	
CHEM4342	Organometallic chemistry (6)	
CHEM4441	Advanced organic chemistry (6)	
CHEM4443	Integrated organic synthesis (6)	
CHEM4444	Chemical biology (6)	
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)	
CHEM4542	Computational chemistry (6)	
CHEM4543	Advanced physical chemistry (6)	
CHEM4910	Chemistry literacy and research (6)	
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)	
CHEM4966	Chemistry internship (6)	
CHEM4999	Chemistry project (12)	

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fuifill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Chemistry
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Chemistry aims to provide students with fundamental knowledge and skills of chemistry. The minor curriculum is flexible. Students of different majors in science and other disciplines will be able to select courses that complement their major areas of study as well as enhance their knowledge in chemistry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	understand and apply the basic concepts of chemistry (by means of coursework and laboratory-based learning in the curriculum)
PLO 2 :	apply chemistry concepts in other subjects (by means of coursework and laboratory-based learning in the curriculum)
PLO 3 :	transfer the basic concepts to complement their major area of study (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Chemistry

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (6 credits)

CHEM1042	General chemistry I (6)	[previous title: General chemistry (6)]

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2442	Fundamentals of organic chemistry (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2541	Introductory physical chemistry (6)	[previous title: Physical chemistry I (6)]

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3146	Principles and applications of spectroscopic and analytical techniques (6)

CHEM3241	Analytical chemistry II: chemical instrumentation (6)	
CHEM3242	Food and water analysis (6)	
CHEM3243	Introductory instrumental chemical analysis (6)	
CHEM3244	Analytical techniques for pharmacy students (6)	
CHEM3341	Inorganic chemistry II (6)	
CHEM3342	Bioinorganic chemistry (6)	
CHEM3441	Organic chemistry II (6)	
CHEM3442	Organic chemistry of biomolecules (6)	
CHEM3443	Organic chemistry laboratory (6)	
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)	[previous title: Physical chemistry II: Introduction to quantum chemistry (6)]
CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)	
CHEM3999	Directed studies in chemistry (6)	
CHEM4142	Symmetry, group theory and applications (6)	
CHEM4143	Interfacial science and technology (6)	
CHEM4144	Advanced materials (6)	
CHEM4145	Medicinal chemistry (6)	
CHEM4241	Modern chemical instrumentation and applications (6)	
CHEM4242	Analytical chemistry (6)	
CHEM4341	Advanced inorganic chemistry (6)	
CHEM4342	Organometallic chemistry (6)	
CHEM4441	Advanced organic chemistry (6)	
CHEM4443	Integrated organic synthesis (6)	
CHEM4444	Chemical biology (6)	
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)	
CHEM4542	Computational chemistry (6)	
CHEM4543	Advanced physical chemistry (6)	
CHEM4910	Chemistry literacy and research (6)	
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)	
CHEM4966	Chemistry internship (6)	
CHEM4999	Chemistry project (12)	

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fuifill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Chemistry
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Chemistry aims to provide students with fundamental knowledge and skills of chemistry. The minor curriculum is flexible. Students of different majors in science and other disciplines will be able to select courses that complement their major areas of study as well as enhance their knowledge in chemistry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	understand and apply the basic concepts of chemistry (by means of coursework and laboratory-based learning in the curriculum)
PLO 2 :	apply chemistry concepts in other subjects (by means of coursework and laboratory-based learning in the curriculum)
PLO 3 :	transfer the basic concepts to complement their major area of study (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Chemistry

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (6 credits)

CHEM1042	General chemistry I (6)	[previous title: General chemistry (6)]

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2442	Fundamentals of organic chemistry (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2541	Introductory physical chemistry (6)	[previous title: Physical chemistry I (6)]

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

CHEM3141	Environmental chemistry (6)
CHEM3142	Chemical process industries and analysis (6)
CHEM3143	Introduction to materials chemistry (6)
CHEM3146	Principles and applications of spectroscopic and analytical techniques (6)

CHEM3241	Analytical chemistry II: chemical instrumentation (6)	
CHEM3242	Food and water analysis (6)	
CHEM3243	Introductory instrumental chemical analysis (6)	
CHEM3244	Analytical techniques for pharmacy students (6)	
CHEM3341	Inorganic chemistry II (6)	
CHEM3342	Bioinorganic chemistry (6)	
CHEM3441	Organic chemistry II (6)	
CHEM3442	Organic chemistry of biomolecules (6)	
CHEM3443	Organic chemistry laboratory (6)	
CHEM3541	Physical chemistry: Introduction to quantum chemistry (6)	[previous title: Physical chemistry II: Introduction to quantum chemistry (6)]
CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory (6)	
CHEM3999	Directed studies in chemistry (6)	
CHEM4142	Symmetry, group theory and applications (6)	
CHEM4143	Interfacial science and technology (6)	
CHEM4144	Advanced materials (6)	
CHEM4145	Medicinal chemistry (6)	
CHEM4241	Modern chemical instrumentation and applications (6)	
CHEM4242	Analytical chemistry (6)	
CHEM4341	Advanced inorganic chemistry (6)	
CHEM4342	Organometallic chemistry (6)	
CHEM4441	Advanced organic chemistry (6)	
CHEM4443	Integrated organic synthesis (6)	
CHEM4444	Chemical biology (6)	
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory (6)	
CHEM4542	Computational chemistry (6)	
CHEM4543	Advanced physical chemistry (6)	
CHEM4910	Chemistry literacy and research (6)	
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia (6)	
CHEM4966	Chemistry internship (6)	
CHEM4999	Chemistry project (12)	

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Chemistry or equivalent to take this major. Students who do not fuifill this requirement are advised to take CHEM1041 Foundations of chemistry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Computational & Financial Mathematics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Computational & Financial Mathematics provides students with fundamental knowledge in both computational mathematics and financial mathematics. It is specifically designed for students who are interested in the above subjects and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving and skills to tackle novel situations and ill-defined problems. It is particularly useful for solving mathematical problems arising from computational sciences and financial industry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts in computational and financial mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Minor in Mathematics

Required courses (42 credits)

1. Introductory level courses (18 credits) (note 3)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

MATH3601	Numerical analysis (6)
MATH3906	Financial calculus (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

MATH3408	Computational methods and differential equations with applications (6)
MATH3603	Probability theory (6)
MATH3904	Introduction to optimization (6)
MATH3911	Game theory and strategy (6)
MATH4602	Scientific computing (6)
MATH4907	Numerical methods for financial calculus (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. Students having completed the two courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits Introductory Level Courses requirement of Computational & Financial Mathematics Minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 30 credits of advanced level Mathematics courses (including MATH3601 & MATH3906) as chosen from the minor structure in order to fulfil the credit requirement of the Minor.

4. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Computational & Financial Mathematics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Computational & Financial Mathematics provides students with fundamental knowledge in both computational mathematics and financial mathematics. It is specifically designed for students who are interested in the above subjects and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving and skills to tackle novel situations and ill-defined problems. It is particularly useful for solving mathematical problems arising from computational sciences and financial industry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts in computational and financial mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Minor in Mathematics

Required courses (42 credits)

1. Introductory level courses (18 credits) (note 3)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

MATH3601	Numerical analysis (6)
MATH3906	Financial calculus (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

MATH3408	Computational methods and differential equations with applications (6)
MATH3603	Probability theory (6)
MATH3904	Introduction to optimization (6)
MATH3911	Game theory and strategy (6)
MATH4602	Scientific computing (6)
MATH4907	Numerical methods for financial calculus (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. Students having completed the two courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits Introductory Level Courses requirement of Computational & Financial Mathematics Minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 30 credits of advanced level Mathematics courses (including MATH3601 & MATH3906) as chosen from the minor structure in order to fulfil the credit requirement of the Minor.

4. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Computational & Financial Mathematics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Computational & Financial Mathematics provides students with fundamental knowledge in both computational mathematics and financial mathematics. It is specifically designed for students who are interested in the above subjects and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving and skills to tackle novel situations and ill-defined problems. It is particularly useful for solving mathematical problems arising from computational sciences and financial industry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts in computational and financial mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Minor in Mathematics

Required courses (42 credits)

1. Introductory level courses (18 credits) (note 3)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

MATH3601	Numerical analysis (6)
MATH3906	Financial calculus (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

MATH3408	Computational methods and differential equations with applications (6)
MATH3603	Probability theory (6)
MATH3904	Introduction to optimization (6)
MATH3911	Game theory and strategy (6)
MATH4602	Scientific computing (6)
MATH4907	Numerical methods for financial calculus (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. Students having completed the two courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits Introductory Level Courses requirement of Computational & Financial Mathematics Minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 30 credits of advanced level Mathematics courses (including MATH3601 & MATH3906) as chosen from the minor structure in order to fulfil the credit requirement of the Minor.

4. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Computational & Financial Mathematics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Computational & Financial Mathematics provides students with fundamental knowledge in both computational mathematics and financial mathematics. It is specifically designed for students who are interested in the above subjects and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving and skills to tackle novel situations and ill-defined problems. It is particularly useful for solving mathematical problems arising from computational sciences and financial industry.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts in computational and financial mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Minor in Mathematics

Required courses (42 credits)

1. Introductory level courses (18 credits) (note 3)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

MATH3601	Numerical analysis (6)
MATH3906	Financial calculus (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

MATH3408	Computational methods and differential equations with applications (6)
MATH3603	Probability theory (6)
MATH3904	Introduction to optimization (6)
MATH3911	Game theory and strategy (6)
MATH4602	Scientific computing (6)
MATH4907	Numerical methods for financial calculus (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. Students having completed the two courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits Introductory Level Courses requirement of Computational & Financial Mathematics Minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 30 credits of advanced level Mathematics courses (including MATH3601 & MATH3906) as chosen from the minor structure in order to fulfil the credit requirement of the Minor.

4. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Earth Sciences
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Earth Sciences aims to provide interested students with an introduction to the fundamental structure, process and history of the Earth. The minor curriculum is designed particularly to provide students from different majors the flexibility to select courses to enhance their interests in Earth Sciences or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	understand and describe the methods used by the Earth scientists to study the Earth systems (by means to coursework, tutorial classes and field-based learning in the curriculum)
PLO 2 :	understand and describe the basic nomenclature used in Earth Sciences (by means to coursework, tutorial classes and field-based learning in the curriculum)
PLO 3 :	discuss and comment critically issues related to the Earth Sciences in media reports (by means to coursework, tutorial classes and field-based learning in the curriculum)

Impermissible Combination:
Major in Earth System Science
Major in Geology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Earth Sciences courses (EASC3XXX or EASC4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

EASC3020	Global change: anthropogenic impacts (6)
EASC3402	Petrology (6)
EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)
EASC3405	Environmental remote sensing (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)

EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
EASC3415	Meteorology (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
EASC4403	Biogeochemical cycles (6)
EASC4406	Earth dynamics & global tectonics (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4911	Earth system: contemporary issues (6)
EASC4955	Integrated field studies (6)
EASC4966	Earth sciences internship (6)
EASC4999	Earth sciences project (12)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Earth Sciences
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Earth Sciences aims to provide interested students with an introduction to the fundamental structure, process and history of the Earth. The minor curriculum is designed particularly to provide students from different majors the flexibility to select courses to enhance their interests in Earth Sciences or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe the methods used by the Earth scientists to study the Earth systems (by means to coursework, tutorial classes and field-based learning in the curriculum)

PLO 2 : understand and describe the basic nomenclature used in Earth Sciences (by means to coursework, tutorial classes and field-based learning in the curriculum)

PLO 3 : discuss and comment critically issues related to the Earth Sciences in media reports (by means to coursework, tutorial classes and field-based learning in the curriculum)

Impermissible Combination:
Major in Earth System Science
Major in Geology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Earth Sciences courses (EASC3XXX or EASC4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

EASC3020	Global change: anthropogenic impacts (6)
EASC3402	Petrology (6)
EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)
EASC3405	Environmental remote sensing (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)

EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
EASC3415	Meteorology (6)
EASC3416	Advanced geochemistry and geochronology (6)
EASC3999	Directed studies in earth sciences (6)
EASC4403	Biogeochemical cycles (6)
EASC4406	Earth dynamics & global tectonics (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4911	Earth system: contemporary issues (6)
EASC4955	Integrated field studies (6)
EASC4966	Earth sciences internship (6)
EASC4999	Earth sciences project (12)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Earth Sciences
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Earth Sciences aims to provide interested students with an introduction to the fundamental structure, process and history of the Earth. The minor curriculum is designed particularly to provide students from different majors the flexibility to select courses to enhance their interests in Earth Sciences or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe the methods used by the Earth scientists to study the Earth systems (by means to coursework, tutorial classes and field-based learning in the curriculum)

PLO 2 : understand and describe the basic nomenclature used in Earth Sciences (by means to coursework, tutorial classes and field-based learning in the curriculum)

PLO 3 : discuss and comment critically issues related to the Earth Sciences in media reports (by means to coursework, tutorial classes and field-based learning in the curriculum)

Impermissible Combination:
Major in Earth System Science
Major in Geology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Earth Sciences courses (EASC3XXX or EASC4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

EASC3020	Global change: anthropogenic impacts (6)
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EASC3415	Meteorology (6)
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EASC3999	Directed studies in earth sciences (6)
EASC4403	Biogeochemical cycles (6)
EASC4406	Earth dynamics & global tectonics (6)
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)
EASC4911	Earth system: contemporary issues (6)
EASC4955	Integrated field studies (6)
EASC4966	Earth sciences internship (6)
EASC4999	Earth sciences project (12)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Earth Sciences
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Earth Sciences aims to provide interested students with an introduction to the fundamental structure, process and history of the Earth. The minor curriculum is designed particularly to provide students from different majors the flexibility to select courses to enhance their interests in Earth Sciences or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe the methods used by the Earth scientists to study the Earth systems (by means to coursework, tutorial classes and field-based learning in the curriculum)

PLO 2 : understand and describe the basic nomenclature used in Earth Sciences (by means to coursework, tutorial classes and field-based learning in the curriculum)

PLO 3 : discuss and comment critically issues related to the Earth Sciences in media reports (by means to coursework, tutorial classes and field-based learning in the curriculum)

Impermissible Combination:
Major in Earth System Science
Major in Geology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

EASC1401	Blue Planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Earth Sciences courses (EASC3XXX or EASC4XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

EASC3020	Global change: anthropogenic impacts (6)
EASC3402	Petrology (6)
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EASC3413	Engineering geology (6)
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EASC3415	Meteorology (6)
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EASC3999	Directed studies in earth sciences (6)
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EASC4911	Earth system: contemporary issues (6)
EASC4955	Integrated field studies (6)
EASC4966	Earth sciences internship (6)
EASC4999	Earth sciences project (12)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2015**

Objectives:
This Minor in Ecology & Biodiversity is an ideal introduction to the natural world, the species and ecosystems it comprises and the biological rules it follows. It aims to allow students to learn about general ecological principles and the local flora and fauna of the region, and the conservation challenges that will need to be addressed in a rapidly-changing world. Students will be able to build upon this basic knowledge developed at the introductory level by selecting from among a wide range of courses that offer learning opportunities through practical and field work, as well as traditional and virtual teaching, in more specialized areas of ecology and biodiversity.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : appreciate and describe the importance of ecology and biodiversity, and the importance of the variety of life to humans (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : understand and describe the impacts of environmental change and the causes and consequences of biodiversity loss (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : appreciate and describe the ecological principles underlying different policies and plans for biodiversity conservation and sustainable development in Hong Kong and elsewhere (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Ecology & Biodiversity

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Core Courses (12 credits)

BIOL1309	Evolutionary diversity (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL3419	Insect ecology: the little things that run the world (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2014**

Objectives:
This Minor in Ecology & Biodiversity is an ideal introduction to the natural world, the species and ecosystems it comprises and the biological rules it follows. It aims to allow students to learn about general ecological principles and the local flora and fauna of the region, and the conservation challenges that will need to be addressed in a rapidly-changing world. Students will be able to build upon this basic knowledge developed at the introductory level by selecting from among a wide range of courses that offer learning opportunities through practical and field work, as well as traditional and virtual teaching, in more specialized areas of ecology and biodiversity.

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Impermissible Combination:
Major in Ecology & Biodiversity

Required courses (36 credits)

1. Introductory level courses (12 credits)

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2. Advanced level courses (24 credits)

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Notes:
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Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2013**

Objectives:
This Minor in Ecology & Biodiversity is an ideal introduction to the natural world, the species and ecosystems it comprises and the biological rules it follows. It aims to allow students to learn about general ecological principles and the local flora and fauna of the region, and the conservation challenges that will need to be addressed in a rapidly-changing world. Students will be able to build upon this basic knowledge developed at the introductory level by selecting from among a wide range of courses that offer learning opportunities through practical and field work, as well as traditional and virtual teaching, in more specialized areas of ecology and biodiversity.

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Major in Ecology & Biodiversity

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Core Courses (12 credits)

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2. Advanced level courses (24 credits)

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Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Ecology & Biodiversity
Offered to students admitted to Year 1 in	**2012**

Objectives:
This Minor in Ecology & Biodiversity is an ideal introduction to the natural world, the species and ecosystems it comprises and the biological rules it follows. It aims to allow students to learn about general ecological principles and the local flora and fauna of the region, and the conservation challenges that will need to be addressed in a rapidly-changing world. Students will be able to build upon this basic knowledge developed at the introductory level by selecting from among a wide range of courses that offer learning opportunities through practical and field work, as well as traditional and virtual teaching, in more specialized areas of ecology and biodiversity.

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PLO 3 : appreciate and describe the ecological principles underlying different policies and plans for biodiversity conservation and sustainable development in Hong Kong and elsewhere (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Ecology & Biodiversity

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Core Courses (12 credits)

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2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

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Remarks:
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Minor Title	Minor in Environmental Science
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Environmental Science aims to provide students with an introduction to some complex environmental issues. Students will gain ecological and physical knowledge of the environment, become literate in issues related to environmental sustainability, monitoring and management, and be able to explore interdisciplinary solutions to these problems. This training will help student understand certain aspects of the environment and possible ways to solving environmental problems which will be useful to students to enhance their career prospects.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 2 : observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 3 : appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 4 : gain skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Major in Environmental Science

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (6 credits)

ENVS1401	Introduction to environmental science (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses (Level 1 & 2):

CHEM1042	General chemistry I (6)
CHEM2041	Principles of chemistry (6)
CHEM2241	Analytical chemistry I (6)
CHEM2442	Fundamentals of organic chemistry (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue Planet (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS1301	Environmental life science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
BIOL4302	Environmental impact assessment (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Environmental Science
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Environmental Science aims to provide students with an introduction to some complex environmental issues. Students will gain ecological and physical knowledge of the environment, become literate in issues related to environmental sustainability, monitoring and management, and be able to explore interdisciplinary solutions to these problems. This training will help student understand certain aspects of the environment and possible ways to solving environmental problems which will be useful to students to enhance their career prospects.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

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PLO 3 : appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

PLO 4 : gain skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Major in Environmental Science

Required courses (42 credits)

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Disciplinary Electives (12 credits)

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CHEM2442	Fundamentals of organic chemistry (6)
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EASC1401	Blue Planet (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS1301	Environmental life science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
BIOL4302	Environmental impact assessment (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Environmental Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
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PLO 1 : identify and describe different components of the environmental systems and key issues in environmental science (by means of lectures, coursework, tutorial classes and field/ laboratory/ team-based learning in the curriculum)

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PLO 4 : gain skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods (by means of field/ laboratory/ team-based learning, research projects, presentation opportunities and capstone experiences in the curriculum)

Impermissible Combination:
Major in Environmental Science

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (6 credits)

ENVS1401	Introduction to environmental science (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses (Level 1 & 2):

CHEM1042	General chemistry I (6)
CHEM2041	Principles of chemistry (6)
CHEM2241	Analytical chemistry I (6)
CHEM2442	Fundamentals of organic chemistry (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue Planet (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS1301	Environmental life science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
BIOL4302	Environmental impact assessment (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
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ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
ENVS4110	Environmental remediation (6)

Notes:
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Minor Title	Minor in Environmental Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Environmental Science aims to provide students with an introduction to some complex environmental issues. Students will gain ecological and physical knowledge of the environment, become literate in issues related to environmental sustainability, monitoring and management, and be able to explore interdisciplinary solutions to these problems. This training will help student understand certain aspects of the environment and possible ways to solving environmental problems which will be useful to students to enhance their career prospects.

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Impermissible Combination:
Major in Environmental Science

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (6 credits)

ENVS1401	Introduction to environmental science (6)

Disciplinary Electives (12 credits)

At least 6 credits selected from the following courses (Level 1) in List A:

List A

CHEM1042	General chemistry I (6)
EASC1401	Blue Planet (6)
ENVS1301	Environmental life science (6)

At least 6 credits selected from the following courses (Level 2) in List B:

List B

BIOL2102	Biostatistics (6)
CHEM2041	Principles of chemistry (6)
CHEM2241	Analytical chemistry I (6)
CHEM2442	Fundamentals of organic chemistry (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)

ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

ENVS3004	Environment, society and economics (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
BIOL4302	Environmental impact assessment (6)
CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
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Remarks:
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Minor Title	Minor in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Food and Nutritional Science aims to provide a comprehensive education in food, nutrition and related sociological and technological topics, enabling graduates to develop their interest in food and nutrition and have a wide range of employment and progression options.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate broad knowledge in the field of food and nutritional science (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : recognize and describe the health risks associated with food and specific nutrients, and discuss how to prevent these risks (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand and describe ethical perspectives and practice in food product development, food safety and public health nutrition (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : synthesize and summarize information from a wide range of sources and draw reasoned conclusions with particular reference to food and nutritional sciences and related global and commercial issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Food & Nutritional Science

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)
BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)

BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
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Offered to students admitted to Year 1 in	**2014**

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BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)
BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)

BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Food and Nutritional Science aims to provide a comprehensive education in food, nutrition and related sociological and technological topics, enabling graduates to develop their interest in food and nutrition and have a wide range of employment and progression options.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate broad knowledge in the field of food and nutritional science (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : recognize and describe the health risks associated with food and specific nutrients, and discuss how to prevent these risks (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand and describe ethical perspectives and practice in food product development, food safety and public health nutrition (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : synthesize and summarize information from a wide range of sources and draw reasoned conclusions with particular reference to food and nutritional sciences and related global and commercial issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Food & Nutritional Science

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)
BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)

BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Food and Nutritional Science aims to provide a comprehensive education in food, nutrition and related sociological and technological topics, enabling graduates to develop their interest in food and nutrition and have a wide range of employment and progression options.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : demonstrate broad knowledge in the field of food and nutritional science (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 2 : recognize and describe the health risks associated with food and specific nutrients, and discuss how to prevent these risks (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 3 : understand and describe ethical perspectives and practice in food product development, food safety and public health nutrition (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

PLO 4 : synthesize and summarize information from a wide range of sources and draw reasoned conclusions with particular reference to food and nutritional sciences and related global and commercial issues (by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Food & Nutritional Science

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)
BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)

BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)
BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Marine Biology
Offered to students admitted to Year 1 in	**2015**

Objectives:
The field of marine biology has become increasingly popular as interest in and awareness of our marine environment grows. Hong Kong already has strong cultural and historical links with the sea as well as a strong economic and societal interest in natural marine resources. This Minor aims to introduce students to the field of marine biology from species, habitat and ecosystem levels, ranging from the deep ocean to intertidal environments, and from both theoretical and practical perspectives. Material will be global and include organisms and their physical, behavioral and physiological adaptations to the marine environment, as well as techniques for marine study, Major marine issues will be covered including benefits derived from the marine environment and possible implications of climate change for marine systems. Particularly relevant examples from Hong Kong and the Southeast Asia region will be highlighted. This minor will provide students from diverse backgrounds (e.g.business, engineering and social science) an excellent opportunity to enter into a career or research in marine environment-related fields such as coastal ecosystem management, fisheries, marine environmental protection, marine resource management, etc.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : appreciate the requirements and constraints to life in different marine environments (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 2 : gain a comprehensive foundation for pursuing marine-orientated studies (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 3 : have a general insight into an ecosystem that covers two-thirds of the planet and supports the only remaining natural resource harvested on a large scale (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 4 : understand the major marine issues both locally and globally (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 5 : appreciate the possible implications of climate change on marine systems (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)
ENVS1301	Environmental life science (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

BIOL3301	Marine biology (6)
ENVS3313	Environmental oceanography (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL3303	Conservation ecology (6)

BIOL3318	Experimental intertidal ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Marine Biology
Offered to students admitted to Year 1 in	**2014**

Objectives:
The field of marine biology has become increasingly popular as interest in and awareness of our marine environment grows. Hong Kong already has strong cultural and historical links with the sea as well as a strong economic and societal interest in natural marine resources. This Minor aims to introduce students to the field of marine biology from species, habitat and ecosystem levels, ranging from the deep ocean to intertidal environments, and from both theoretical and practical perspectives. Material will be global and include organisms and their physical, behavioral and physiological adaptations to the marine environment, as well as techniques for marine study, Major marine issues will be covered including benefits derived from the marine environment and possible implications of climate change for marine systems. Particularly relevant examples from Hong Kong and the Southeast Asia region will be highlighted. This minor will provide students from diverse backgrounds (e.g.business, engineering and social science) an excellent opportunity to enter into a career or research in marine environment-related fields such as coastal ecosystem management, fisheries, marine environmental protection, marine resource management, etc.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	appreciate the requirements and constraints to life in different marine environments (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
PLO 2 :	gain a comprehensive foundation for pursuing marine-orientated studies (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
PLO 3 :	have a general insight into an ecosystem that covers two-thirds of the planet and supports the only remaining natural resource harvested on a large scale (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
PLO 4 :	understand the major marine issues both locally and globally (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
PLO 5 :	appreciate the possible implications of climate change on marine systems (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)
ENVS1301	Environmental life science (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

BIOL3301	Marine biology (6)
ENVS3313	Environmental oceanography (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL3303	Conservation ecology (6)

BIOL3318	Experimental intertidal ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Marine Biology
Offered to students admitted to Year 1 in	**2013**

Objectives:
The field of marine biology has become increasingly popular as interest in and awareness of our marine environment grows. Hong Kong already has strong cultural and historical links with the sea as well as a strong economic and societal interest in natural marine resources. This Minor aims to introduce students to the field of marine biology from species, habitat and ecosystem levels, ranging from the deep ocean to intertidal environments, and from both theoretical and practical perspectives. Material will be global and include organisms and their physical, behavioral and physiological adaptations to the marine environment, as well as techniques for marine study, Major marine issues will be covered including benefits derived from the marine environment and possible implications of climate change for marine systems. Particularly relevant examples from Hong Kong and the Southeast Asia region will be highlighted. This minor will provide students from diverse backgrounds (e.g.business, engineering and social science) an excellent opportunity to enter into a career or research in marine environment-related fields such as coastal ecosystem management, fisheries, marine environmental protection, marine resource management, etc.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : appreciate the requirements and constraints to life in different marine environments (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 2 : gain a comprehensive foundation for pursuing marine-orientated studies (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 3 : have a general insight into an ecosystem that covers two-thirds of the planet and supports the only remaining natural resource harvested on a large scale (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 4 : understand the major marine issues both locally and globally (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 5 : appreciate the possible implications of climate change on marine systems (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)
ENVS1301	Environmental life science (6)
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2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

BIOL3301	Marine biology (6)
ENVS3313	Environmental oceanography (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL3303	Conservation ecology (6)

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BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Marine Biology
Offered to students admitted to Year 1 in	**2012**

Objectives:
The field of marine biology has become increasingly popular as interest in and awareness of our marine environment grows. Hong Kong already has strong cultural and historical links with the sea as well as a strong economic and societal interest in natural marine resources. This Minor aims to introduce students to the field of marine biology from species, habitat and ecosystem levels, ranging from the deep ocean to intertidal environments, and from both theoretical and practical perspectives. Material will be global and include organisms and their physical, behavioral and physiological adaptations to the marine environment, as well as techniques for marine study, Major marine issues will be covered including benefits derived from the marine environment and possible implications of climate change for marine systems. Particularly relevant examples from Hong Kong and the Southeast Asia region will be highlighted. This minor will provide students from diverse backgrounds (e.g.business, engineering and social science) an excellent opportunity to enter into a career or research in marine environment-related fields such as coastal ecosystem management, fisheries, marine environmental protection, marine resource management, etc.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : appreciate the requirements and constraints to life in different marine environments (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 2 : gain a comprehensive foundation for pursuing marine-orientated studies (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 3 : have a general insight into an ecosystem that covers two-thirds of the planet and supports the only remaining natural resource harvested on a large scale (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 4 : understand the major marine issues both locally and globally (by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)

PLO 5 : appreciate the possible implications of climate change on marine systems (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)
ENVS1301	Environmental life science (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

Disciplinary Core Courses (12 credits)

BIOL3301	Marine biology (6)
ENVS3313	Environmental oceanography (6)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL3303	Conservation ecology (6)

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BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Mathematics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Mathematics provides students with fundamental knowledge in the subject. It is specifically designed for students who are interested in the subject and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts of mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics. (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics

Required courses (36 credits)

1. Introductory level courses (18 credits) (note 4)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (18 credits)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), subject to pre-requisite requirements. The current course list includes courses in List A:

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3301	Algebra I (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3401	Analysis I (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)

MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH3999	Directed studies in mathematics (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. If students would like to take more courses in analysis such as MATH3401 (Analysis I), they are advised to take the introductory course MATH2241 Introduction to mathematical analysis first.

4. Students having completed the two courses MATH1821 Mathematical methods for actuarial Science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits introductory level courses requirement of Mathematics minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 24 credits of advanced level Mathematics courses in order to fulfil the credit requirement of the Minor.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Mathematics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Mathematics provides students with fundamental knowledge in the subject. It is specifically designed for students who are interested in the subject and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts of mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics. (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics

Required courses (36 credits)

1. Introductory level courses (18 credits) (note 4)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (18 credits)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), subject to pre-requisite requirements. The current course list includes courses in List A:

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3301	Algebra I (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3401	Analysis I (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)

MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH3999	Directed studies in mathematics (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. If students would like to take more courses in analysis such as MATH3401 (Analysis I), they are advised to take the introductory course MATH2241 Introduction to mathematical analysis first.

4. Students having completed the two courses MATH1821 Mathematical methods for actuarial Science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits introductory level courses requirement of Mathematics minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 24 credits of advanced level Mathematics courses in order to fulfil the credit requirement of the Minor.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Mathematics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Mathematics provides students with fundamental knowledge in the subject. It is specifically designed for students who are interested in the subject and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts of mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics. (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics

Required courses (36 credits)

1. Introductory level courses (18 credits) (note 4)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (18 credits)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), subject to pre-requisite requirements. The current course list includes courses in List A:

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3301	Algebra I (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3401	Analysis I (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)

MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH3999	Directed studies in mathematics (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. If students would like to take more courses in analysis such as MATH3401 (Analysis I), they are advised to take the introductory course MATH2241 Introduction to mathematical analysis first.

4. Students having completed the two courses MATH1821 Mathematical methods for actuarial Science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits introductory level courses requirement of Mathematics minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 24 credits of advanced level Mathematics courses in order to fulfil the credit requirement of the Minor.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Mathematics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Mathematics provides students with fundamental knowledge in the subject. It is specifically designed for students who are interested in the subject and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : understand and describe fundamental concepts of mathematics (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply mathematical methods and analysis to real life problems (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : communicate and discuss scientific issues related to mathematics. (by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics

Required courses (36 credits)

1. Introductory level courses (18 credits) (note 4)

Disciplinary Core Courses (18 credits)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (18 credits)

Disciplinary Electives (18 credits)

At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), subject to pre-requisite requirements. The current course list includes courses in List A:

List A

MATH3001	Development of mathematical ideas (6)
MATH3002	Mathematics seminar (6)
MATH3301	Algebra I (6)
MATH3303	Matrix theory and its applications (6)
MATH3304	Introduction to number theory (6)
MATH3401	Analysis I (6)
MATH3403	Functions of a complex variable (6)
MATH3405	Differential equations (6)
MATH3408	Computational methods and differential equations with applications (6)
MATH3600	Discrete mathematics (6)

MATH3601	Numerical analysis (6)
MATH3603	Probability theory (6)
MATH3901	Operations research I (6)
MATH3904	Introduction to optimization (6)
MATH3905	Queueing theory and simulation (6)
MATH3906	Financial calculus (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
MATH3999	Directed studies in mathematics (6)
MATH4302	Algebra II (6)
MATH4402	Analysis II (6)
MATH4404	Functional analysis (6)
MATH4406	Introduction to partial differential equations (6)
MATH4501	Geometry (6)
MATH4511	Introduction to differentiable manifolds (6)
MATH4602	Scientific computing (6)
MATH4902	Operations research II (6)
MATH4907	Numerical methods for financial calculus (6)
MATH4910	Senior mathematics seminar (6)
MATH4911	Mathematics capstone project (6)
MATH4966	Mathematics internship (6)
MATH4999	Mathematics project (12)
MATH7101	Intermediate complex analysis (6)
MATH7201	Topics in geometry (6)
MATH7202	Complex manifolds (6)
MATH7217	Topics in financial mathematics (6)
MATH7219	Topics in applied functional analysis (6)
MATH7224	Topics in advanced probability theory (6)
MATH7501	Topics in algebra (6)
MATH7502	Topics in applied discrete mathematics (6)
MATH7503	Topics in mathematical programming and optimization (6)
MATH7504	Geometric topology (6)
MATH7505	Real analysis (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

3. If students would like to take more courses in analysis such as MATH3401 (Analysis I), they are advised to take the introductory course MATH2241 Introduction to mathematical analysis first.

4. Students having completed the two courses MATH1821 Mathematical methods for actuarial Science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits introductory level courses requirement of Mathematics minor. Such students should, however, take two extra MATH2XXX or above level courses to replace MATH2101 Linear algebra I and MATH2211 Multivariable calculus, and at least 24 credits of advanced level Mathematics courses in order to fulfil the credit requirement of the Minor.

5. The two courses MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics together are deemed equivalent to MATH1013 University mathematics II. However, students have to take an extra MATH2XXX or above level course to replace MATH1013 to fulfill the credit requirement.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Molecular Biology & Biotechnology aims to provide students with a fundamental understanding of molecular biology and biotechnology which are relevant to many other disciplines of study and our daily life. Students will learn the principles underlying current molecular and cell biology advances, and biotechnological applications and will become literate in biotechnology business and advancements.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : develop and apply basic technical and knowledge-based skills in molecular and cell biology, and biotechnology (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : develop and apply skills of critical inquiry, teamwork, and effective communication (by means of group projects, tutorial classes and presentation opportunities in the curriculum)

PLO 3 : understand and describe the issues and concerns fundamental to the field (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Molecular Biology & Biotechnology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2306	Ecology and evolution (6)	

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

BIOL3401	Molecular biology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)

BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Molecular Biology & Biotechnology aims to provide students with a fundamental understanding of molecular biology and biotechnology which are relevant to many other disciplines of study and our daily life. Students will learn the principles underlying current molecular and cell biology advances, and biotechnological applications and will become literate in biotechnology business and advancements.

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By the end of this programme, students should be able to:

PLO 1 : develop and apply basic technical and knowledge-based skills in molecular and cell biology, and biotechnology (by means of coursework and laboratory-based learning in the curriculum)

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Impermissible Combination:
Major in Molecular Biology & Biotechnology

Required courses (36 credits)

1. Introductory level courses (12 credits)

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At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)	
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BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2306	Ecology and evolution (6)	

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

BIOL3401	Molecular biology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)

BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Molecular Biology & Biotechnology aims to provide students with a fundamental understanding of molecular biology and biotechnology which are relevant to many other disciplines of study and our daily life. Students will learn the principles underlying current molecular and cell biology advances, and biotechnological applications and will become literate in biotechnology business and advancements.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : develop and apply basic technical and knowledge-based skills in molecular and cell biology, and biotechnology (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : develop and apply skills of critical inquiry, teamwork, and effective communication (by means of group projects, tutorial classes and presentation opportunities in the curriculum)

PLO 3 : understand and describe the issues and concerns fundamental to the field (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Molecular Biology & Biotechnology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2306	Ecology and evolution (6)	

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

BIOL3401	Molecular biology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)

BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Molecular Biology & Biotechnology aims to provide students with a fundamental understanding of molecular biology and biotechnology which are relevant to many other disciplines of study and our daily life. Students will learn the principles underlying current molecular and cell biology advances, and biotechnological applications and will become literate in biotechnology business and advancements.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : develop and apply basic technical and knowledge-based skills in molecular and cell biology, and biotechnology (by means of coursework and laboratory-based learning in the curriculum)

PLO 2 : develop and apply skills of critical inquiry, teamwork, and effective communication (by means of group projects, tutorial classes and presentation opportunities in the curriculum)

PLO 3 : understand and describe the issues and concerns fundamental to the field (by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Molecular Biology & Biotechnology

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2306	Ecology and evolution (6)	

2. Advanced level courses (24 credits)

Disciplinary Core Courses (6 credits)

BIOL3401	Molecular biology (6)

Disciplinary Electives (18 credits)

At least 18 credits selected from the following courses:

BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)

BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Physics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Physics is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses which provides them to pursue a wide range of topics from the very small scale of nanomaterials to the large scale of astrophysics.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : analyze some physics problems qualitatively and quantitatively (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics/Physics
Major in Physics

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)

PHYS3851	Atomic and nuclear physics (6)
PHYS3999	Directed studies in physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Physics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Physics is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses which provides them to pursue a wide range of topics from the very small scale of nanomaterials to the large scale of astrophysics.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	identify and describe physical systems with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)
PLO 2 :	analyze some physics problems qualitatively and quantitatively (by means of coursework, tutorial classes and laboratory works in the curriculum)
PLO 3 :	communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics/Physics
Major in Physics

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)

PHYS3851	Atomic and nuclear physics (6)
PHYS3999	Directed studies in physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Physics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Physics is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses which provides them to pursue a wide range of topics from the very small scale of nanomaterials to the large scale of astrophysics.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : analyze some physics problems qualitatively and quantitatively (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics/Physics
Major in Physics

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)

PHYS3851	Atomic and nuclear physics (6)
PHYS3999	Directed studies in physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Physics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Physics is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses which provides them to pursue a wide range of topics from the very small scale of nanomaterials to the large scale of astrophysics.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : identify and describe physical systems with fundamental knowledge in physics (by means of coursework and tutorial classes in the curriculum)

PLO 2 : analyze some physics problems qualitatively and quantitatively (by means of coursework, tutorial classes and laboratory works in the curriculum)

PLO 3 : communicate and collaborate with people effectively in scientific issues (by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics/Physics
Major in Physics

Required courses (42 credits)

1. Introductory level courses (18 credits)

Disciplinary Core Courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS7XXX level), subject to prerequisite requirements. The current course list includes courses in List A:

List A

PHYS3150	Theoretical physics (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)
PHYS3551	Introductory solid state physics (6)
PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS3750	Laser and spectroscopy (6)
PHYS3751	Physics of nanomaterials (6)
PHYS3850	Waves and optics (6)

PHYS3851	Atomic and nuclear physics (6)
PHYS3999	Directed studies in physics (6)
PHYS4150	Computational physics (6)
PHYS4151	Data analysis and modeling in physics (6)
PHYS4350	Advanced classical mechanics (6)
PHYS4351	Advanced quantum mechanics (6)
PHYS4450	Advanced electromagnetism (6)
PHYS4550	Advanced statistical mechanics (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS4750	Experimental physics (6)
PHYS4966	Physics internship (6)
PHYS4999	Physics project (12)
PHYS7350	Graduate classical mechanics (6)
PHYS7351	Graduate quantum mechanics (6)
PHYS7450	Graduate electromagnetism (6)
PHYS7550	Graduate statistical mechanics (6)
PHYS7551	Solid state physics (6)
PHYS7650	Stellar atmospheres (6)
PHYS7750	Nanophysics (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Students must have level 3 or above in HKDSE Physics or equivalent to take this major. Students who do not fulfill this requirement are advised to take PHYS1240 Physics by inquiry.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Plant Science
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Plant Science is offered to students who are fascinated by the diversity and beauty of plants and the molecular mechanisms underlying their growth and development. Knowledge in plant science is essential for tackling daily-life issues such as the production of high-quality food, utilization of plant products as biofuels and extraction of beneficial phytochemicals. Recent advances in plant genetic engineering have also allowed scientists to manipulate plant growth and development for nutritional and environmental benefits. This minor aims to provide broad training in the biology of plants from the molecular to the organism level as well as the agricultural and nutritional applications of plants and plant-derived products.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	appreciate plants as an important part in our culture and their functions and roles in food, nutrition, and environment (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
PLO 2 :	understand and describe the fundamental concepts of plant evolution, anatomy, biochemistry, physiology and biotechnology (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
PLO 3 :	acquire necessary academic and practical skills for careers in government agencies, secondary school teaching and postgraduate research in different disciplines of plant science (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3107	Plant physiology (6)
BIOL3210	Grain production and utilization (6)
BIOL3314	Plant structure and evolution (6)
BIOL3408	Genetics (6)
BIOL4209	Functional foods (6)
BIOL4411	Plant and food biotechnology (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Plant Science
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Plant Science is offered to students who are fascinated by the diversity and beauty of plants and the molecular mechanisms underlying their growth and development. Knowledge in plant science is essential for tackling daily-life issues such as the production of high-quality food, utilization of plant products as biofuels and extraction of beneficial phytochemicals. Recent advances in plant genetic engineering have also allowed scientists to manipulate plant growth and development for nutritional and environmental benefits. This minor aims to provide broad training in the biology of plants from the molecular to the organism level as well as the agricultural and nutritional applications of plants and plant-derived products.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 :	appreciate plants as an important part in our culture and their functions and roles in food, nutrition, and environment (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
PLO 2 :	understand and describe the fundamental concepts of plant evolution, anatomy, biochemistry, physiology and biotechnology (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
PLO 3 :	acquire necessary academic and practical skills for careers in government agencies, secondary school teaching and postgraduate research in different disciplines of plant science (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3107	Plant physiology (6)
BIOL3210	Grain production and utilization (6)
BIOL3314	Plant structure and evolution (6)
BIOL3408	Genetics (6)
BIOL4209	Functional foods (6)
BIOL4411	Plant and food biotechnology (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Plant Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Plant Science is offered to students who are fascinated by the diversity and beauty of plants and the molecular mechanisms underlying their growth and development. Knowledge in plant science is essential for tackling daily-life issues such as the production of high-quality food, utilization of plant products as biofuels and extraction of beneficial phytochemicals. Recent advances in plant genetic engineering have also allowed scientists to manipulate plant growth and development for nutritional and environmental benefits. This minor aims to provide broad training in the biology of plants from the molecular to the organism level as well as the agricultural and nutritional applications of plants and plant-derived products.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : appreciate plants as an important part in our culture and their functions and roles in food, nutrition, and environment (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

PLO 2 : understand and describe the fundamental concepts of plant evolution, anatomy, biochemistry, physiology and biotechnology (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

PLO 3 : acquire necessary academic and practical skills for careers in government agencies, secondary school teaching and postgraduate research in different disciplines of plant science (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3107	Plant physiology (6)
BIOL3210	Grain production and utilization (6)
BIOL3314	Plant structure and evolution (6)
BIOL3408	Genetics (6)
BIOL4209	Functional foods (6)
BIOL4411	Plant and food biotechnology (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Plant Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Plant Science is offered to students who are fascinated by the diversity and beauty of plants and the molecular mechanisms underlying their growth and development. Knowledge in plant science is essential for tackling daily-life issues such as the production of high-quality food, utilization of plant products as biofuels and extraction of beneficial phytochemicals. Recent advances in plant genetic engineering have also allowed scientists to manipulate plant growth and development for nutritional and environmental benefits. This minor aims to provide broad training in the biology of plants from the molecular to the organism level as well as the agricultural and nutritional applications of plants and plant-derived products.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : appreciate plants as an important part in our culture and their functions and roles in food, nutrition, and environment (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

PLO 2 : understand and describe the fundamental concepts of plant evolution, anatomy, biochemistry, physiology and biotechnology (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

PLO 3 : acquire necessary academic and practical skills for careers in government agencies, secondary school teaching and postgraduate research in different disciplines of plant science (by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

Disciplinary Electives (24 credits)

At least 24 credits selected from the following courses:

BIOL3107	Plant physiology (6)
BIOL3210	Grain production and utilization (6)
BIOL3314	Plant structure and evolution (6)
BIOL3408	Genetics (6)
BIOL4209	Functional foods (6)
BIOL4411	Plant and food biotechnology (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Risk Management
Offered to students admitted to Year 1 in	**2015**

Objectives:
The Minor in Risk Management aims to provide interested students with basic concepts of risk management and fundamental skills of employing various statistical techniques for managing risk. The minor curriculum is particularly designed for students from different majors to enhance their interests in Risk Management or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic understanding and identify the generic risk management issues and techniques (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply elementary methods and models for risk assessment and management (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : acquire and interpret relevant data and information for risk management (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3609	The statistics of investment risk (6)
STAT3610	Risk management and insurance (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3614	Business forecasting (6)
STAT3615	Practical mathematics for investment (6)

STAT3618	Derivatives and risk management (6)
STAT4601	Time-series analysis (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Risk Management
Offered to students admitted to Year 1 in	**2014**

Objectives:
The Minor in Risk Management aims to provide interested students with basic concepts of risk management and fundamental skills of employing various statistical techniques for managing risk. The minor curriculum is particularly designed for students from different majors to enhance their interests in Risk Management or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic understanding and identify the generic risk management issues and techniques (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply elementary methods and models for risk assessment and management (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : acquire and interpret relevant data and information for risk management (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3609	The statistics of investment risk (6)
STAT3610	Risk management and insurance (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3614	Business forecasting (6)
STAT3615	Practical mathematics for investment (6)

STAT3618	Derivatives and risk management (6)
STAT4601	Time-series analysis (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Risk Management
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Risk Management aims to provide interested students with basic concepts of risk management and fundamental skills of employing various statistical techniques for managing risk. The minor curriculum is particularly designed for students from different majors to enhance their interests in Risk Management or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic understanding and identify the generic risk management issues and techniques (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply elementary methods and models for risk assessment and management (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : acquire and interpret relevant data and information for risk management (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3609	The statistics of investment risk (6)
STAT3610	Risk management and insurance (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3614	Business forecasting (6)
STAT3615	Practical mathematics for investment (6)

STAT3618	Derivatives and risk management (6)
STAT4601	Time-series analysis (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Risk Management
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Risk Management aims to provide interested students with basic concepts of risk management and fundamental skills of employing various statistical techniques for managing risk. The minor curriculum is particularly designed for students from different majors to enhance their interests in Risk Management or to complement their major of study.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic understanding and identify the generic risk management issues and techniques (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : apply elementary methods and models for risk assessment and management (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 3 : acquire and interpret relevant data and information for risk management (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3609	The statistics of investment risk (6)
STAT3610	Risk management and insurance (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3614	Business forecasting (6)
STAT3615	Practical mathematics for investment (6)

STAT3618	Derivatives and risk management (6)
STAT4601	Time-series analysis (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Statistics
Offered to students admitted to Year 1 in	**2015**

Objectives:
The curriculum of the Minor in Statistics is structured specifically to cater for the general need of non-statistical disciplines and provide basic training in statistical methodologies and their applications to practical problems. It aims to provide students with a strong and rigorous sense of quantitative reasoning that has become an indispensable skill in nearly all disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic statistical knowledge alongside their major disciplines, with emphases on correct applications of statistical methods and insightful interpretations of statistical findings (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : equip with computational skills essential to conducting complete data analyses (by means of coursework, tutorial classes, project-based learning and presentation opportunities in the curriculum)

PLO 3 : participate proactively in large-scale, multi-disciplinary studies, determine objective findings, and provide guidance on all aspects of data collection and analyses (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Decision Analytics
Major in Risk Management
Major in Statistics
Minor in Risk Management

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)
STAT2605	Demographic and socio-economic statistics (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3600	Linear statistical analysis (6)
STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)

STAT3604	Design and analysis of experiments (6)
STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3614	Business forecasting (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3955	Survival analysis (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Statistics
Offered to students admitted to Year 1 in	**2014**

Objectives:
The curriculum of the Minor in Statistics is structured specifically to cater for the general need of non-statistical disciplines and provide basic training in statistical methodologies and their applications to practical problems. It aims to provide students with a strong and rigorous sense of quantitative reasoning that has become an indispensable skill in nearly all disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic statistical knowledge alongside their major disciplines, with emphases on correct applications of statistical methods and insightful interpretations of statistical findings (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : equip with computational skills essential to conducting complete data analyses (by means of coursework, tutorial classes, project-based learning and presentation opportunities in the curriculum)

PLO 3 : participate proactively in large-scale, multi-disciplinary studies, determine objective findings, and provide guidance on all aspects of data collection and analyses (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Computing and Data Analytics
Major in Decision Analytics
Major in Risk Management
Major in Statistics
Minor in Risk Management

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)
STAT2605	Demographic and socio-economic statistics (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3600	Linear statistical analysis (6)
STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)

STAT3604	Design and analysis of experiments (6)
STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3614	Business forecasting (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3955	Survival analysis (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Statistics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The curriculum of the Minor in Statistics is structured specifically to cater for the general need of non-statistical disciplines and provide basic training in statistical methodologies and their applications to practical problems. It aims to provide students with a strong and rigorous sense of quantitative reasoning that has become an indispensable skill in nearly all disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic statistical knowledge alongside their major disciplines, with emphases on correct applications of statistical methods and insightful interpretations of statistical findings (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : equip with computational skills essential to conducting complete data analyses (by means of coursework, tutorial classes, project-based learning and presentation opportunities in the curriculum)

PLO 3 : participate proactively in large-scale, multi-disciplinary studies, determine objective findings, and provide guidance on all aspects of data collection and analyses (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Decision Analytics
Major in Risk Management
Major in Statistics
Minor in Risk Management

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)
STAT2605	Demographic and socio-economic statistics (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3600	Linear statistical analysis (6)
STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)
STAT3604	Design and analysis of experiments (6)

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3614	Business forecasting (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3955	Survival analysis (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

Minor Title	Minor in Statistics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The curriculum of the Minor in Statistics is structured specifically to cater for the general need of non-statistical disciplines and provide basic training in statistical methodologies and their applications to practical problems. It aims to provide students with a strong and rigorous sense of quantitative reasoning that has become an indispensable skill in nearly all disciplines.

Learning Outcomes:
By the end of this programme, students should be able to:

PLO 1 : acquire basic statistical knowledge alongside their major disciplines, with emphases on correct applications of statistical methods and insightful interpretations of statistical findings (by means of coursework, tutorial classes and project-based learning in the curriculum)

PLO 2 : equip with computational skills essential to conducting complete data analyses (by means of coursework, tutorial classes, project-based learning and presentation opportunities in the curriculum)

PLO 3 : participate proactively in large-scale, multi-disciplinary studies, determine objective findings, and provide guidance on all aspects of data collection and analyses (by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Decision Analytics
Major in Risk Management
Major in Statistics
Minor in Risk Management

Required courses (42 credits)

1. Introductory level courses (12 credits)

Disciplinary Electives (12 credits)

At least 12 credits from List A and List B, with at least 6 credits from List B:

List A

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

List B

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)
STAT2605	Demographic and socio-economic statistics (6)

2. Advanced level courses (30 credits)

Disciplinary Electives (30 credits)

At least 30 credits selected from the following courses:

STAT3600	Linear statistical analysis (6)
STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)
STAT3604	Design and analysis of experiments (6)

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3614	Business forecasting (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3620	Modern nonparametric statistics (6)
STAT3621	Statistical data analysis (6)
STAT3955	Survival analysis (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("disciplinary core") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

Remarks:
Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.

SECTION VII

Students taking double Majors, Major-Minor or double Minors with overlapping course requirements

SCIENCE

SECTION VII Students taking double Majors, Major-Minor or double Minors with overlapping course requirements

1. Double-counting of courses up to a maximum of 24 credits is permissible with double majors. The double-counted courses in both Science majors must include SCNC1111 and SCNC1112. Additional credits to be double-counted must be for courses required ('disciplinary core') by both majors. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

2. The following list shows the major-major combinations that have more than 24 credits of the same 'disciplinary core' courses that appear in both majors and is subject to the rule of double counting:

Major-Major combination	**No. of common 'disciplinary core' courses (credits) appear in both majors including SCNC1111 and SCNC1112**	**No. of replacement courses (credits) to be taken in the 2nd major ('Major 2')**
Major in Astronomy Major in Mathematics/Physics	5 (30 credits)	1 (6 credits)
Major in Astronomy Major in Physics	6 (36 credits)	2 (12 credits)
Major in Biochemistry Major in Molecular Biology & Biotechnology	5 (30 credits)	1 (6 credits)
Major in Biological Sciences Major in Ecology & Biodiversity	7 (42 credits)	3 (18 credits)
Major in Biological Sciences Major in Food & Nutritional Science	6 (36 credits)	2 (12 credits)
Major in Biological Sciences Major in Molecular Biology & Biotechnology	5 (30 credits)	1 (6 credits)
Major in Earth System Science Major in Geology	5 (30 credits)	1 (6 credits)
Major in Ecology & Biodiversity Major in Food & Nutritional Science	6 (36 credits)	2 (12 credits)
Major in Ecology & Biodiversity Major in Molecular Biology & Biotechnology	5 (30 credits)	1 (6 credits)
Major in Food & Nutritional Science Major in Molecular Biology & Biotechnology	6 (36 credits)	2 (12 credits)

   If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses ('disciplinary core') in both the first ('Major 1') and second ('Major 2') majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) in the second major ('Major 2'). The replacement course(s) must be the disciplinary elective course in the second major ('Major 2') and have the same prefix and at the same or higher level as the double-counted course(s). **<u>The double counted credits should count the following courses in this order: (1) SCNC1111 and SCNC1112, (2) introductory level (levels 1 and 2) courses, and (3) advanced level (level 3 or above) courses</u>.** For example, if a student takes a first major in Biological Sciences ('Major 1') and the 2nd major in Molecular Biology & Biotechnology ('Major 2'), SCNC1111, SCNC1112, BIOL1110, BIOL2102 and BIOL2103 are the common 'disciplinary core' courses that appear in both majors. The first 3 courses SCNC1111, SCNC1112, and BIOL1110 would first be counted plus either BIOL2102 or BIOL2103 for the major in Molecular Biology & Biotechnology. The student has to take a replacement 'disciplinary elective' course (with a prefix of BIOL at level 2 or above) in the 2nd major in Molecular Biology & Biotechnology to make up for BIOL2102 or BIOL2103. Another example is a 1st major in Biochemistry and a 2nd major in Molecular Biology & Biotechnology. SCNC1111, SCNC1112, BIOL1110, BIOC2600 and BIOL3401 are the 5 common courses that appear in both majors. Students can have the first 4 courses SCNC1111, SCNC1112, BIOL1110, BIOC2600 double counted in both majors but have to take a replacement 'disciplinary elective' course (with a prefix of BIOL at level 3 or above) for BIOL3401 in the 2nd major in Molecular Biology & Biotechnology.

3. Double counting of credits is not permissible for major–minor or double-minors combinations. When a course is required ('disciplinary core') both by the major and minor or by both minors, the student must take a replacement course for the minor. The replacement course must be the disciplinary elective in the minor and have the same prefix and at the same or higher level as the course to be replaced.

4. For the situations of 2 and 3 above, students have to complete the application form, seek the written endorsement from the Course Selection Adviser of the second major ('Major 2') / minor and then return it to the <u>Faculty Office</u> by the closing dates of course selection or add/drop periods.

SECTION VIII

Degree Regulations

SCIENCE

SECTION VIII   Degree Regulations

REGULATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE (BSc)

These regulations apply to students admitted under the 4-year '2012 curriculum' to the BSc degree curriculum in the academic year 2012-2013 and thereafter.
(See also General Regulations and Regulations for First Degree Curricula)

Definitions

Sc1[1] For the purpose of these regulations and the syllabuses for the BSc degree, unless the context otherwise requires:

"Science course" means any course offered by the Faculty of Science, and the School of Biomedical Sciences.

"Advanced Science course" means any level 3, 4 or above course offered by the Faculty of Science and the School of Biomedical Sciences.

"Course" means a course of study, with a credit value expressed as a number of credit-units as specified in the syllabuses for a degree curriculum.

"Syllabus" means courses taught by departments, centres, and schools, offered under a degree curriculum.

"Credits" or "credit-units" means the value assigned to each course to indicate its study load relative to the total study load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classroom, and includes contact hours and time spent on assessment tasks and examinations. Candidates who satisfactorily complete courses with a credit value earn the credits assigned to these courses.

Admission to the BSc degree

Sc2 To be eligible for admission to the BSc degree, candidates shall:

(a) comply with the General Regulations;

(b) comply with the Regulations for First Degree Curricula; and

(c) satisfy all the requirements of the curriculum in accordance with these regulations and the syllabuses.

Period of study

Sc3 The curriculum for the BSc degree shall normally require eight semesters of full-time study, extending over not fewer than four academic years, and shall include any assessment to be held during and/or at the end of each semester. Candidates shall not in any case be permitted to extend their studies beyond the maximum period of registration of six academic years.

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[1] This regulation should be read in conjunction with UG1 of the Regulations for First Degree Curricula.

Selection of courses

Sc4 Candidates shall select their courses in accordance with these regulations and the guidelines specified in the syllabuses before the beginning of each semester. Any change to the selection of courses shall be made only during the add/drop period of the semester in which the course begins, and such changes shall not be reflected in the transcript of the candidate. Requests for changes after the designated add/drop period of the semester shall not be considered.

Curriculum requirements and progression in curriculum

Sc5

(a) Candidates shall satisfy the requirements prescribed in UG5 of the Regulations of First Degree Curricula.

(b) Candidates shall take not fewer than 240 credits, in the manner specified in these regulations and the syllabuses.

(c) Candidates shall take at least 96 credits of Science courses including all required courses of the major programme of the BSc degree curriculum.

(d) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of outstanding credits required to complete the curriculum requirements may be fewer than 24 credits.

(e) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load of 288 credits for the normative period of study specified in the curriculum regulations, save as provided for under Sc5(f).

(f) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load of 432 credits for the maximum period of registration specified in the curriculum regulations.

(g) Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The number of transferred credits will be recorded on the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

(h) Candidates shall be recommended for discontinuation of their studies if they have:

  (i) failed to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters, or

  (ii) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester), or

  (iii) exceeded the maximum period of registration specified in Sc3,

  unless otherwise permitted by the Board of the Faculty.

Advanced standing

Sc6 Advanced standing may be granted to candidates in recognition of studies completed successfully in an approved institution of higher education elsewhere in accordance with UG2 of the Regulations for First Degree Curricula. Credits granted for advanced standing will be recorded on the transcript of the candidate but shall not be included in the calculation of the GPA.

Assessment

Sc7

(a) Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

(b) Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

(c) Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

(d) Candidates are required to make up for failed courses in the following manner: repeating the failed course by undergoing instruction and satisfying the assessment, or for elective courses, taking another course in lieu and satisfying the assessment requirements.

(e) There shall be no appeal against the results of examinations and all other forms of assessment.

Award of BSc Degree

Sc8 To be eligible for the award of the BSc degree, candidates shall have:

(a) satisfied the requirements in UG5 of the Regulations for First Degree Curricula;

(b) passed not fewer than 240 credits, comprising 96 credits of the required courses as prescribed in the major programme of the BSc degree curriculum.

Honours classification

Sc9 .

(a) Honours classifications shall be awarded in five divisions: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, and Pass. The classification of honours shall be determined by the Board of Examiners for the Degree of BSc in accordance with the following Cumulative GPA scores, with all courses taken (including failed courses, but not including courses approved by the Senate graded as 'Pass', 'Fail' or 'Distinction') carrying equal weighting:

Class of honours	*CGPA range*
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate's Cumulative GPA and the Board of Examiners for the Degree of BSc may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Cumulative GPA falls below the range stipulated in UG9(a) of the higher classification by not more than 0.1 Grade Point.

(c) A list of candidates who have successfully completed all degree requirements shall be posted on Faculty noticeboards.

REGULATIONS FOR FIRST DEGREE CURRICULA[1]

Regulations for First Degree Curricula (for students admitted under the 4-year '2012 curriculum' to the first year of first degree curricula in 2014-15 and thereafter)

(See also General Regulations)

UG 1 Definitions:

For the purpose of regulations and syllabuses for all first degree curricula unless otherwise defined —

An 'academic year' comprises two semesters, the first semester to commence in September and end in December, and the second semester to commence in January and end in May/June, on dates as prescribed by the Senate. It includes, normally at the end of each semester, a period during which candidates are assessed. For some curricula, a 'summer semester' may be organized in addition to the normal two semesters. Clinical curricula have extended semesters.

A 'summer semester' normally comprises seven to eight weeks of intensive timetabled teaching and assessment to commence four weeks after the end of the second semester assessment period, and to conclude about one week before the start of the next academic year.

The 'maximum period of registration' is equivalent to a period which is 150% of the curriculum's normative period of study as specified in the degree regulations, provided that where this results in a residual fraction of an academic year, the fractional period shall be extended to one full academic year.

'Degree curriculum' means the entire study requirements for the award of an undergraduate degree.

'Major programme' means the study requirements, including a capstone experience, for a single major area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 72 credits nor more than 96 credits, as prescribed in the syllabuses for a degree curriculum.

'Minor programme' means the study requirements for a single minor area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 36 credits nor more than 48 credits, as prescribed in the syllabuses for a degree curriculum.

'Professional core' refers to the study requirements, including a capstone experience, prescribed in the regulations and syllabuses for disciplinary studies in degree curricula which are not structured as major/minor programmes for reasons relating to professional qualification and/or accreditation.

'Course' means a course of study, with a credit value expressed as a number of credit-units

[1] These regulations are applicable to candidates admitted from 2014-15 onwards to the first year of first degree curricula under the 4-year '2012 curriculum', the 2-year curriculum in respect of the BSc(IM), the 5-year curriculum in respect of the BA&BEd(LangEd), BEd&BSc, BEd&BSocSc, BSc(Sp&HearSc), and BNurs, and the 6-year curriculum in respect of the BChinMed, BDS and MBBS. Reference in these regulations to the powers of the Boards of Faculties shall be applicable to Senate Boards of Studies which administer first degree curricula.

(The Regulations for First Degree Curricula applicable to cohorts admitted in 2012-13 and 2013-14 under the 4-year '2012 curriculum' can be found in the Calendar for 2013-14, and in the Calendar for 2012-13 for the cohort admitted in 2012-13 under the 3-year '2010 curriculum'.)

as specified in the syllabuses for a degree curriculum.

'Disciplinary elective course' or 'Disciplinary Elective' means any course offered in the same major or minor programme or the professional core which can be taken by candidates to fulfill the curriculum requirements as specified in the syllabuses of the degree curriculum.

'Elective course' or 'Elective' means any course offered within the same or another curriculum, other than compulsory courses in the candidate's degree curriculum, that can be taken by the candidate in order to complete the credit requirements of the degree curriculum.

'Capstone experience' refers to one or more courses within the major programme or professional core which are approved by the Board of the Faculty for the purpose of integrating knowledge and skills acquired, and which are prescribed in the syllabuses of the degree curriculum.

'Syllabus' means courses taught by departments, centres, and schools, offered under a degree curriculum.

'Prerequisite' means a course or a group of courses which candidates must have completed successfully or a requirement which candidates must have fulfilled before being permitted to take the course in question.

'Corequisite' means a course which candidates must take in conjunction with the course in question.

'Credits' or 'credit-units' means the value assigned to each course to indicate its study load relative to the total study load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classroom, and includes contact hours and time spent on assessment tasks and examinations. Candidates who satisfactorily complete courses with a credit value earn the credits assigned to these courses.

'Grade Points' are standardized measurements of candidates' academic achievement in courses taken to satisfy the requirements of the degree curriculum and are expressed as a scale prescribed in these regulations.

'Grade Point Average' is a numerical measure of a candidate's academic achievement over a specified period of time. Each course attempted (including each failed course) is assigned a numerical value, with all courses carrying equal weighting. This numerical value is the product of grade points earned for the course and the credit value of that course. The 'Grade Point Average' is the sum of these numerical values divided by the total number of credits attempted:

$$GPA = \frac{\sum_{i} \textit{Course Grade Point} \times \textit{Course Credit Value}}{\sum_{i} \textit{Course Credit Value}}$$

(where 'i' stands for all passed and failed courses taken by the student over a specified period)

'Semester Grade Point Average' or 'Semester GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given semester.

'Year Grade Point Average' or 'Year GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given academic year.

'Cumulative Grade Point Average' or 'Cumulative GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) at the time of calculation.

'Assessment' refers to judgment about the quality and extent to which a student has achieved the stated learning objectives or learning outcomes. It includes all types of assessment activities which allow for such a judgment to be made. For the purpose of interpreting the relevant provisions of the Ordinance and the Statutes and where appropriate, reference to 'examination' or 'examinations' in the Ordinance and the Statutes shall include and cover all forms of 'assessment' and its related processes.

A 'transcript' refers to a transcript of the record of study of a candidate, issued by the Registry of the University.

UG 2 Advanced standing:

Advanced standing may be granted to candidates in recognition of studies completed successfully before admission to the curriculum. Candidates who are awarded Advanced Standing will not be granted any further credit transfer for those studies for which Advanced Standing has been granted. The amount of credits to be granted for advanced standing shall be determined by the Board of the Faculty, in accordance with the following principles:

(a) at least half the number of credits of the degree curriculum normally required for award of the degree shall be accumulated through study at this University or from transfer of credits for courses completed at other institutions in accordance with Regulation UG 4(d); and

(b) in accordance with Statute III.5 and notwithstanding the granting of advanced and/or transfer credits, a minimum of two semesters of study at this University shall be required before a candidate is considered for the award of a first degree, other than a degree in medicine or surgery, and a minimum of four semesters of study at this University shall be required before a candidate is considered for a first degree in medicine or surgery.

Credits granted for advanced standing shall not normally be included in the calculation of the GPA unless permitted by the Board of the Faculty but will be recorded on the transcript of the candidate.

UG 3 Period of study:

The period of study of the curriculum shall be specified in the regulations governing the degree. To be eligible for award of the degree, a candidate shall fulfill all curriculum requirements within the maximum period of registration, unless otherwise permitted or required by the Board of the Faculty.

UG 4 Progression in curriculum:

(a) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of outstanding credits required to complete the curriculum requirements is fewer than 24 credits.

(b) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load for the normative period of study specified in the curriculum regulations, save as provided for under UG4(c).

(c) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load for the maximum period of registration specified in the curriculum regulations.

(d) Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The number of transferred credits may be recorded in the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

(e) Unless otherwise permitted by the Board of the Faculty, candidates shall be recommended for discontinuation of their studies if they have:

(i) failed to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters, or
(ii) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester), or
(iii) exceeded the maximum period of registration specified in the regulations of the degree.

UG 5 Requirements for graduation:

To be eligible for admission to the degree, candidates shall fulfill the following requirements in addition to the requirements prescribed in the regulations and syllabuses governing the degree curriculum within the maximum period of registration:

(a) successful completion of 12 credits in English language enhancement, including 6 credits in Core University English[2] and 6 credits in an English in the Discipline course[3];
(b) successful completion of 6 credits in Chinese language enhancement[4];
(c) successful completion of 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry[5] with not more than one course from the same Area of Inquiry being selected within one academic year except where candidates are required to make up for failed credits; and
(d) successful completion of a capstone experience as specified in the syllabuses of the degree curriculum.

UG 6 Exemption:

Candidates may be exempted, with or without special conditions attached, from any of the requirements in UG 5 by the Senate in exceptional circumstances. Candidates who are so

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[2] Candidates who have achieved Level 5** in English Language in the Hong Kong Diploma of Secondary Education Examination, or equivalent, may at the discretion of the Faculty be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

[3] (a) To satisfy the English in the Discipline (ED) requirement, candidates who have passed the ED course for a Major but subsequently change that Major are required to pass the ED course for the new Major, or either of the double Majors finally declared upon graduation irrespective of whether the second Major is offered within or outside of the candidates' home Faculty.

(b) Candidates declaring double Majors can, if they fail in the ED course for one of the Majors, either (i) re-take and successfully complete that failed ED course, or (ii) successfully complete the ED course for the other Major, irrespective of whether the Major is offered within or outside of the candidates' home Faculty.

(c) Candidates who undertake studies in double Majors or double degrees are not required to take a second ED course but may be advised by the Faculty to do so.

[4] Candidates who have not studied Chinese language during their secondary education may be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

[5] Candidates registered for double degree studies are required to successfully complete 24 credits of courses in the Common Core Curriculum, selecting one course from each Area of Inquiry, within the curriculum of the first degree, as appropriate.

exempted must replace the number of exempted credits with courses of the same credit value.

UG 7 Assessment:

(a) Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

(b) Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

(c) Candidates suspended under Statute XXXI shall not be allowed to take, present themselves for, and participate in any assessments during the period of suspension, unless otherwise permitted by the Senate.

(d) Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

(e) Candidates are required to make up for failed courses in the following manner as prescribed in the curriculum regulations:

(i) undergoing re-assessment/re-examination in the failed course to be held no later than the end of the following semester (not including the summer semester); or

(ii) re-submitting failed coursework, without having to repeat the same course of instruction; or

(iii) repeating the failed course by undergoing instruction and satisfying the assessments; or

(iv) for elective courses, taking another course *in lieu* and satisfying the assessment requirements.

(f) There shall be no appeal against the results of examinations and all other forms of assessment.

UG 8 Grading system:

(a) The grades, their standards and the grade points for assessment shall be as follows[6]:

Grade	*Standard*	*Grade Point*
A+	Excellent	4.3
A		4.0
A-		3.7
B+	Good	3.3
B		3.0
B-		2.7
C+	Satisfactory	2.3
C		2.0
C-		1.7
D+	Pass	1.3
D		1.0
F	Fail	0

[6] UG 8 is not applicable to the respective Professional Core of the BDS and MBBS curricula.

(b) Special permission may be given by Senate for courses in individual curricula to be graded as ‘Pass’, ‘Fail’ or ‘Distinction’. Such courses will not be included in the calculation of the GPA.

UG 9 Honours classifications:

(a) Honours classifications shall be awarded in five divisions[7]: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, and Pass. The classification of honours shall be determined by the Board of Examiners for the degree in accordance with the following Cumulative GPA scores, with all courses taken (including failed courses) carrying equal weighting:

Class of honours	*CGPA range*
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate’s Cumulative GPA and the Board of Examiners for the degree may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Cumulative GPA falls below the range stipulated in UG9(a) of the higher classification by not more than 0.1 Grade Point.

(c) A list of candidates who have successfully completed all degree requirements shall be posted on Faculty noticeboards.

[7] UG 9 is not applicable to the BChinMed, BDS and MBBS curricula.

REGULATIONS FOR FIRST DEGREE CURRICULA[1]

Regulations for First Degree Curricula (for students admitted under the 4-year ‘2012 curriculum’ to the first year of first degree curricula in 2012-13 and 2013-14 and students admitted directly to the third year in 2014-15)

(See also General Regulations)

UG 1 Definitions:

For the purpose of regulations and syllabuses for all first degree curricula unless otherwise defined —

An ‘academic year’ comprises two semesters, the first semester to commence in September and end in December, and the second semester to commence in January and end in May/June, on dates as prescribed by the Senate. It includes, normally at the end of each semester, a period during which candidates are assessed. For some curricula, a ‘summer semester’ may be organized in addition to the normal two semesters. Clinical curricula have extended semesters.

A ‘summer semester’ normally comprises seven to eight weeks of intensive timetabled teaching and assessment to commence four weeks after the end of the second semester assessment period, and to conclude about one week before the start of the next academic year.

The ‘maximum period of registration’ is equivalent to a period which is 150% of the curriculum’s normative period of study as specified in the degree regulations, provided that where this results in a residual fraction of an academic year, the fractional period shall be extended to one full academic year.

‘Degree curriculum’ means the entire study requirements for the award of an undergraduate degree.

‘Major programme’ means the study requirements, including a capstone experience, for a single major area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 72 credits nor more than 96 credits, as prescribed in the syllabuses for a degree curriculum.

‘Minor programme’ means the study requirements for a single minor area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 36 credits nor more than 48 credits, as prescribed in the syllabuses for a degree curriculum.

‘Professional core’ refers to the study requirements, including a capstone experience, prescribed in the regulations and syllabuses for disciplinary studies in degree curricula which are not structured as major/minor programmes for reasons relating to professional qualification and/or accreditation.

‘Course’ means a course of study, with a credit value expressed as a number of credit-units

[1] These regulations are applicable to candidates admitted under the 4-year ‘2012 curriculum’ (the 2-year curriculum in respect of the BSc(IM), the 5-year curriculum in respect of the BA&BEd(LangEd), BEd&BSc, BEd&BSocSc, BSc(Sp&HearSc), and BNurs, and the 6-year curriculum in respect of the BChinMed, BDS and MBBS) to the first year of first degree curricula in 2012-13 and 2013-14. Reference in these regulations to the powers of the Boards of Faculties shall be applicable to Senate Boards of Studies which administer first degree curricula.

(Please refer to the Calendar for 2011-12 for the Regulations for First Degree Curricula applicable to cohorts admitted in 2010-11 and 2011-12 under the 3-year ‘2010 curriculum’.)

as specified in the syllabuses for a degree curriculum.

'Disciplinary elective course' or 'Disciplinary Elective' means any course offered in the same major or minor programme or the professional core which can be taken by candidates to fulfill the curriculum requirements as specified in the syllabuses of the degree curriculum.

'Elective course' or 'Elective' means any course offered within the same or another curriculum, other than compulsory courses in the candidate's degree curriculum, that can be taken by the candidate in order to complete the credit requirements of the degree curriculum.

'Capstone experience' refers to one or more courses within the major programme or professional core which are approved by the Board of the Faculty for the purpose of integrating knowledge and skills acquired, and which are prescribed in the syllabuses of the degree curriculum.

'Syllabus' means courses taught by departments, centres, and schools, offered under a degree curriculum.

'Prerequisite' means a course or a group of courses which candidates must have completed successfully or a requirement which candidates must have fulfilled before being permitted to take the course in question.

'Corequisite' means a course which candidates must take in conjunction with the course in question.

'Credits' or 'credit-units' means the value assigned to each course to indicate its study load relative to the total study load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classroom, and includes contact hours and time spent on assessment tasks and examinations. Candidates who satisfactorily complete courses with a credit value earn the credits assigned to these courses.

'Grade Points' are standardized measurements of candidates' academic achievement in courses taken to satisfy the requirements of the degree curriculum and are expressed as a scale prescribed in these regulations.

'Grade Point Average' is a numerical measure of a candidate's academic achievement over a specified period of time. Each course attempted (including each failed course) is assigned a numerical value, with all courses carrying equal weighting. This numerical value is the product of grade points earned for the course and the credit value of that course. The 'Grade Point Average' is the sum of these numerical values divided by the total number of credits attempted:

$$GPA = \frac{\sum_{i} \textit{Course Grade Point} \times \textit{Course Credit Value}}{\sum_{i} \textit{Course Credit Value}}$$

(where 'i' stands for all passed and failed courses taken by the student over a specified period)

'Semester Grade Point Average' or 'Semester GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given semester.

'Year Grade Point Average' or 'Year GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given academic year.

'Cumulative Grade Point Average' or 'Cumulative GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) at the time of calculation.

'Assessment' refers to judgment about the quality and extent to which a student has achieved the stated learning objectives or learning outcomes. It includes all types of assessment activities which allow for such a judgment to be made. For the purpose of interpreting the relevant provisions of the Ordinance and the Statutes and where appropriate, reference to 'examination' or 'examinations' in the Ordinance and the Statutes shall include and cover all forms of 'assessment' and its related processes.

A 'transcript' refers to a transcript of the record of study of a candidate, issued by the Registry of the University.

UG 2 Advanced standing:

Advanced standing may be granted to candidates in recognition of studies completed successfully elsewhere before admission to the University. Candidates who are awarded Advanced Standing will not be granted any further credit transfer for those studies for which Advanced Standing has been granted. The amount of credits to be granted for advanced standing shall be determined by the Board of the Faculty, in accordance with the following principles:

(a) at least half the number of credits of the degree curriculum normally required for award of the degree shall be accumulated through study at this University or from transfer of credits for courses completed at other institutions in accordance with Regulation UG 4(d); and

(b) in accordance with Statute III.5 and notwithstanding the granting of advanced and/or transfer credits, a minimum of two semesters of study at this University shall be required before a candidate is considered for the award of a first degree, other than a degree in medicine or surgery, and a minimum of four semesters of study at this University shall be required before a candidate is considered for a first degree in medicine or surgery.

Credits granted for advanced standing shall not normally be included in the calculation of the GPA unless permitted by the Board of the Faculty but will be recorded on the transcript of the candidate.

UG 3 Period of study:

The period of study of the curriculum shall be specified in the regulations governing the degree. To be eligible for award of the degree, a candidate shall fulfill all curriculum requirements within the maximum period of registration, unless otherwise permitted or required by the Board of the Faculty.

UG 4 Progression in curriculum:

(a) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of outstanding credits required to complete the curriculum requirements is fewer than 24 credits.

(b) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load for the normative period of study specified in the curriculum regulations, save as provided for under UG4(c).

(c) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load for the maximum period of registration specified in the curriculum regulations.

(d) Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The number of transferred credits may be recorded in the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

(e) Unless otherwise permitted by the Board of the Faculty, candidates shall be recommended for discontinuation of their studies if they have:

(i) failed to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters, or
(ii) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester), or
(iii) exceeded the maximum period of registration specified in the regulations of the degree.

UG 5 Requirements for graduation:

To be eligible for admission to the degree, candidates shall fulfill the following requirements in addition to the requirements prescribed in the regulations and syllabuses governing the degree curriculum within the maximum period of registration:

(a) successful completion of 12 credits in English language enhancement, including 6 credits in Core University English[2] and 6 credits in an English in the Discipline course[3];
(b) successful completion of 6 credits in Chinese language enhancement[4];
(c) successful completion of 36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and not more than two courses from each Area of Inquiry[5] during the whole period of study; and
(d) successful completion of a capstone experience as specified in the syllabuses of the degree curriculum.

UG 6 Exemption:

Candidates may be exempted, with or without special conditions attached, from any of the

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[2] Candidates who have achieved Level 5** in English Language in the Hong Kong Diploma of Secondary Education Examination, or equivalent, may at the discretion of the Faculty be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

[3] (a) To satisfy the English in the Discipline (ED) requirement, candidates who have passed the ED course for a Major but subsequently change that Major are required to pass the ED course for the new Major, or either of the double Majors finally declared upon graduation irrespective of whether the second Major is offered within or outside of the candidates' home Faculty.

(b) Candidates declaring double Majors can, if they fail in the ED course for one of the Majors, either (i) re-take and successfully complete that failed ED course, or (ii) successfully complete the ED course for the other Major, irrespective of whether the Major is offered within or outside of the candidates' home Faculty.

(c) Candidates who undertake studies in double Majors or double degrees are not required to take a second ED course but may be advised by the Faculty to do so.

[4] Candidates who have not studied Chinese language during their secondary education may be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

[5] Candidates registered for double degree studies are required to successfully complete 24 credits of courses in the Common Core Curriculum, selecting one course from each Area of Inquiry, within the curriculum of the first degree, as appropriate.

requirements in UG 5 by the Senate in exceptional circumstances. Candidates who are so exempted must replace the number of exempted credits with courses of the same credit value.

UG 7 Assessment:

(a) Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

(b) Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

(c) Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

(d) Candidates are required to make up for failed courses in the following manner as prescribed in the curriculum regulations:

(i) undergoing re-assessment/re-examination in the failed course to be held no later than the end of the following semester (not including the summer semester); or
(ii) re-submitting failed coursework, without having to repeat the same course of instruction; or
(iii) repeating the failed course by undergoing instruction and satisfying the assessments; or
(iv) for elective courses, taking another course *in lieu* and satisfying the assessment requirements.

(e) There shall be no appeal against the results of examinations and all other forms of assessment.

UG 8 Grading system:

(a) The grades, their standards and the grade points for assessment shall be as follows[6]:

Grade	*Standard*	*Grade Point*
A+	Excellent	4.3
A		4.0
A-		3.7
B+	Good	3.3
B		3.0
B-		2.7
C+	Satisfactory	2.3
C		2.0
C-		1.7
D+	Pass	1.3
D		1.0
F	Fail	0

(b) Special permission may be given by Senate for courses in individual curricula to be graded as 'Pass', 'Fail' or 'Distinction'. Such courses will not be included in the

[6] UG 8 is not applicable to the BDS and MBBS curricula.

calculation of the GPA.

UG 9 Honours classifications:

(a) Honours classifications shall be awarded in five divisions[7]: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, and Pass. The classification of honours shall be determined by the Board of Examiners for the degree in accordance with the following Cumulative GPA scores, with all courses taken (including failed courses) carrying equal weighting:

Class of honours	*CGPA range*
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate's Cumulative GPA and the Board of Examiners for the degree may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Cumulative GPA falls below the range stipulated in UG9(a) of the higher classification by not more than 0.1 Grade Point.

(c) A list of candidates who have successfully completed all degree requirements shall be posted on Faculty noticeboards.

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[7] UG 9 is not applicable to the BChinMed, BDS and MBBS.

SECTION IX

Teaching Weeks

SCIENCE

SECTION IX Teaching Weeks

Teaching Weeks 2015-2016 for Undergraduate and Taught Postgraduate Students

	SUN	MON	TUE	WED	THUR	FRI	SAT	Week	
SEP-15			1	2	[3]	4	5	1	**FIRST SEMESTER: SEP 1 - DEC 23, 2015** First Day of Teaching: Sep 1, 2015
	6	7	8	9	10	11	12	2	
	13	14	15	16	17	18	19	3	
	20	21	22	23	24	25	26	4	
	27	[28]	29	30				5	
OCT-15					[1]	2	3		
	4	5	6	7	8	9	10	6	
	11	12	13	14	15	16	17	7 (Reading)	Reading/ Field Trip Week: Oct 12 - 17, 2015
	18	19	20	[21]	22	23	24	8	
	25	26	27	28	29	30	31	9	
NOV-15	1	2	3	4	5	6	7	10	
	8	9	10	11	12	13	14	11	
	15	16	17	18	19	20	21	12	
	22	23	24	25	26	27	28	13	
	29	30							Last Day of Teaching: Nov 30, 2015
DEC-15			1	2	3	4	5	14 (Revision)	Revision Period: Dec 1 - 7, 2015
	6	7	8	9	10	11	12	15	Assessment Period: Dec 8 - 23, 2015
	13	14	15	16	17	18	19	16	
	20	21	22	23	(24)	[25]	[26]	17	
	27	28	29	30	<31>			18 (Break)	
JAN-16						[1]	2		
	3	4	5	6	7	8	9	19 (Break)	
	10	11	12	13	14	15	16	20 (Break)	**SECOND SEMESTER: JAN 18 - MAY 28, 2016**
	17	18	19	20	21	22	23	21	First Day of Teaching: Jan 18, 2016
	24	25	26	27	28	29	30	22	
	31								
FEB-16		1	2	3	4	5	6	23	Class Suspension Period for the Lunar New Year:
	7	[8]	[9]	[10]	11	12	13	24	Feb 8 - 13, 2016
	14	15	16	17	18	19	20	25	
	21	22	23	24	25	26	27	26	
	28	29						27	
MAR-16			1	2	3	4	5		
	6	7	8	9	10	11	12	28 (Reading)	Reading/ Field Trip Week: Mar 7 - 12, 2016
	13	14	15	(16)	17	18	19	29	
	20	21	22	23	24	[25]	[26]	30	
	27	[28]	29	30	31			31	
APR-16						1	2		
	3	[4]	5	6	7	8	9	32	
	10	11	12	13	14	15	16	33	
	17	18	19	20	21	22	23	34	
	24	25	26	27	28	29	30	35	Last Day of Teaching: Apr 30, 2016
MAY-16	1	[2]	3	4	5	6	7	36 (Revision)	Revision Period: May 2 - 7, 2016
	8	9	10	11	12	13	[14]	37	Assessment Period: May 9 - 28, 2016
	15	16	17	18	19	20	21	38	
	22	23	24	25	26	27	28	39	
	29	30	31					40 (Break)	
JUN-16				1	2	3	4		
	5	6	7	8	[9]	10	11	41 (Break)	
	12	13	14	15	16	17	18	42 (Break)	
	19	20	21	22	23	24	25	43 (Break)	**OPTIONAL SUMMER SEMESTER**
	26	27	28	29	30			44	Jun 27 - Aug 20, 2016
JUL-16						[1]	2		
	3	4	5	6	7	8	9	45	
	10	11	12	13	14	15	16	46	
	17	18	19	20	21	22	23	47	
	24	25	26	27	28	29	30	48	
	31								
AUG-16		1	2	3	4	5	6	49	
	7	8	9	10	11	12	13	50	
	14	15	16	17	18	19	20	51	
	21	22	23	24	25	26	27	52 (Break)	
	28	29	30	31				53 (Break)	

[ ] General Holiday

( ) University Holiday (Full Day)

< > University Holiday (afternoon only)

Reading/ Field Trip Week

Revision Period

Class Suspension Period for the Lunar New Year

Assessment Period

Notes:

First Semester: 11 Mondays, 12 Tuesdays, 11 Wednesdays, 10 Thursdays, 12 Fridays, and 12 Saturdays

Second Semester: 11 Mondays, 13 Tuesdays, 12 Wednesdays, 13 Thursdays, 12 Fridays, and 12 Saturdays

SECTION X

List of BSc Courses and English and Chinese language courses on offer in 2015-16 and 2016-17

SCIENCE

SECTION X List of BSc Courses on offer in 2015/16 and 2016/17^

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biomedical Sciences													
BIOC1600	Perspectives in biochemistry	6	Level 3 or above in HKDSE Biology, Chemistry, or Combined Science with Biology or Chemistry component, or equivalent	Y	Y	1	Dec	---	Dr J Tanner, Biomedical Sciences	Major in Biochemistry (2014,2013,2012)	Major in Biochemistry (2015); Minor in Biochemistry (2015,2014,2013,2012)		
BIOC2600	Basic biochemistry	6	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells or ENGG1207 Foundation of biochemistry for medical engineering; and Not for students who have passed in BIOL2220 Principles of biochemistry or MEDE2301 Life sciences I (Biochemistry), already enrolled in this course.	Y	Y	1	Dec	300	Prof D K Y Shum, Biomedical Sciences	Major in Biochemistry (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Minor in Biochemistry (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOC3601	Basic metabolism	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life sciences I (Biochemistry)	Y	Y	1	Dec	80	Dr N S Wong, Biomedical Sciences	Major in Biochemistry (2015,2014,2013,2012)	Minor in Biochemistry (2015,2014,2013,2012)		
BIOC3602	Understanding metabolism diseases	6	Pass in BIOC3601 Basic metabolism	N	N	---	---	40	Dr L Y L Cheng, Biomedical Sciences				
BIOC3604	Essential techniques in biochemistry and molecular biology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life science I	Y	Y	2	May	70	Dr K M Yao, Biomedical Sciences	Major in Biochemistry (2015,2014,2013,2012)	Minor in Biochemistry (2015,2014,2013,2012)		
BIOC3605	Sequence bioinformatics	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BBMS2003 Human genetics or BBMS2007 Essential molecular biology or MEDE2301 Life science I	Y	Y	2	May	50	Dr B C W Wong, Biomedical Sciences		Major in Biochemistry (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012)		
BIOC3606	Molecular medicine	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life science I	Y	Y	2	May	50	Prof D Y Jin, Biomedical Sciences		Major in Biochemistry (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012)		
BIOC3999	Directed studies in biochemistry	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Biochemistry Major including BIOC2600 Basic biochemistry and BIOL3401 Molecular biology. This capstone course is for Biochemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	36	Prof J D Huang, Biomedical Sciences				Major in Biochemistry (2015,2014,2013,2012)
BIOC4610	Advanced biochemistry	6	Pass in BIOC3601 Metabolism or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3404 Protein structure and function	Y	Y	1	Dec	50	Dr K M Yao, Biomedical Sciences	Major in Biochemistry (2015,2014,2013,2012)	Minor in Biochemistry (2015,2014,2013,2012)		
BIOC4611	Advanced biochemistry II	6	Pass in BIOC3601 Metabolism; and BIOL3404 Protein structure and function or CHEM2441 Organic chemistry I; and Pass in BIOC4610 Advanced biochemistry, or already enrolled in this course	N	N	---	---	50	Prof D Chan, Biomedical Sciences				
BIOC4612	Molecular biology of the gene	6	Pass in BIOC3601 Metabolism or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3404 Protein structure and function or BBMS2007 Essential molecular biology	Y	Y	2	May	50	Prof K S E Cheah, Biomedical Sciences		Major in Biochemistry (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012)		
BIOC4613	Advanced techniques in biochemistry & molecular biology	6	Pass in BIOC3604 Essential techniques in biochemistry and molecular biology	Y	Y	1	Dec	70	Prof D Chan, Biomedical Sciences	Major in Biochemistry (2015,2014,2013,2012)	Minor in Biochemistry (2015,2014,2013,2012)		

^ Availability of courses in 2016-2017 is subject to change.

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biolmedical Sciences (Cont'd)													
BIOC4966	Biochemistry internship	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Biochemistry Major including BIOC3604 Essential techniques in biochemistry & molecular biology. This capstone course is for Biochemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	20	Prof J D Huang, Biomedical Sciences				Major in Biochemistry (2015,2014,2013,2012)
BIOC4999	Biochemistry project	12	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Biochemistry Major including 4 of the following 5 courses: BIOL3401 Molecular biology, BIOC3601 Basic metabolism, and BIOC3604 Essential techniques in biochemistry and molecular biology; and BIOC4610 Advanced biochemistry and BIOC4613 Advanced techniques in biochemistry & molecular biology. BIOC4610 Advanced biochemistry and BIOC4613 Advanced techniques in biochemistry & molecular biology can be taken concurrently with this course. This capstone course is for Biochemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	25	Dr N S Wong, Biomedical Sciences				Major in Biochemistry (2015,2014,2013,2012)
School of Biological Sciences													
BIOL1110	From molecules to cells	6	NIL	Y	Y	1, 2	Dec, May	169	Prof B K C Chow, Biological Sciences	Major in Biochemistry (2014,2013,2012); Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Food & Nutritional Science (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Major in Biochemistry (2015); Minor in Biochemistry (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL1111	Introductory microbiology	6	NIL	N	N	---	---	80	TBC, Biological Sciences	Major in Biological Sciences (2015,2014,2013,2012)			
BIOL1201	Introduction to food and nutrition	6	NIL	Y	Y	1	Dec	110	Prof N P Shah, Biological Sciences	Major in Food & Nutritional Science (2015,2014,2013,2012)	Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL1309	Evolutionary diversity	6	NIL	Y	Y	2	May	105	Prof R M K Saunders, Biological Sciences	Major in Food & Nutritional Science (2015); Major in Biological Sciences (2015,2014,2013,2012); Major in Earth System Science (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)	Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biological Sciences (Cont'd)													
BIOL1501	Bioethics	6	NIL	N	Y	---	---	40	Prof F C C Leung, Biological Sciences				
BIOL1502	The gene	6	NIL Not for students with level 3 or above in HKDSE Biology or Combined Science with Biology component or equivalent.	N	Y	---	---	50	Prof F C C Leung, Biological Sciences				
BIOL2102	Biostatistics	6	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells or BIOL2306 Ecology and evolution or ENVS1301 Environmental life science or ENVS2002 Environmental data analysis	Y	Y	2	May	135	Dr G Panagiotou, Biological Sciences	Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Food & Nutritional Science (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL2103	Biological sciences laboratory course	6	Pass in BIOL1110 From molecules to cells	Y	Y	1, 2	Dec, May	215	Dr W Y Lui, Biological Sciences	Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Food & Nutritional Science (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL2220	Principles of biochemistry	6	Pass in BIOL1110 From molecules to cells; and Not for students who have passed in BIOC2600 Basic biochemistry or have already enrolled in this course.	Y	Y	1	Dec	100	Dr C S C Lo, Biological Sciences	Major in Food & Nutritional Science (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Minor in Food & Nutritional Science (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL2306	Ecology and evolution	6	Pass in BIOL1309 Evolutionary diversity or BIOL1110 From molecules to cells or ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science	Y	Y	1	Dec	80	Prof D Dudgeon, Biological Sciences	Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Food & Nutritional Science (2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)	Major in Environmental Science (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL3105	Animal physiology and environmental adaptation	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOL2102 Biostatistics or BIOL2306 Ecology and evolution	Y	Y	2	May	40	Prof A O L Wong, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012)		
BIOL3107	Plant physiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	1	Dec	30	Dr W K Yip, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biological Sciences (Cont'd)													
BIOL3108	Microbial physiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	1	Dec	50	Dr A Yan, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012)		
BIOL3109	Environmental microbiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	2	May	40	Dr J D Gu, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL3110	Environmental toxicology	6	Pass in BIOL2103 Biological sciences laboratory course or ENVS3042 Pollution or CHEM3141 Environmental chemistry	Y	Y	1	Dec	60	Dr J D Gu, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
BIOL3201	Food chemistry	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	60	Dr J C Y Lee, Biological Sciences	Major in Food & Nutritional Science (2015,2014,2013,2012)	Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3202	Nutritional biochemistry	6	Pass in BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry or MEDE2301 Life science I	Y	Y	1	Dec	100	Dr E T S Li, Biological Sciences	Major in Food & Nutritional Science (2015,2014,2013,2012)	Major in Biochemistry (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3203	Food microbiology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	60	Dr H S El-Nezami, Biological Sciences	Major in Food & Nutritional Science (2015,2014,2013,2012)	Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3204	Nutrition and the life cycle	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3202 Nutritional biochemistry	Y	Y	2	May	70	Dr E T S Li, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3205	Human physiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	1	Dec	120	Dr W Y Lui, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3206	Clinical nutrition	6	Pass in BIOL3202 Nutritional biochemistry or BIOL3203 Food microbiology or BIOL3204 Nutrition and the life cycle or BIOL3205 Human physiology	Y	Y	2	May	70	Dr J M F Wan, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3207	Food and nutritional toxicology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3205 Human physiology	Y	Y	2	May	80	Dr H S El-Nezami, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		

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School of Biological Sciences (Cont'd)													
BIOL3208	Food safety and quality management	6	Pass in BIOL3201 Food chemistry or BIOL3203 Food microbiology	Y	Y	1	Dec	40	Prof H Corke, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3209	Food and nutrient analysis	6	Pass in BIOL3201 Food chemistry	Y	Y	1	Dec	70	Dr M F Wang, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3210	Grain production and utilization	6	Pass in any level 2 BIOL course	Y	Y	1	Dec	40	Prof H Corke, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL3211	Nutrigenomics	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	40	Dr K C Tan-Un, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL3301	Marine biology	6	Pass in BIOL2306 Ecology and evolution or ENVS2002 Environmental data analysis	Y	Y	2	May	40	Dr M Yasuhara, Biological Sciences	Minor in Marine Biology (2015,2014,2013,2012)	Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL3302	Systematics and phylogenetics	6	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course	Y	Y	1	Dec	60	Prof R M K Saunders, Biological Sciences	Major in Ecology & Biodiversity (2015,2014,2013,2012)	Major in Biological Sciences (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL3303	Conservation ecology	6	Pass in BIOL2306 Ecology and evolution	Y	Y	2	May	40	Dr T C Bonebrake, Biological Sciences	Major in Ecology & Biodiversity (2015,2014,2013,2012)	Major in Biological Sciences (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012)		
BIOL3313	Freshwater ecology	6	Pass in BIOL2102 Biostatistics and BIOL2306 Ecology and evolution	N	Y	---	---	30	Prof D Dudgeon, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)		

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School of Biological Sciences (Cont'd)													
BIOL3314	Plant structure and evolution	6	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course	Y	Y	2	May	30	Prof R M K Saunders, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL3318	Experimental intertidal ecology	6	Pass in BIOL2102 Biostatistics or BIOL3301 Marine biology	Y	Y	2	May	20	Prof G A Williams, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012)		
BIOL3319	Terrestrial ecology	6	Pass in BIOL3303 Conservation ecology	Y	Y	2	May	30	Dr B Guenard, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL3320	The biology of marine mammals	6	Pass in BIOL2306 Ecology and evolution	Y	N	1	Dec	30	Dr L Karczmarski, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012)		
BIOL3401	Molecular biology	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry or MEDE2301 Life science I	Y	Y	1	Dec	130	Prof B K C Chow, Biological Sciences	Major in Biochemistry (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Major in Biological Sciences (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012)		
BIOL3402	Cell biology and cell technology	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry or MEDE2301 Life science I	Y	Y	1	Dec	120	Prof A S T Wong, Biological Sciences	Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Major in Biochemistry (2015,2014,2013,2012); Major in Biological Sciences (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL3403	Immunology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL2103 Biological sciences laboratory course or MEDE2301 Life science I	Y	Y	2	May	100	Prof W W M Lee, Biological Sciences		Major in Biochemistry (2015,2014,2013,2012); Major in Biological Sciences (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
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School of Biological Sciences (Cont'd)													
BIOL3404	Protein structure and function	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life science I	Y	Y	2	May	160	Dr W K Yip, Biological Sciences		Major in Biochemistry (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012)		
BIOL3405	Molecular microbiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	2	May	30	Dr J S H Tsang, Biological Sciences		Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL3406	Reproduction and reproductive biotechnology	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOL2102 Biostatistics or BIOL2306 Ecology and evolution	Y	Y	1	Dec	40	Prof A O L Wong, Biological Sciences		Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL3408	Genetics	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	1	Dec	50	Dr C S C Lo, Biological Sciences		Major in Biochemistry (2015,2014,2013,2012); Major in Biological Sciences (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL3409	Business aspects of biotechnology	6	Pass in any level 2 BIOL or BIOC course	Y	Y	2	No exam	40	Dr W B L Lim, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL3419	Insect ecology: the little things that run the world	6	Pass in BIOL1309 Evolutionary diversity and BIOL2306 Ecology and evolution	Y	Y	1	Dec	25	Dr B Guenard, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL3501	Evolution	6	Pass in BIOL2306 Ecology and evolution	N	Y	---	---	50	Dr M Sun, Biological Sciences				
BIOL3502	Conservation genetics	6	Pass in BIOL2306 Ecology and evolution or BIOL3303 Conservation ecology or BIOL3408 Genetics	Y	Y	2	May	50	Dr M Sun, Biological Sciences				
BIOL3503	Endocrinology: human physiology II	6	Pass in BIOL2103 Biological sciences laboratory course	Y	N	2	May	120	Prof B K C Chow, Biological Sciences				
BIOL3505	Oyster aquaculture and restoration	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2306 Ecology and evolution or BIOL3301 Marine biology or BIOL3303 Conservation ecology	Y	Y	2	No Exam	20	Dr T Vengatesen, Biological Sciences				
BIOL3951	Ecology & biodiversity field course	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2	No exam	20	Dr L Karczmarski, Biological Sciences				Major in Ecology & Biodiversity (2015,2014,2013,2012)

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biological Sciences (Cont'd)													
BIOL3991	Directed studies in ecology & biodiversity	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof G A Williams, Biological Sciences				Major in Ecology & Biodiversity (2015,2014,2013,2012)
BIOL3992	Directed studies in food & nutritional science	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutritional Science Major. This capstone course is for Food & Nutritional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof H Corke, Biological Sciences				Major in Food & Nutritional Science (2015,2014,2013,2012)
BIOL3993	Directed studies in Molecular biology & biotechnology	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Molecular Biology & Biotechnology Major. This capstone course is for Molecular Biology & Biotechnology Major students The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Dr W K Yip, Biological Sciences				Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)
BIOL3994	Directed studies in biological sciences	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Biological Sciences Major. This capstone course is for Biological Sciences Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Dr J S H Tsang, Biological Sciences				Major in Biological Sciences (2015,2014,2013,2012)
BIOL4201	Public health nutrition	6	Pass in BIOL3201 Food chemistry or BIOL3202 Nutritional biochemistry	Y	Y	2	May	90	Dr J M F Wan, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL4204	Diet, brain function and behavior	6	Pass in BIOL3204 Nutrition and the life cycle or already enrolled in this course	N	Y	---	---	40	Dr E T S Li, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL4205	Food processing and engineering	6	Pass in BIOL3201 Food chemistry	Y	Y	1	Dec	60	Dr J C Y Lee, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL4207	Meat and dairy sciences	6	Pass in BIOL3201 Food chemistry	Y	Y	2	May	50	Prof N P Shah, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
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School of Biological Sciences (Cont'd)													
BIOL4209	Functional foods	6	Pass in BIOL3201 Food chemistry or BIOL3202 Nutritional biochemistry	Y	Y	1	Dec	40	Dr M F Wang, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL4210	Food product development	6	Pass in BIOL3203 Food microbiology or BIOL4205 Food processing and engineering	Y	Y	1	No exam	40	Dr M F Wang, Biological Sciences		Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012)		
BIOL4301	Fish and fisheries	6	Pass in BIOL3301 Marine biology or BIOL3303 Conservation ecology	Y	Y	2	May	30	Prof Y J Sadovy, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012)		
BIOL4302	Environmental impact assessment	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2306 Ecology and evolution; and Any BIOL3XXX course or ENVS3004 Environment, society and economics	Y	Y	2	May	30	Dr D M Baker, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
BIOL4303	Animal behaviour	6	Pass in BIOL2306 Ecology and evolution; and pass in one of the following courses: BIOL3301 Marine biology or BIOL3313 Freshwater ecology or BIOL3319 Terrestrial ecology or BIOL3320 The biology of marine mammals	N	Y	---	---	30	Dr L Karczmarski, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Minor in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL4401	Medical microbiology and applied immunology	6	Pass in BIOL3401 Molecular biology or BIOL3403 Immunology	Y	Y	2	May	40	Dr W Y Lui, Biological Sciences		Major in Biological Sciences (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL4402	Microbial biotechnology	6	Pass in BIOL3401 Molecular biology	Y	Y	2	May	30	Dr J S H Tsang, Biological Sciences	Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL4409	General virology	6	Pass in BIOL3401 Molecular biology or BIOL3403 Immunology	Y	Y	1	Dec	30	Dr W B L Lim, Biological Sciences		Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biological Sciences (Cont'd)													
BIOL4411	Plant and food biotechnology	6	Pass in BIOL3401 Molecular biology or BIOL3211 Nutrigenomics	Y	Y	1	Dec	80	Prof M L Chye, Biological Sciences	Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Major in Food & Nutritional Science (2015,2014,2013,2012); Minor in Food & Nutritional Science (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Plant Science (2015,2014,2013,2012)		
BIOL4415	Healthcare biotechnology	6	Pass in BIOL3401 Molecular biology	Y	Y	2	May	70	Prof A S T Wong, Biological Sciences	Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)	Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL4416	Stem cells and regenerative biology	6	Pass in BIOL3211 Nutrigenomics or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3403 Immunology or BIOL3404 Protein structure and function or BIOL3408 Genetics or BIOC3601 Metabolism or BIOC3604 Essential techniques in biochemistry and molecular biology.	Y	Y	2	May	40	Dr K W Y Yuen, Biological Sciences		Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL4417	'Omics' and systems biology	6	Pass in BIOL3211 Nutrigenomics or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3403 Immunology or BIOL3404 Protein structure and function or BIOL3408 Genetics or BIOC3601 Metabolism or BIOC3604 Essential techniques in biochemistry and molecular biology.	Y	Y	2	May	40	Dr J W Zhang, Biological Sciences		Major in Biochemistry (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
BIOL4501	Molecular phylogenetics and evolution	6	Pass in BIOL3401 Molecular biology or BIOL3408 Genetics	N	Y	---	---	25	TBC, Biological Sciences				
BIOL4861	Ecology & biodiversity internship	6	This course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Dr T Vengatesen, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012)		
BIOL4911	Conservation science in practice	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major including BIOL3303 Conservation ecology. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	S	No exam	15	Prof Y J Sadovy, Biological Sciences				Major in Ecology & Biodiversity (2015,2014,2013,2012)
BIOL4912	Sensory evaluation of food	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutrional Science Major including BIOL3201 Food Chemistry This capstone course is for Food & Nutrional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2	No exam	20	Prof H Corke, Biological Sciences				Major in Food & Nutritional Science (2015,2014,2013,2012)

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				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biological Sciences (Cont'd)													
BIOL4962	Food & nutritional science internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutritional Science Major. This capstone course is for Food & Nutritional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Dr J C Y Lee, Biological Sciences				Major in Food & Nutritional Science (2015,2014,2013,2012)
BIOL4963	Molecular biology & biotechnology internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Molecular Biology & Biotechnology Major. This capstone course is for Molecular Biology & Biotechnology Major students The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Dr W K Yip, Biological Sciences				Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)
BIOL4964	Biological sciences internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Biological Sciences Major. This captsone course is for Biological Sciences Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Dr J S H Tsang, Biological Sciences				Major in Biological Sciences (2015,2014,2013,2012)
BIOL4991	Ecology & biodiversity project	12	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major; and Cumulative GPA of 3.0 or above. Students are not permitted to take both BIOL3991 and BIOL4991. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof G A Williams, Biological Sciences				Major in Ecology & Biodiversity (2015,2014,2013,2012)
BIOL4992	Food & nutritional science project	12	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutritional Science Major; and Cumulative GPA of 3.0 or above. This capstone course is for Food & Nutritional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof N P Shah, Biological Sciences				Major in Food & Nutritional Science (2015,2014,2013,2012)
BIOL4993	Molecular biology & biotechnology project	12	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Molecular Biology & Biotechnology Major; and Cumulative GPA of 3.0 or above. This capstone course is for Molecular Biology & Biotechnology Major students The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Dr W K Yip, Biological Sciences				Major in Molecular Biology & Biotechnology (2015,2014,2013,2012)

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				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
School of Biological Sciences (Cont'd)													
BIOL4994	Biological sciences project	12	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Biological Sciences Major; and Cumulative GPA of 3.0 or above. This capstone course is for Biological Sciences Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Dr J S H Tsang, Biological Sciences				Major in Biological Sciences (2015,2014,2013,2012)
ENVS1301	Environmental life science	6	NIL	Y	Y	1	Dec	40	Dr T Vengatesen, Biological Sciences		Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012); Minor in Marine Biology (2015,2014,2013,2012)		
ENVS2001	Environmental field and lab course	6	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity	Y	Y	1	No exam	30	Dr D M Baker, Biological Sciences	Major in Environmental Science (2015,2014,2013)	Major in Environmental Science (2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS2002	Environmental data analysis	6	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity	Y	Y	2	May	50	Dr T C Bonebrake, Biological Sciences	Major in Ecology & Biodiversity (2015,2014,2013); Major in Environmental Science (2015,2014,2013)	Major in Environmental Science (2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS3019	Urban ecology	6	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution	Y	N	1	Dec	50	Dr T C Bonebrake, Biological Sciences		Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS4110	Environmental remediation	6	Pass in BIOL3109 Environmental microbiology or BIOL3110 Environmental toxicology or BIOL3401 Molecular biology or ENVS3042 Pollution	Y	N	2	May	30	Dr J D Gu, Biological Sciences		Major in Environmental Science (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012); Minor in Molecular Biology & Biotechnology (2015,2014,2013,2012)		
ENVS4955	Environmental science in practice	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	18	Dr M Yasuhara, Biological Sciences				Major in Environmental Science (2015,2014,2013,2012)

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Centre for Applied English Studies													
CAES1000	Core University English	6	NIL	Y	Y	1, 2	Dec, May	---	Dr N Fong, English				
CAES9820	Academic English for science students	6	NIL	Y	Y	1, 2	No exam	---	Ms E Law, English				
Department of Chemistry													
CHEM1041	Foundations of chemistry	6	Level 3 or above in HKDSE Combined Science with Chemistry component or Integrated Science, or equivalent. Students without such background but keen on taking this foundation chemistry course may approach the course coordinator for consideration. Not for students with Level 3 or above in HKDSE Chemistry.	Y	Y	1	Dec	156	Dr A P L Tong, Chemistry				
CHEM1042	General chemistry I	6	Level 3 or above in HKDSE Chemistry or equivalent; students without Level 3 or above in HKDSE Chemistry but having a pass in CHEM1041 Foundations of chemistry may be allowed to take this course.	Y	Y	1, 2	Dec, May	318	Dr A P L Tong, Chemistry	Major in Biochemistry (2015,2014,2013,2012); Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)	Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM1043	General chemistry II	6	Pass in CHEM1042 General chemistry I	Y	Y	2	May	180	Dr A P L Tong, Chemistry	Major in Biochemistry (2015); Major in Chemistry (2015); Minor in Chemistry (2015)	Major in Biochemistry (2014,2013,2012)		
CHEM2041	Principles of chemistry	6	Pass in CHEM1042 General chemistry I; and Not for students who have passed in CHEM2341 Inorganic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2441 Organic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2541 Introductory physical chemistry/Physical chemistry I, or have already enrolled in this course; and Not for Chemistry major students.	N	Y	---	---	140	Dr I K Chu, Chemistry		Major in Environmental Science (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM2241	Analytical chemistry I	6	Pass in CHEM1042 General chemistry I (for students admitted in 2014-15 or before); Pass in CHEM1042 General chemistry I; and Pass in CHEM1043 General chemistry II or already enrolled in this course (for students admitted in 2015-16 or thereafter)	Y	Y	1, 2	Dec, May	115	Dr W T Chan Chemistry	Major in Chemistry (2015,2014,2013,2012)	Major in Environmental Science (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM2341	Inorganic chemistry I	6	Pass in CHEM1042 General chemistry I; and NOT for students who have passed in CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2014-15 or before); Pass in CHEM1042 General chemistry I; and Pass in CHEM1043 General chemistry II or already enrolled in this course; and NOT for students who have passed in CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2015-16 or thereafter)	Y	Y	1, 2	Dec, May	115	Prof V W W Yam (1st sem); Dr H Y Au Yeung (2nd sem), Chemistry	Major in Chemistry (2015,2014,2013,2012)	Minor in Chemistry (2015,2014,2013,2012)		

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Department of Chemistry (Cont'd)													
CHEM2441	Organic chemistry I	6	Pass in CHEM1042 General chemistry I; and NOT for students who have passed in CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2014-15 or before); Pass in CHEM1042 General chemistry I; and Pass in CHEM1043 General chemistry II or already enrolled in this course; and NOT for students who have passed CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2015-16 or thereafter)	Y	Y	1, 2	Dec, May	200	Prof P Chiu, Chemistry	Major in Biochemistry (2015,2014,2013,2012); Major in Chemistry (2015,2014,2013,2012)	Minor in Chemistry (2015,2014,2013,2012)		
CHEM2442	Fundamentals of organic chemistry	6	Pass in CHEM1042 General chemistry I; and Not for students who have passed CHEM2441 Organic chemistry I or have already enrolled in this course.	Y	Y	1	Dec	130	Dr P H Toy, Chemistry		Major in Environmental Science (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM2443	Fundamentals of organic chemistry for pharmacy students	6	Pass in CHEM1042 General chemistry I; and Not for students who have passed CHEM2442 Fundamentals of organic chemistry, or already enrolled in this course. (This course is for BPharm students only)	Y	Y	1	Dec	60	Dr P H Toy, Chemistry				
CHEM2541	Introductory physical chemistry	6	Pass in CHEM1042 General chemistry I; and NOT for students who have passed CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2014-15 or before) Pass in CHEM1042 General chemistry I and CHEM1043 General chemistry II; and NOT for students who have passed CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2015-16 or thereafter)	Y	Y	1, 2	Dec, May	200	Dr J Y Tang, Chemistry	Major in Chemistry (2015,2014,2013,2012)	Major in Biochemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3141	Environmental chemistry	6	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Introductory physical chemistry/Physical chemistry I	Y	Y	2	May	100	Dr W T Chan, Chemistry		Major in Chemistry (2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM3142	Chemical process industries and analysis	6	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Introductory physical chemistry/Physical chemistry I	Y	Y	2	May	60	Prof G K Y Chan, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Chemistry (Cont'd)													
CHEM3143	Introduction to materials chemistry	6	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Introductory physical chemistry/Physical chemistry I	Y	Y	1	Dec	100	Prof W K Chan, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3146	Principles and applications of spectroscopic and analytical techniques	6	Pass in any CHEM2XXX level course	Y	N	2	May	200	Dr X Li, Chemistry	Major in Chemistry (2014,2013,2012)	Minor in Chemistry (2015,2014,2013,2012)		
CHEM3241	Analytical chemistry II: chemical instrumentation	6	Pass in CHEM2241 Anlytical chemistry I	Y	Y	1	Dec	80	Dr W T Chan, Chemistry	Major in Chemistry (2015,2014,2013,2012)	Major in Environmental Science (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM3242	Food and water analysis	6	Pass in CHEM2041 Principles of chemistry or CHEM2241 Analytical chemistry I or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Introductory physical chemistry/Physical chemistry I; and Pass in CHEM3241 Analytical chemistry II: chemical instrumentation, or already enrolled in this course.	Y	Y	2	May	50	Dr K M Ng, Chemistry		Major in Chemistry (2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
CHEM3243	Introductory instrumental chemical analysis	6	Pass in CHEM2041 Principles of chemistry or CHEM2241 Analytical chemistry I; and Not for students who have passed CHEM3241 Analytical chemistry II: chemical instrumentation or have already enrolled in this course.	Y	Y	2	May	65	Dr X Li, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3244	Analytical techniques for pharmacy students	6	For BPharm students only; and Pass in BPHM2136 Physical chemistry: principles and applications in pharmaceutical science	Y	Y	2	May	35	Dr X Li, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3341	Inorganic chemistry II	6	Pass in CHEM2341 Inorganic chemistry I	Y	Y	1	Dec	90	Prof V W W Yam, Chemistry	Major in Chemistry (2015,2014,2013,2012)	Minor in Chemistry (2015,2014,2013,2012)		
CHEM3342	Bioinorganic chemistry	6	Pass in CHEM2341 Inorganic chemistry I	Y	Y	2	May	50	Prof H Z Sun, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3441	Organic chemistry II	6	Pass in CHEM2441 Organic chemistry I [Remarks: CHEM3441 Organic chemistry II will be changed to lecture-based course from semester 2, 2015-16. For Chemistry students who admitted in 2014-15 or before, they must enroll also CHEM3443 for enrolling CHEM3441 (new version without lab component) to meet the Chemistry Major requirements.]	Y	Y	1, 2	Dec, May	80	Prof D Yang, Chemistry	Major in Chemistry (2015,2014,2013,2012)	Major in Biochemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3442	Organic chemistry of biomolecules	6	Pass in CHEM2442 Fundamentals of organic chemistry or CHEM2443 Fundamentals of organic chemistry for pharmacy students or CHEM3441 Organic chemistry II	Y	Y	1	Dec	50	Dr P H Toy, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		

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Department of Chemistry (Cont'd)													
CHEM3443	Organic chemistry laboratory	6	Pass in CHEM2441 Organic chemistry I; and pass in CHEM3441 Organic chemistry II or already enrolled in this course; NOT for students who have passed CHEM3441A in semester 1, 2015-16, or CHEM3441 in or before 2014-2015 (for students admitted in 2014-15 or before) Pass in CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2443 Fundamentals of organic chemistry for pharmacy students; and Pass in CHEM3441 Organic chemistry II or CHEM3442 Organic chemistry of biomolecules or already enrolled in any of these two courses (for students admitted in 2015-16 or thereafter)	Y	Y	2	May	80	Dr A M Y Yuen, Chemistry	Major in Chemistry (2015)	Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3541	Physical chemistry: Introduction to quantum chemistry	6	Pass in CHEM2541 Introductory physical chemistry/Physical chemistry I	Y	Y	1	Dec	80	Prof A S C Cheung, Chemistry	Major in Chemistry (2015,2014,2013,2012)	Minor in Chemistry (2015,2014,2013,2012)		
CHEM3542	Physical chemistry: statistical thermodynamics and kinetics theory	6	Pass in CHEM2541 Introductory physical chemistry/Physical chemistry I	Y	Y	2	May	40	Dr H Hu, Chemistry		Major in Chemistry (2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM3999	Directed studies in chemistry	6	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major including a pass in CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Introductory physical chemistry/Physical chemistry I or CHEM3146 Principles and applications of spectroscopic techniques. This capstone course is for Chemistry Major students only. This course is designed for third year students who would like to take an early experience on research. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2	No exam	---	Prof D L Phillips, Chemistry		Minor in Chemistry (2015,2014,2013,2012)		Major in Chemistry (2015,2014,2013,2012)
CHEM4142	Symmetry, group theory and applications	6	Pass in CHEM3341 Inorganic chemistry II	Y	Y	1	Dec	60	Prof V W W Yam, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4143	Interfacial science and technology	6	Pass in CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry	Y	N	2	May	50	Prof G K Y Chan, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4144	Advanced materials	6	Pass in CHEM3143 Introduction to materials chemistry	Y	Y	2	May	50	Prof W K Chan, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4145	Medicinal chemistry	6	Pass in CHEM3441 Organic chemistry II or CHEM3442 Organic chemistry of biomolecules	Y	Y	2	May	70	Prof H Z Sun, Chemistry		Major in Biochemistry (2015,2014,2013,2012); Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		

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Department of Chemistry (Cont'd)													
CHEM4241	Modern chemical instrumentation and applications	6	Pass in CHEM3241 Analytical chemistry II: chemical instrumentation	Y	Y	1	Dec	50	Dr I K Chu, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4242	Analytical chemistry	6	Pass in CHEM3241 Analytical chemistry II: chemical instrumentation or CHEM3242 Food and water analysis	Y	Y	2	May	50	Dr K M Ng, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4341	Advanced inorganic chemistry	6	Pass in CHEM3341 Inorganic chemistry II	Y	Y	1	Dec	60	Prof C M Che, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4342	Organometallic chemistry	6	Pass in CHEM3341 Inorganic chemistry II	Y	Y	1	Dec	40	Prof V W W Yam, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4441	Advanced organic chemistry	6	Pass in CHEM3441 Organic chemistry II; or	Y	Y	1	Dec	80	Prof D Yang, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4443	Integrated organic synthesis	6	Pass in CHEM3441 Organic chemistry II This capstone course is for Chemistry Major students only.	Y	Y	2	May	50	Prof P Chiu, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4444	Chemical biology	6	Pass in CHEM3441 Organic chemistry II or BIOC3601 Metabolism	Y	Y	2	May	50	Dr X C Li, Chemistry		Major in Biochemistry (2015,2014,2013,2012); Major in Chemistry (2015,2014,2013,2012); Minor in Biochemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetics theory	6	Pass in CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry	N	N	---	---	40	Dr H Hu, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4542	Computational chemistry	6	Pass in PHYS3351 Quantum mechanics or CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry.	N	Y	---	---	60	Prof G H Chen, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4543	Advanced physical chemistry	6	Pass in CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry	Y	Y	2	May	40	Prof G H Chen, Chemistry		Major in Chemistry (2015,2014,2013,2012); Minor in Chemistry (2015,2014,2013,2012)		
CHEM4910	Chemistry literacy and research	6	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major including CHEM3241 Analytical chemistry II: chemical instrumentation; and CHEM3341 Inorganic chemistry II; and CHEM3441 Organic chemistry II; and CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2	No exam	---	Dr X Li, Chemistry		Minor in Chemistry (2015,2014,2013,2012)		Major in Chemistry (2015,2014,2013,2012)

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Chemistry (Cont'd)													
CHEM4911	Capstone experience for chemistry undergraduates: HKUtopia	6	Students are expected to have satisfactorily completed all introductory chemistry disciplinary core courses and at least 24 credits of advanced level disciplinary core/elective chemistry courses in the Chemistry Major. Students who are interested in taking the course should contact the course coordinator for application in April - May. Late application may not be considered. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	S	No exam	---	Dr A P L Tong, Chemistry		Minor in Chemistry (2015,2014,2013,2012)		Major in Chemistry (2015,2014,2013,2012)
CHEM4966	Chemistry internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2, S	No exam	---	Dr H Y Au-Yeung, Chemistry		Minor in Chemistry (2015,2014,2013,2012)		Major in Chemistry (2015,2014,2013,2012)
CHEM4999	Chemistry project	12	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major including CHEM3241 Analytical chemistry II: chemistry instrumentation, and CHEM3341 Inorganic chemistry II, and CHEM3441 Organic chemistry II, and CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Dr J Y Tang, Chemistry		Minor in Chemistry (2015,2014,2013,2012)		Major in Chemistry (2015,2014,2013,2012)
School of Chinese													
CSCI9001	Practical Chinese for science students	6	NIL	Y	Y	1, 2	Dec, May	---	Mr K W Wong, Chinese				
Department of Earth Sciences													
EASC1020	Introduction to climate science	6	NIL	Y	Y	2	May	---	Dr Z H Liu, Earth Sciences		Minor in Environmental Science (2015,2014,2013); Major in Environmental Science (2015,2014,2013,2012)		
EASC1401	Blue Planet	6	NIL	Y	Y	1, 2	Dec, May	---	Dr P Bach, Earth Sciences	Major in Earth System Science (2015,2014,2013,2012)	Major in Environmental Science (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Earth Sciences (Cont'd)													
EASC1402	Principles of geology	6	NIL	Y	Y	1	Dec	---	Prof M Sun, Earth Sciences	Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012)	Minor in Earth Sciences (2015,2014,2013,2012)		
EASC1403	Geological heritage of Hong Kong	6	NIL	Y	Y	2	May	35	Prof M F Zhou, Earth Sciences				
EASC1404	Early life on earth	6	NIL	N	N	---	---	50	Dr K H Lemke, Earth Sciences				
EASC1405	Peaceful use of nuclear technologies	6	NIL	Y	Y	1	Dec	---	Dr S H Li, Earth Sciences				
EASC2401	Fluid/solid interactions in earth processes	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology	Y	Y	2	May	---	Dr K H Lemke, Earth Sciences	Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012)	Minor in Earth Sciences (2015,2014,2013,2012)		
EASC2402	Field methods	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology	Y	Y	1	Dec	---	Dr P Bach, Earth Sciences	Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012)			
EASC2404	Introduction to atmosphere and hydrosphere	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology	Y	Y	1	Dec	50	Dr J R Ali, Earth Sciences	Major in Earth System Science (2015,2014,2013,2012)	Major in Environmental Science (2012); Minor in Environmental Science (2015,2014,2013,2012)		
EASC2406	Geochemistry	6	Pass in EASC1402 Principles of geology	Y	Y	1	Dec	---	Dr S H Li, Earth Sciences	Major in Geology (2015,2014,2013,2012)			
EASC2407	Mineralogy	6	Pass in EASC1402 Principles of geology	Y	Y	1	Dec	30	Prof M Sun, Earth Sciences	Major in Geology (2015,2014,2013,2012)			
EASC2408	Planetary geology	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology or PHYS1650 Nature of the universe	Y	Y	2	May	---	Dr M H Lee, Earth Sciences	Major in Astronomy (2015,2014,2013,2012)			
EASC2409	Regional field studies	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology and consent of course coordinator	Y	Y	1	No exam	40	Dr J R Ali, Earth Sciences				
EASC3020	Global change: anthropogenic impacts	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course	N	Y	---	---	---	Dr Z H Liu, Earth Sciences		Major in Environmental Science (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
EASC3402	Petrology	6	Pass in EASC2407 Mineralogy	Y	Y	2	May	---	Prof G Zhao, Earth Sciences	Major in Geology (2015,2014,2013,2012)	Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3403	Sedimentary environments	6	Pass in EASC2402 Field methods or EASC3402 Petrology	Y	Y	2	May	---	Dr S C Chang, Earth Sciences	Major in Geology (2015,2014,2013,2012)	Major in Earth System Science (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3404	Structural geology	6	Pass in EASC2402 Field methods and EASC3402 Petrology	Y	Y	1	Dec	40	Dr J R Ali, Earth Sciences	Major in Geology (2015,2014,2013,2012)	Minor in Earth Sciences (2015,2014,2013,2012)		

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Department of Earth Sciences (Cont'd)													
EASC3405	Environmental remote sensing	6	Pass in BIOL2306 Ecology and evolution or EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	N	Y	---	---	25	TBC, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
EASC3406	Reconstruction of past climate	6	Pass in EASC2401 Fluid/solid interactions in earth processes	Y	N	2	May	---	Dr S H Li, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3408	Geophysics	6	Pass in EASC2401 Fluid/solid interactions in earth processes or EASC2402 Field methods or PHYS2250 Introductory mechanics	Y	Y	2	May	---	Prof P P C Wu, Earth Sciences	Major in Geology (2015,2014,2013,2012)	Major in Earth System Science (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3409	Igneous and metamorphic petrogenesis	6	Pass in EASC3402 Petrology	Y	Y	2	May	30	Prof M Sun, Earth Sciences	Major in Geology (2015,2014,2013,2012)	Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3410	Hydrogeology	6	Pass in EASC2402 Field methods	Y	Y	1	Dec	40	Prof J J Jiao, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3412	Earth resources	6	Pass in EASC2402 Field methods or EASC3402 Petrology	Y	Y	1	Dec	40	Prof M F Zhou, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3413	Engineering geology	6	Pass in EASC3410 Hydrogeology, or already enrolled in this course. This course is only for final year students	Y	Y	2	May	40	Prof J J Jiao, Earth Sciences		Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3414	Soil and rock mechanics	6	Pass in EASC3410 Hydrogeology, or already enrolled in this course	Y	Y	2	May	40	Prof J J Jiao, Earth Sciences		Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3415	Meteorology	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere	Y	Y	1	Dec	---	Dr Z H Liu, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC3416	Advanced geochemistry and geochronology	6	Pass in EASC2401 Fluid/solid interactions in earth processes or EASC2406 Geochemistry or EASC2407 Mineralogy	N	Y	---	---	50	Prof M F Zhou, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		

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Department of Earth Sciences (Cont'd)													
EASC3999	Directed studies in earth sciences	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology or Earth System Science Majors; and Cumulative GPA of 2.5 or above. This course is not a capstone course and students cannot use this course to fulfill the capstone requirement of the Earth System Science and Geology Majors. The earliest that a student is allowed to take this course is their year 3 study.	Y	Y	0	No exam	---	Prof M Sun, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC4403	Biogeochemical cycles	6	Pass in ENVS3313 Environmental oceanography or EASC3403 Sedimentary environments or EASC3416 Advanced geochemistry and geochronology	Y	Y	1	Dec	---	Dr Y Li, Earth Sciences	Major in Earth System Science (2015,2014,2013,2012)	Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC4406	Earth dynamics & global tectonics	6	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3408 Geophysics or EASC3409 Igneous and metamorphic petrogenesis	Y	Y	2	May	---	Prof G Zhao, Earth Sciences	Major in Geology (2015,2014,2013,2012)	Minor in Earth Sciences (2015,2014,2013,2012)		
EASC4407	Regional geology	6	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3409 Igneous and metamorphic petrogenesis	Y	Y	1	Dec	40	Dr J R Ali, Earth Sciences		Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC4408	Special topics in earth sciences	6	Pass in any EASC3XXX or EASC4XXX course	N	Y	---	---	---	TBC, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
EASC4911	Earth system: contemporary issues	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Earth System Science Major including at least two of the following courses: EASC3410 Hydrogeology; EASC3415 Meteorology; ENVS3313 Environmental oceanography. This capstone course is for Earth System Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2	No exam	---	Dr Y Li, Earth Sciences		Minor in Earth Sciences (2015,2014,2013,2012)	Major in Earth System Science (2015,2014,2013,2012)	
EASC4955	Integrated field studies	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology Major. This must include either a PASS in, or student must be already enrolled in EASC3403 Sedimentary environments, EASC3404 Structural geology, EASC3409 Igneous and metamorphic petrogenesis. This capstone course is for Geology Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	2	No exam	36	Dr J A King, Earth Sciences		Minor in Earth Sciences (2015,2014,2013,2012)	Major in Geology (2015,2014,2013,2012)	

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Department of Earth Sciences (Cont'd)													
EASC4966	Earth sciences internship	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology or Earth System Science Majors. This course is not a capstone course and students cannot use this course to fulfill the capstone requirement of the Earth System Science and Geology Majors. The earliest that a student is allowed to take this course is their year 3 study.	Y	Y	2, S	No exam	---	Dr X R Zuo, Earth Sciences		Minor in Earth Sciences (2015,2014,2013,2012)		
EASC4999	Earth sciences project	12	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology or Earth System Science Majors; and Cumulative GPA of 2.7 or above. This course is not a capstone course and students cannot use this course to fulfill the capstone requirement of the Earth System Science and Geology Majors. The earliest that a student is allowed to take this course is their year 3 study.	Y	Y	0	No exam	---	Prof M Sun, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Earth Sciences (2015,2014,2013,2012)		
ENVS1401	Introduction to environmental science	6	NIL	Y	Y	1	Dec	---	Dr C Dingle, Earth Sciences	Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)			
ENVS3004	Environment, society and economics	6	Pass in one of the following: CHEM2041 Principles of chemistry, EASC2404 Introduction to atmosphere and hydrosphere, ENVS2001 Environmental field and lab course, and ENVS2002 Environmental data analysis	Y	Y	1	Dec	---	Prof Y Q Zong, Earth Sciences	Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)			
ENVS3007	Natural hazards and mitigation	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	N	Y	---	---	---	Prof Y Q Zong, Earth Sciences		Major in Earth System Science (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS3020	Global change ecology	6	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution	N	Y	---	---	50	Dr C Dingle, Earth Sciences		Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS3042	Pollution	6	Pass in CHEM1042 General chemistry I; and Pass in ENVS1401 Introduction to environmental science or BIOL1110 From molecules to cells or ENVS1301 Environmental life science; and CHEM2041 Principles of chemistry or CHEM2442 Fundamentals of organic chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	Y	Y	2	No exam	40	Dr B Thibodeau, Earth Sciences		Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
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Department of Earth Sciences (Cont'd)													
ENVS3313	Environmental oceanography	6	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution or EASC2404 Introduction to atmosphere and hydrosphere	Y	Y	2	May	---	Dr C A Not, Earth Sciences	Minor in Marine Biology (2015,2014,2013,2012)	Major in Earth System Science (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS3999	Directed studies in environmental science	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major. Cumulative GPA of 2.5 or above in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Dr C Dingle, Earth Sciences				Major in Environmental Science (2015,2014,2013,2012)
ENVS4966	Environmental science internship	6	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Dr C Dingle, Earth Sciences				Major in Environmental Science (2015,2014,2013,2012)
ENVS4999	Environmental science project	12	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major; and Students must have a cumulative GPA of 3.0 or above in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof Y Q Zong, Earth Sciences				Major in Environmental Science (2015,2014,2013,2012)
Department of Mathematics													
MATH1009	Basic mathematics for business and economics	6	NIL The course has no pre-requisite, but students are expected to have already achieved Level 2 or above in HKDSE Mathematics or equivalent. Not for students who have passed MATH1011 University mathematics I or MATH1013 University mathematics II, or have already enrolled in these courses. This course is exclusively for non-Science and non-Engineering students (i.e. not for students from the Faculty of Science or Engineering).	Y	Y	1, 2	Dec, May	380	Dr Y M Chan (1st sem); Dr K H Law (2nd sem), Mathematics				

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH1011	University mathematics I	6	NIL The course has no pre-requisite, but students are expected to have achieved Level 2 or above in HKDSE Mathematics or equivalent before enrolling the course; and Not for students with Level 2 or above in Module 1 or Module 2 of HKDSE Mathematics or equivalent.	Y	Y	1, 2	Dec, May	---	Dr H Y Zhang, Mathematics				
MATH1013	University mathematics II	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University mathematics I; and Not for students who have passed MATH1821 Mathematical methods for actuarial science I, or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics), or have already enrolled in this course.	Y	Y	1, 2	Dec, May	650	Dr C W Wong (1st sem); Dr Y M Chan (2nd sem), Mathematics	Major in Decision Analytics (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
MATH1641	Mathematical laboratory and modeling	6	NIL	N	N	---	---	20	TBC, Mathematics				
MATH1821	Mathematical methods for actuarial science I	6	Level 4 or above in HKDSE Mathematics plus Module 1, or Level 4 or above in HKDSE Mathematics plus Module 2, or equivalent; and Not for students who have passed MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, Probability and statistics), or have already enrolled in these courses. For BSc(ActuarSc) students only.	Y	Y	1	Dec	---	Dr J T Chan, Mathematics	BSc in Actuarial Science (2015,2014,2013,2012)			
MATH1851	Calculus and ordinary differential equations	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University mathematics I (This course is exclusively for Engineering students.)	Y	Y	1, 2	Dec, May	640	Prof K M Tsang (1st sem); Dr Y K Lau (2nd sem), Mathematics				
MATH1853	Linear algebra, probability and statistics	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University Mathematics I. (This course is exclusively for Engineering students.)	Y	Y	1, 2	Dec, May	640	Dr G Han, Mathematics				
MATH2012	Fundamental concepts of mathematics	6	Pass in MATH1013 University mathematics II or MATH1821 Mathematical methods for actuarial science I or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics).	Y	Y	1, 2	Dec, May	---	Dr Y M Chan, Mathematics	Major in Mathematics (2015,2014,2013,2012)			

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH2014	Multivariable calculus and linear algebra	6	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics). Not for students who have passed MATH2822 Mathematical methods for actuarial science II or ((MATH2101 Linear algebra I or MATH2102 Linear algebra II) and MATH2211 Multivariable calculus), or have already enrolled in these courses.	Y	Y	1, 2	Dec, May	---	Dr H Y Zhang, Mathematics	Major in Risk Management (2015,2014); Major in Statistics (2015,2014); Major in Decision Analytics (2015,2014,2013,2012)			
MATH2101	Linear algebra I	6	Pass in MATH1013 University mathematics II or MATH1821 Mathematical methods for actuarial science I or (MATH1851 calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics).	Y	Y	1, 2	Dec, May	---	Dr K H Law, Mathematics	Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)			
MATH2102	Linear algebra II	6	Pass in MATH2101 Linear algebra I or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	Y	2	May	---	Prof W Zang, Mathematics	Major in Mathematics (2015,2014,2013,2012)			
MATH2211	Multivariable calculus	6	Pass in MATH1013 University mathematics II or MATH1821 Mathematical methods for actuarial science I or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics).	Y	Y	1, 2	Dec, May	---	Dr Z Hua (1st sem); Dr C W Wong (2nd sem), Mathematics	Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)			
MATH2241	Introduction to mathematical analysis	6	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics) or MATH2822 Mathematical methods for actuarial science II. Students are strongly recommended to have taken MATH2012 Fundamental concepts of mathematics if they wish to take this course.	Y	Y	1, 2	Dec, May	---	Dr B Kane (1st sem); Prof N Mok (2nd sem), Mathematics	Major in Mathematics (2015,2014,2013,2012)			
MATH2822	Mathematical methods for actuarial science II	6	Pass in MATH1821 Mathematical methods for actuarial science I. For BSc(ActuarSc) students only.	Y	Y	2	May	---	Dr J T Chan, Mathematics	BSc in Actuarial Science (2015,2014,2013,2012)			
MATH3001	Development of mathematical ideas	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis.	N	N	---	---	---	Prof W K Ching, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH3002	Mathematics seminar	6	Pass in MATH2012 Fundamental concepts of mathematics, MATH2101 Linear algebra I, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis. (This course is for second year BSc students only.)	N	N	---	---	12	Prof T W Ng, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3301	Algebra I	6	Pass in MATH2101 Linear algebra I.	Y	Y	1	Dec	---	Dr Y K Lau, Mathematics	Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)	Minor in Mathematics (2015,2014,2013,2012)		
MATH3303	Matrix theory and its applications	6	Pass in MATH2101 Linear algebra I and MATH2102 Linear algebra II.	N	Y	---	---	---	Dr M Young, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3304	Introduction to number theory	6	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus.	Y	Y	2	May	---	Prof K M Tsang, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3401	Analysis I	6	Pass in MATH2211 Multivariable calculus.	Y	Y	1	Dec	---	Prof W S Cheung, Mathematics	Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)	Minor in Mathematics (2015,2014,2013,2012)		
MATH3403	Functions of a complex variable	6	Pass in MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis.	Y	Y	1	Dec	---	Prof T W Ng, Mathematics	Major in Mathematics (2015,2014,2013,2012)	Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3405	Differential equations	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	Y	2	May	---	Dr C W Wong, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3408	Computational methods and differential equations with applications	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	N	2	May	---	Dr C W Wong, Mathematics		Major in Decision Analytics (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		

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				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH3600	Discrete mathematics	6	Pass in (MATH1013 University mathematics II and any 1 of Level 2 MATH courses) or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics and any 1 of level 2 MATH courses) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science	Y	N	1	Dec	---	Dr K H Law, Mathematics		Major in Decision Analytics (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3601	Numerical analysis	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	Y	1	Dec	---	Dr Z Zhang, Mathematics	Minor in Computational & Financial Mathematics (2015,2014,2013,2012)	Major in Decision Analytics (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3603	Probability theory	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	Y	1	Dec	---	Dr Z Qu, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3901	Operations research I	6	Pass in MATH2014 Multivariable calculus and linear algebra or MATH2101 Linear algebra I or MATH2102 Linear algebra II.	Y	Y	2	May	---	Dr Z Qu, Mathematics		Major in Decision Analytics (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3904	Introduction to optimization	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	Y	2	May	---	Prof W Zang, Mathematics	Major in Decision Analytics (2015,2014,2013,2012)	Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3905	Queueing theory and simulation	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	N	2	May	---	Dr Z Zhang, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH3906	Financial calculus	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II) or STAT2601 Probability and statistics I.	Y	Y	1	Dec	---	Dr S P Yung, Mathematics	Minor in Computational & Financial Mathematics (2015,2014,2013,2012)	Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3911	Game theory and strategy	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).	Y	Y	2	May	---	Dr K H Law, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3943	Network models in operations research	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra); and Pass in MATH3901 Operations research I, or already enrolled in this course.	N	Y	---	---	---	Prof W Zang, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH3999	Directed studies in mathematics	6	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors, in addition to a pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2	No exam	---	Prof W K Ching, Mathematics		Minor in Mathematics (2015,2014,2013,2012)		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)
MATH4302	Algebra II	6	Pass in MATH3301 Algebra I.	Y	Y	2	May	---	Prof J H Lu, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4402	Analysis II	6	Pass in MATH3401 Analysis I.	Y	Y	2	May	---	Dr M Young, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4404	Functional analysis	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis and MATH3401 Analysis I.	Y	Y	2	May	---	Dr J T Chan, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH4406	Introduction to partial differential equations	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2241 Introduction to mathematical analysis; and Pass in MATH3405 Differential equations, or already enrolled in this course.	Y	Y	2	May	---	Dr H Y Zhang, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4501	Geometry	6	Pass in MATH2101 Linear algebra I and MATH3401 Analysis I.	Y	Y	1	Dec	---	Dr J Fullwood, Mathematics	Major in Mathematics/Physics (2015,2014,2013,2012)	Major in Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4511	Introduction to differentiable manifolds	6	Pass in MATH3401 Analysis I (having taken MATH4501 Geometry would be helpful; the course can also be taken concurrently with MATH4402 Analysis II).	Y	N	2	May	---	Prof J H Lu, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4602	Scientific computing	6	Pass in MATH3601 Numerical analysis.	N	Y	---	---	---	Prof W K Ching, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4902	Operations research II	6	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus; and Pass in MATH3901 Operations research I, or already enrolled in this course.	N	Y	---	---	---	Dr G Han, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4907	Numerical methods for financial calculus	6	Pass in MATH3906 Financial calculus or equivalent.	N	Y	---	---	---	TBC, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Computational & Financial Mathematics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH4910	Senior mathematics seminar	6	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors including MATH3301 Algebra I, MATH3401 Analysis I, and MATH3403 Functions of a complex variable. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	N	Y	---	---	12	Prof T W Ng, Mathematics		Minor in Mathematics (2015,2014,2013,2012)		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)

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				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH4911	Mathematics capstone project	6	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. (This course is for third and fourth year students only. The earliest that a student is allowed to take this capstone course is their year 3 study.)	N	Y	---	---	---	Dr S P Yung, Mathematics		Minor in Mathematics (2015,2014,2013,2012)		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)
MATH4966	Mathematics internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Prof T W Ng, Mathematics		Minor in Mathematics (2015,2014,2013,2012)		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)
MATH4999	Mathematics project	12	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors including MATH3301 Algebra I, MATH3401 Analysis I, and MATH3403 Functions of a complex variable. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof W K Ching, Mathematics		Minor in Mathematics (2015,2014,2013,2012)		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012)
MATH7101	Intermediate complex analysis	6	Pass in a first course in Complex Analysis such as MATH3403 Functions of a complex variable, and approval by the course coordinator.	Y	Y	1	Dec	---	Prof N Mok, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7201	Topics in geometry	6	Pass in (MATH4402 Analysis II or MATH4501 Geometry) and (MATH4511 Introduction to differentiable manifolds or the approval of the course coordinator).	N	Y	---	---	---	Prof W K Ching, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7202	Complex manifolds	6	Pass in a first course in Complex Analysis such as MATH3403 Functions of a complex variable, a first course in Differential Geometry such as MATH4501 Geometry, and approval by the course coordinator.	N	N	---	---	---	Prof N Mok, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		

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				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Mathematics (Cont'd)													
MATH7217	Topics in financial mathematics	6	Pass in an advanced level mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) and subject to the approval of the course coordinator.	N	N	---	---	---	Dr J Song, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7219	Topics in applied functional analysis	6	Pass in MATH3401 Analysis I and MATH4404 Functional analysis, or approval of the course coordinator.	N	Y	---	---	---	Dr S P Yung, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7224	Topics in advanced probability theory	6	Pass in MATH3603 Probability theory and MATH4402 Analysis II and approval of the course coordinator.	Y	N	1	Dec	---	Dr G Han, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7501	Topics in algebra	6	Pass in MATH4302 Algebra II.	Y	N	2	May	---	Dr Z Hua, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7502	Topics in applied discrete mathematics	6	Pass in MATH3301 Algebra I and MATH3600 Discrete mathematics.	N	Y	---	---	---	Prof W Zang, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7503	Topics in mathematical programming and optimization	6	Pass in MATH3901 Operations research I, MATH3904 Introduction to optimization and MATH4902 Operations research II.	Y	N	1	Dec	---	Prof W Zang, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7504	Geometric topology	6	Pass in MATH3301 Algebra I and MATH3401 Analysis I.	N	N	---	---	---	Dr Z Hua, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		
MATH7505	Real analysis	6	Pass in MATH3401 Analysis I.	Y	Y	2	May	---	Prof W S Cheung, Mathematics		Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Mathematics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
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Department of Physics													
PHYS1050	Physics for engineering students	6	Level 3 or above in HKDSE Physics or Combined Science with Physics components or equivalent (This course is exclusive for Engineering students.)	Y	Y	1, 2	Dec, May	---	Prof M H Xie, Physics				
PHYS1055	How things work	6	NIL	Y	Y	2	May	---	Dr M K Yip, Physics				
PHYS1056	Weather and climate	6	NIL	Y	Y	1	Dec	---	Dr K M Lee, Physics				
PHYS1057	Kitchen science	6	NIL	N	N	---	---	---	Prof A B Djurisic, Physics				
PHYS1150	Problem solving in physics	6	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course.	Y	Y	2	May	---	Dr S Z Zhang, Physics	Major in Physics (2015,2014,2013,2012)			
PHYS1240	Physics by inquiry	6	NIL Not for students with level 3 or above in HKDSE Physics; and Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course; and Not for students who have passed in PHYS1250 Fundamental physics or already enrolled in this course.	Y	Y	1	Dec	---	Dr F K Chow, Physics				
PHYS1250	Fundamental physics	6	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course; Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Dr M K Yip, Physics	Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)			
PHYS1650	Nature of the universe	6	NIL	Y	Y	1, 2	Dec, May	---	Dr K M Lee, Physics	Major in Astronomy (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012)			
PHYS2055	Introduction to relativity	6	Pass in PHYS1250 Fundamental physics or PHYS1150 Problem solving in physics or PHYS1050 Physics for engineering students	Y	Y	2	May	---	Dr K M Lee, Physics				
PHYS2150	Methods in physics I	6	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations	Y	Y	1	Dec	---	Dr F K Chow, Physics				
PHYS2155	Methods in physics II	6	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations	Y	Y	2	May	---	Dr F C C Ling, Physics				

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
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Department of Physics (Cont'd)													
PHYS2250	Introductory mechanics	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	1, 2	Dec, May	---	Dr M K Yip, Physics	Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)			
PHYS2255	Introductory electricity and magnetism	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	2	May	---	Dr J C S Pun, Physics	Major in Astronomy (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012)			
PHYS2260	Heat and waves	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	1	Dec	---	Dr F C C Ling, Physics	Major in Physics (2015,2014,2013,2012)			
PHYS2265	Modern physics	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	1, 2	Dec, May	---	Dr F K Chow, Physics	Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)			
PHYS2850	Atomic and nuclear physics	6	Pass in PHYS2265 Modern physics	N	N	---	---	---	Dr S Z Zhang, Physics				
PHYS3150	Theoretical physics	6	Pass in (PHYS2250 Introductory mechanics or PHYS2255 Introductory electricity and magnetism or PHYS2265 Modern physics) and (PHYS2150 Methods in physics I or MATH2211 Multivariable calculus)	Y	Y	1	Dec	---	Prof Z D Wang, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3350	Classical mechanics	6	Pass in PHYS2250 Introductory mechanics	Y	Y	1	Dec	---	Dr S Z Zhang, Physics	Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012)	Major in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3351	Quantum mechanics	6	Pass in PHYS2265 Modern physics	Y	Y	1	Dec	---	Dr W Yao, Physics	Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012)	Major in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3450	Electromagnetism	6	Pass in PHYS2255 Introductory electricity and magnetism	Y	Y	2	May	---	Prof X D Cui, Physics	Major in Physics (2015,2014,2013,2012)	Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Physics (Cont'd)													
PHYS3550	Statistical mechanics & thermodynamics	6	Pass in PHYS2260 Heat and waves	Y	Y	2	May	---	Prof M H Xie, Physics	Major in Physics (2015,2014,2013,2012)	Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3551	Introductory solid state physics	6	Pass in PHYS2260 Heat and waves and PHYS2265 Modern physics	Y	Y	1	Dec	---	Prof J Gao, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3650	Observational astronomy	6	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2265 Modern physics)	Y	Y	1	Dec	---	Dr J J L Lim, Physics	Major in Astronomy (2015,2014,2013,2012)	Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3651	The physical universe	6	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2265 Modern physics)	Y	Y	1	Dec	---	Dr S C Y Ng, Physics	Major in Astronomy (2015,2014,2013,2012)	Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3652	Principles of astronomy	6	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2265 Modern physics)	Y	Y	2	May	---	Dr J J L Lim, Physics	Major in Astronomy (2015,2014,2013,2012)	Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3750	Laser and spectroscopy	6	Pass in PHYS3551 Introductory solid state physics, or already enrolled in this course.	Y	Y	1	Dec	---	Prof S J Xu, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3751	Physics of nanomaterials	6	Pass in PHYS3351 Quantum mechanics, and Pass in PHYS3551 Introductory solid state physics, or already enrolled in this course.	N	N	---	---	---	TBC, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Physics (Cont'd)													
PHYS3850	Waves and optics	6	Pass in PHYS2255 Introductory electricity and magnetism and PHYS2260 Heat and waves	Y	Y	2	May	---	Prof S J Xu, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3851	Atomic and nuclear physics	6	Pass in PHYS3351 Quantum mechanics	Y	Y	2	May	---	Dr J H C Lee, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS3999	Directed studies in physics	6	Pass in at least 24 credits of advanced level (3XXX level or above) disciplinary core/elective courses of the Physics Major, Mathematics/Physics Major or Astronomy Major curriculum. This capstone course is for Astronomy, Mathematics/Physics, and Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Prof J Wang, Physics		Minor in Physics (2015,2014,2013,2012)		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012)
PHYS4150	Computational physics	6	Pass in (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations); and Pass in any three of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics and thermodynamics	Y	Y	1	Dec	---	Prof J Wang, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4151	Data analysis and modeling in physics	6	Pass in (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations); and Pass in any one of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics & thermodynamics	N	Y	---	---	---	Prof H F Chau, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4350	Advanced classical mechanics	6	Pass in PHYS3350 Classical mechanics	Y	Y	2	May	---	Prof S Q Shen, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Physics (Cont'd)													
PHYS4351	Advanced quantum mechanics	6	Pass in PHYS3351 Quantum mechanics	Y	Y	2	May	---	Dr W Yao, Physics	Major in Mathematics/Physics (2015,2014,2013,2012)	Major in Astronomy (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4450	Advanced electromagnetism	6	Pass in PHYS3450 Electromagnetism	Y	Y	1	Dec	---	Prof X D Cui, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4550	Advanced statistical mechanics	6	Pass in PHYS3550 Statistical mechanics & thermodynamics	Y	Y	2	May	---	Dr Y Tu, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4650	Stellar physics	6	Pass in PHYS3651 The physical universe and PHYS3351 Quantum mechanics	Y	Y	2	May	---	Dr S C Y Ng, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4651	Selected topics in astrophysics	6	Pass in PHYS3351 Quantum mechanics or PHYS3450 Electromagnetism or PHYS3550 Statistical mechanics & thermodynamics or PHYS3651 The physical universe	Y	N	1	Dec	---	Prof K S Cheng, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4652	Planetary science	6	Pass in PHYS3651 The physical universe or (PHYS3350 Classical mechanics and PHYS3550 Statistical mechanics & thermodynamics)	Y	N	2	May	---	Dr M H Lee, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Physics (Cont'd)													
PHYS4653	Cosmology	6	Pass in PHYS3651 The physical universe or PHYS3652 Principles of astronomy	N	Y	---	---	---	Prof K S Cheng, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4654	General relativity	6	Pass in PHYS2055 Introduction to relativity and PHYS3350 Classical mechanics	Y	N	1	Dec	---	Dr K M Lee, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4655	Interstellar medium	6	Pass in PHYS3651 The physical universe or (PHYS3351 Quantum mechanics and PHY3550 Statistical mechanics & thermodynamics)	N	Y	---	---	---	Dr M H Lee, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4750	Experimental physics	6	TBC	N	N	---	---	---	TBC, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS4966	Physics internship	6	Pass in at least 24 credits of advanced level (3XXX level or above) disciplinary core/elective courses of the Physics Major, Mathematics/Physics Major or Astronomy Major curriculum. This capstone course is for Astronomy, Mathematics/Physics, and Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	S	No exam	---	Dr J C S Pun, Physics		Minor in Physics (2015,2014,2013,2012)		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012)
PHYS4999	Physics project	12	Pass in at least 24 credits of advanced level (3XXX level or above) disciplinary core/elective courses of the Physics Major, Mathematics/Physics Major or Astronomy Major curriculum. This capstone course is for Astronomy, Mathematics/Physics, and Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	---	Prof J Wang, Physics		Minor in Physics (2015,2014,2013,2012)		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012)

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Physics (Cont'd)													
PHYS7350	Graduate classical mechanics	6	Pass in PHYS4350 Advanced classical mechanics	N	N	---	---	---	TBC, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS7351	Graduate quantum mechanics	6	Pass in PHYS4351 Advanced quantum mechanics	N	Y	---	---	---	Prof S Q Shen, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS7450	Graduate electromagnetism	6	Pass in PHYS4450 Advanced electromagnetism	Y	Y	2	May	---	Prof Z D Wang, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS7550	Graduate statistical mechanics	6	Pass in PHYS4550 Advanced statistical mechanics	N	Y	---	---	---	Prof J Wang, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS7551	Solid state physics	6	Pass in PHYS3551 Introductory solid state physics and PHYS4351 Advanced quantum mechanics	Y	N	2	May	---	Prof J Wang, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
PHYS7650	Stellar atmospheres	6	TBC	N	N	---	---	---	TBC, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Astronomy (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Physics (Cont'd)													
PHYS7750	Nanophysics	6	Pass in PHYS4351 Advanced quantum mechanics and PHYS3551 Introductory solid state physics	N	N	---	---	---	Prof S J Xu, Physics		Major in Astronomy (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Minor in Physics (2015,2014,2013,2012)		
ENVS3006	Environmental radiation	6	Pass in PHYS2265 Modern physics or CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	N	N	---	---	---	Dr J K C Leung, Physics		Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
ENVS3010	Sustainable energy and environment	6	Pass in PHYS2260 Heat and waves or CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	Y	Y	2	May	---	Prof A B Djurisic, Physics		Major in Environmental Science (2015,2014,2013,2012); Minor in Environmental Science (2015,2014,2013,2012)		
Faculty of Science													
SCNC1111	Scientific method and reasoning	6	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)	Y	Y	1, 2	Dec, May	---	Dr K F Lam, Statistics & Actuarial Science	Major in Astronomy (2015,2014,2013,2012); Major in Biochemistry (2015,2014,2013,2012); Major in Biological Sciences (2015,2014,2013,2012); Major in Chemistry (2015,2014,2013,2012); Major in Decision Analytics (2015,2014,2013,2012); Major in Earth System Science (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Major in Food & Nutritional Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)			

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Faculty of Science (Cont'd)													
SCNC1112	Fundamentals of modern science	6	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)	Y	Y	1, 2	Dec, May	---	Dr J C S Pun, Physics	Major in Astronomy (2015,2014,2013,2012); Major in Biochemistry (2015,2014,2013,2012); Major in Biological Sciences (2015,2014,2013,2012); Major in Chemistry (2015,2014,2013,2012); Major in Decision Analytics (2015,2014,2013,2012); Major in Earth System Science (2015,2014,2013,2012); Major in Ecology & Biodiversity (2015,2014,2013,2012); Major in Environmental Science (2015,2014,2013,2012); Major in Food & Nutritional Science (2015,2014,2013,2012); Major in Geology (2015,2014,2013,2012); Major in Mathematics (2015,2014,2013,2012); Major in Mathematics/Physics (2015,2014,2013,2012); Major in Molecular Biology & Biotechnology (2015,2014,2013,2012); Major in Physics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)			
SCNC1113	The big history of our planet: a scientific perspective on everything that has ever happened	6	Level 3 or above in at least one science subject at the pre-university level (HKDSE Physics, Chemistry, Biology, Combined/Integrated Science or equivalent) This course is not offered to students in the 6901 BSc or 6119 BEd&BSc programmes.	Y	Y	1	No exam	50	Dr W M Y Cheung, Faculty				
SCNC2121	Sustainable food production	6	Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will also need to pass an interview in order to be enrolled in the course.	Y	Y	S	No exam	32	Dr H S El-Nezami, Biological Sciences				
SCNC2122	Marine life science: a North East Pacific perspective	6	Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will need to pass an interview in order to be enrolled in the course.	Y	Y	S	Summer	32	Dr T Vengatesen, Biological Sciences				
SCNC3111	Frontiers of science honours seminar course	6	Pass in SCNC1111, SCNC1112 and a level 2 science course. Students who participated or will participate in ORF/SRF must take this course.	Y	Y	2	No exam	30	Prof P Chiu, Chemistry				

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science													
STAT1600	Statistics: ideas and concepts	6	NIL	Y	Y	1, 2	Dec, May	---	Dr K P Wat, Statistics & Actuarial Science	Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)			
STAT1601	Elementary statistical methods	6	Level 2 or above in HKDSE Mathematics or equivalent; and Not for students with Level 2 or above in HKDSE Mathematics Extended Module 1 or 2; and Not for students who have passed or already enrolled in any of the following courses: STAT2901 Probability and statistics: foundations of actuarial science, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, ECON1280 Analysis of economic data	Y	Y	2	May	---	Mrs G M Jing, Statistics & Actuarial Science	Major in Environmental Science (2012)	Major in Environmental Science (2015,2014,2013); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT1602	Business statistics	6	NIL Not for students who have passed or already enrolled in any of the following courses: STAT1601 Elementary statistical methods, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science, ECON1280 Analysis of economic data (This course is exclusive for School of Business students.)	Y	Y	1, 2	Dec, May	---	Dr R W L Wong, Statistics & Actuarial Science		Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT1603	Introductory statistics	6	(Level 2 or above in HKDSE Mathematics Extended Module 1 or 2 or equivalent) or (Pass in MATH1011 University mathematics I, or already enrolled in this course); and Not for students who have passed or already enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science	Y	Y	1	Dec	---	Dr E K F Lam, Statistics & Actuarial Science	Major in Environmental Science (2012)	Major in Environmental Science (2015,2014,2013); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT2601	Probability and statistics I	6	Pass or already enrolled in MATH2014 Multivariable calculus and linear algebra, or (MATH2101 Linear algebra I and MATH2211 Multivariable calculus), for students admitted in 2014 or thereafter; or Pass in MATH1013 University mathematics II, or already enrolled in this course, for students admitted in 2013 or before; or Pass in MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics, for students admitted in 2013 or before; and Not for students who have passed in STAT1603 Introductory statistics, or already enrolled in this course; Not for students who have passed in STAT2901 Probability and statistics: foundations of actuarial science, or already enrolled in this course; and Not for BSc(ActuarSc) students.	Y	Y	1, 2	Dec, May	---	Dr C W Kwan, Statistics & Actuarial Science	Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT2602	Probability and statistics II	6	Pass in STAT2601 Probability and statistics I; and Not for students who have passed in STAT3902 Statistical models, or already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Dr E K F Lam, Statistics & Actuarial Science	Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT2603	Data management with SAS	6	Pass in STAT1600 Statistics: ideas and concepts, or already enrolled in this course	Y	Y	1, 2	Dec, May	50	Dr C W Kwan, Statistics & Actuarial Science	Major in Risk Management (2013,2012); Major in Statistics (2013,2012)	Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT2605	Demographic and socio-economic statistics	6	(Level 2 or above in HKDSE Mathematics or Level 2 or above in HKDSE Mathematics Extended Module 1 or 2 or equivalent); and Pass in or already enrolled in any of these courses: BIOL2102 Biostatistics, ECON1280 Analysis of economic data, STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science	Y	Y	2	May	---	Ms L M S Kwan, Statistics & Actuarial Science		Minor in Actuarial Studies (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT2901	Probability and statistics: foundations of actuarial science	6	(Pass in MATH1821 Mathematical methods for actuarial science I (for BSc(ActuarSc) students) or already enrolled in this course) or (Pass in MATH1013 University mathematics II or already enrolled in this course (for students outside the BSc(ActuarSc) programme); and Not for students who have passed or enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics	Y	Y	2	May	---	Prof J J F Yao, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT2902	Financial mathematics	6	Pass in STAT2901 Probability and statistics: foundations of actuarial science or already enrolled in this course; and Not for students who have passed in STAT3615 Practical mathematics for investment, or already enrolled in this course.	Y	Y	2	May	---	Prof K C Yuen, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)			
STAT3600	Linear statistical analysis	6	Pass in STAT2602 Probability and statistics II; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Prof S M S Lee, Statistics & Actuarial Science	Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)	Minor in Statistics (2015,2014,2013,2012)		
STAT3602	Statistical inference	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models	Y	Y	1	Dec	---	Prof S M S Lee, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3603	Probability modelling	6	Pass in STAT2601 Probability and statistics I; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3903 Stochastic models, or have already enrolled in this course.	Y	Y	1	Dec	---	Dr J Song, Statistics & Actuarial Science	Major in Statistics (2015,2014,2013,2012)	Major in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT3604	Design and analysis of experiments	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3611 Computer-aided data analysis	Y	Y	2	May	---	Dr G Li, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3605	Quality control and management	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3902 Statistical models	Y	Y	2	May	---	Dr E A L Li, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3606	Business logistics	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed MATH3901 Operations research I, or have already enrolled in this course.	Y	Y	1	Dec	---	Ms O T K Choi, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3607	Statistics in clinical medicine and bio-medical research	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models	Y	Y	2	May	---	Prof G Yin, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3608	Statistical genetics	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models	Y	Y	2	May	---	Prof T W K Fung, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3609	The statistics of investment risk	6	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3611 Computer-aided data analysis or STAT3614 Business forecasting; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course; and Not for BSc(Actuarial Science) students	Y	Y	1	Dec	---	Dr K P Wat, Statistics & Actuarial Science	Major in Risk Management (2015,2014,2013,2012)	Minor in Risk Management (2015,2014,2013,2012)		
STAT3610	Risk management and insurance	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science. (Not available to Actuarial Science students)	Y	Y	2	May	---	Dr R W L Wong, Statistics & Actuarial Science		Major in Risk Management (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT3611	Computer-aided data analysis	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or (STAT1603 Introductory statistics and any University level 2 course); and Not for students who have passed in or have already enrolled in any of these courses: STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science, STAT3616 Advanced SAS programming	N	N	---	---	---	Dr E K F Lam, Statistics & Actuarial Science		Major in Environmental Science (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3612	Data mining	6	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3902 Statistical models Co-requisites: STAT3600 Linear statistical analysis	Y	Y	2	No exam	50	Dr G C S Lui, Statistics & Actuarial Science	Major in Decision Analytics (2015,2014,2013,2012)	BSc in Actuarial Science (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3613	Marketing engineering	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science	Y	Y	1	Dec	50	Dr C W Kwan, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3614	Business forecasting	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or (STAT1603 Introductory statistics and any University level 2 course); and Not for students who have passed or already enrolled in any of these courses: STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science, STAT3907 Linear models and forecasting, STAT4601 Time-series analysis, ECON2280 Introductory econometrics.	N	N	---	---	---	Dr R W L Wong, Statistics & Actuarial Science		Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT3615	Practical mathematics for investment	6	Pass in (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in STAT2902 Financial mathematics, or have already enrolled in this course.	Y	Y	2	May	---	Dr E C K Cheung, Statistics & Actuarial Science	Major in Risk Management (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		
STAT3616	Advanced SAS programming	6	STAT2601 Probability and statistics I or STAT2901 Probability and statistics: foundations of actuarial science (Students are strongly recommended to take STAT2603 Data management with SAS prior to taking this course.)	Y	Y	2	May	50	Prof K W Ng, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012); Major in Decision Analytics (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3617	Sample survey methods	6	Pass or already enrolled in: BIOL2102 Biostatistics, or (ECON1280 Analysis of economic data and any University level 2 course), or (STAT1601 Elementary statistical methods and any University level 2 course), or (STAT1602 Business statistics and any University level 2 course), or STAT2601 Probability and statistics I, or (STAT1603 Introductory statistics and any University level 2 course), or STAT2901 Probability and statistics: foundations of actuarial science.	Y	Y	2	May	---	Ms O T K Choi, Statistics & Actuarial Science		Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3618	Derivatives and risk management	6	Pass in STAT3615 Practical mathematics for investment; and Not for BSc(Actuarial Science) students; and Not for students who have passed in STAT3910 Financial economics I, or have already enrolled in this course; and Not for students who have passed in STAT3905 Introduction to financial derivatives, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.	Y	Y	1	Dec	---	Dr R W L Wong, Statistics & Actuarial Science		Major in Risk Management (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		
STAT3620	Modern nonparametric statistics	6	Pass in STAT2602 Probability and statistics II	Y	Y	1	Dec	---	Dr P L H Yu, Statistics & Actuarial Science		Major in Decision Analytics (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3621	Statistical data analysis	6	STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting (Students are strongly recommended to take STAT2603 Data management with SAS prior to taking this course.)	Y	Y	2	May	50	Dr G Tian, Statistics & Actuarial Science		Major in Decision Analytics (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3622	Data visualization	6	STAT2602 Probability and statistics II	N	Y	---	---	---	Dr P L H Yu, Statistics & Actuarial Science		Major in Decision Analytics (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT3799	Directed studies in statistics	6	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in the Major in Risk Management/Statistics/Decision Analytics; and Not for students who have already enrolled in STAT4799 Statistics project in this academic year. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors only; and subject to the consent of course coordinator. This course is mutually exclusive with STAT4710. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2	No exam	30	Prof S M S Lee, Statistics & Actuarial Science				Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)
STAT3901	Life contingencies	6	(Pass in STAT2602 Probability and statistics II and STAT3615 Practical mathematics for investment) or (Pass in STAT2902 Financial mathematics and (Pass in STAT3902 Statistical models, or already enrolled in this course)) or (Pass in STAT2602 Probability and statistics II and STAT2902 Financial mathematics)	Y	Y	1	Dec	---	Prof K C Yuen, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT3902	Statistical models	6	Pass in STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in STAT2602 Probability and Statistics II, or already enrolled in this course; and For BSc(Actuarial Science) students only.	Y	Y	1	Dec	---	Dr G Tian, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)			
STAT3903	Stochastic models	6	For BSc(Actuarial Science) students only; and Pass in STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3603 Probability modelling, or have already enrolled in this course.	Y	Y	2	May	---	Dr Y K Chung, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)			
STAT3904	Corporate finance for actuarial science	6	[(Pass in ACCT1101 Introduction to accounting and STAT2902 Financial mathematics) or (Pass in STAT3610 Risk management and insurance and STAT3615 Practical mathematics for investment)]; and Not for students who have passed in FINA1310 Corporate finance, or have already enrolled in this course.	Y	Y	2	May	---	Dr J K Woo, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT3905	Introduction to financial derivatives	6	Pass in STAT2902 Financial mathematics; and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.	Y	Y	1	Dec	---	Dr E C K Cheung, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)			

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT3906	Risk theory I	6	Pass in STAT3903 Stochastic models, or already enrolled in this course; or Pass in STAT3603 Probability modelling or MATH3603 Probability theory	Y	Y	2	May	---	Dr K C Cheung, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT3907	Linear models and forecasting	6	(Pass in STAT2602 Probability and statistics II; or Pass in STAT3902 Statistical models, or already enrolled in this course); and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT3600 Linear statistical analysis, or have already enrolled in this course; and Not for students who have passed in STAT4601 Time-series analysis, or have already enrolled in this course; and Not for students who have passed in ECON2280 Introductory econometrics, or have already enrolled in this course.	Y	Y	2	May	---	Dr G C S Lui, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)			
STAT3908	Credibility theory and loss distributions	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3906 Risk theory I	Y	Y	1	Dec	---	Dr K C Cheung, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT3909	Advanced life contingencies	6	Pass in STAT3901 Life contingencies, or already enrolled in this course; and For BSc(Actuarial Science) students only.	Y	Y	2	May	---	Prof H L Yang, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)			
STAT3910	Financial economics I	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.	Y	Y	1	Dec	---	Prof H L Yang, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT3911	Financial economics II	6	Pass in MATH3603 Probability theory or STAT3603 Probability modelling or STAT3903 Stochastic models or STAT3910 Financial economics I	Y	Y	2	May	---	Prof H L Yang, Statistics & Actuarial Science	BSc in Actuarial Science (2015,2014,2013,2012)	Major in Risk Management (2015,2014,2013,2012); Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT3951	Advanced contingencies	6	Pass in STAT3909 Advanced life contingencies; and Pass in STAT3910 Financial economics I or already enrolled in this course; and For BSc(Actuarial Science) students only.	Y	Y	1	Dec	---	Dr E C K Cheung, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		
STAT3952	Investment and asset management	6	Pass in STAT3901 Life contingencies; and For BSc(Actuarial Science) students only; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course.	N	N	---	---	---	TBC, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		
STAT3953	Fundamentals of actuarial practice	6	Pass in STAT3909 Advanced life contingencies; and For BSc(Actuarial Science) students only.	Y	Y	1	No exam	---	Dr L F K Ng, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		
STAT3954	Current topics in actuarial science	6	(Pass in STAT3901 Life contingencies, or already enrolled in this course; or Pass in STAT3909 Advanced life contingencies, or already enrolled in this course); and For BSc(Actuarial Science) students only.	N	N	---	---	---	Prof W K Li, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long 1=1st sem 2=2nd sem S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT3955	Survival analysis	6	Pass in STAT3902 Statistical models, or already enrolled in this course; or Pass in STAT3600 Linear statistical analysis or STAT3901 Life contingencies	Y	Y	2	May	---	Dr J F Xu, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT3956	Pension funds and pension mathematics	6	Pass in STAT3909 Advanced life contingencies	Y	Y	1	Dec	---	Prof G Ma, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		
STAT4601	Time-series analysis	6	Pass in STAT3600 Linear statistical analysis; and Not for students who have passed in STAT3614 Business forecasting, or have already enrolled in this course; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Dr G Li, Statistics & Actuarial Science	Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)	Major in Decision Analytics (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT4602	Multivariate data analysis	6	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting	Y	Y	2	May	50	Prof T W K Fung, Statistics & Actuarial Science	Major in Statistics (2015,2014,2013,2012)	BSc in Actuarial Science (2015,2014,2013,2012); Major in Decision Analytics (2015,2014,2013,2012); Minor in Statistics (2015,2014,2013,2012)		
STAT4603	Current topics in risk management	6	Pass in STAT4601 Time-series analysis	N	N	---	---	---	TBC, Statistics & Actuarial Science		Major in Risk Management (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		
STAT4606	Risk management and Basel Accords in banking and finance	6	Pass in STAT3910 Financial economics I or STAT3905 Introduction to financial derivatives or STAT3618 Derivatives and risk management or (FINA2322 Derivatives and any University level 3 course).	Y	Y	2	May	---	Mr P K Y Pang, Statistics & Actuarial Science		Major in Risk Management (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		
STAT4607	Credit risk analysis	6	Pass or already enrolled in STAT3910 Financial economics I or STAT3618 Derivatives and risk management or STAT3905 Introduction to financial derivatives or (FINA2322 Derivatives and any University level 3 course)	Y	Y	2	May	---	Dr K P Wat, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		
STAT4608	Market risk analysis	6	(Pass in STAT3907 Linear models and forecasting and STAT3910 Financial economics I); or [Pass in STAT4601 Time-series analysis and (FINA2320 Investments and portfolio analysis or STAT3609 The statistics of investment risk)]	Y	Y	2	May	---	Dr Z Zhang, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Minor in Risk Management (2015,2014,2013,2012)		
STAT4609	Big data analytics	6	Pass in STAT3612 Data mining	Y	Y	2	May	---	Dr G C S Lui, Statistics & Actuarial Science	Major in Decision Analytics (2015,2014,2013,2012)			
STAT4710	Capstone experience for statistics undergraduates	6	Students are expected to have satisfactorily completed at least 24 credits of advanced level (STAT3XXX, STAT4XXX or STAT6XXX) disciplinary core/elective courses in Decision Analytics, Risk Management, and Statistics Majors. Students who are interested in taking the course should submit their applications to the Department. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors students only, and is mutually exclusive with STAT3799, STAT4799 and STAT4766.	Y	Y	1, 2	No exam	50	Prof W K Li, Statistics & Actuarial Science				Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT4711	Capstone experience for actuarial science undergraduates	6	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in BSc(Actuarial Science) programme including (STAT3901 Life contingencies, or already enrolled in this course; or Pass in STAT3909 Advanced life contingencies, or already enrolled in this course); and This capstone course is for BSc(Actuarial Science) students only, and is mutually exclusive with STAT4798 and STAT4767. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2	No exam	50	Prof W K Li, Statistics & Actuarial Science				BSc in Actuarial Science (2015,2014,2013,2012)
STAT4766	Statistics internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in the Decision Analytics, Risk Management, and Statistics Majors. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors students only; and is mutually exclusive with STAT4710. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2, S	No exam	---	Dr K P Wat, Statistics & Actuarial Science				Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)
STAT4767	Actuarial science internship	6	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in BSc(Actuarial Science) programme including STAT3901 Life contingencies; and This capstone course is for BSc(Actuarial Science) students only; and is mutually exclusive with STAT4711. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2	No exam	---	Dr L F K Ng, Statistics & Actuarial Science				BSc in Actuarial Science (2015,2014,2013,2012)
STAT4798	Statistics and actuarial science project	6	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in BSc(Actuarial Science) programme including STAT3902 Statistical models and STAT3907 Linear models and forecasting; and Pass or already enrolled in at least one of the following courses: STAT3616 Advanced SAS programming, STAT3911 Financial economics II, STAT4601 Time-series analysis, STAT4602 Multivariate data analysis; and This capstone course is for BSc(Actuarial Science) students only; and subject to the consent of course coordinator. This course is mutually exclusive with STAT4711. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	1, 2	No exam	50	Prof S M S Lee, Statistics & Actuarial Science				BSc in Actuarial Science (2015,2014,2013,2012)

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2015-2016	Exam held in 2015-2016	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as)			
				2015-2016	2016-2017	0=year long 1=1st sem 2=2nd sem S=Summer			TBC = To be confirmed	Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Department of Statistics & Actuarial Science (Cont'd)													
STAT4799	Statistics project	12	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in the Major in Risk Management / Statistics / Decision Analytics including STAT3600 Linear statistical analysis; and Pass or already enrolled in at least one of the following courses: STAT3616 Advanced SAS programming, STAT3911 Financial economics II, STAT4601 Time-series analysis, STAT4602 Multivariate data analysis; and Not for students who have already enrolled in STAT3799 Directed studies in statistics in this academic year. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors students only; and subject to the consent of course coordinator. This course is mutually exclusive with STAT4710. The earliest that a student is allowed to take this capstone course is their year 3 study.	Y	Y	0	No exam	30	Prof S M S Lee, Statistics & Actuarial Science				Major in Decision Analytics (2015,2014,2013,2012); Major in Risk Management (2015,2014,2013,2012); Major in Statistics (2015,2014,2013,2012)
STAT4901	Risk theory II	6	Pass in STAT3906 Risk theory I	Y	Y	2	May	---	Dr J K Woo, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		
STAT4902	Selected topics in actuarial science	6	Pass in STAT3906 Risk theory I	N	N	---	---	---	TBC, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012)		
STAT4903	Actuarial techniques for general insurance	6	Pass in STAT3906 Risk theory I	Y	Y	2	May	---	Dr L F K Ng, Statistics & Actuarial Science		BSc in Actuarial Science (2015,2014,2013,2012); Minor in Actuarial Studies (2015,2014,2013,2012)		
STAT7609	Research methods in statistics	6	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting	Y	Y	1	Dec	---	Dr J F Xu, Statistics & Actuarial Science				
STAT7610	Advanced probability	6	Pass in STAT3603 Probability modelling or STAT3903 Stochastic models	Y	Y	1	Dec	---	Prof J J F Yao, Statistics & Actuarial Science				
STAT7611	Computational statistics	6	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting	Y	Y	1	Dec	---	Dr G Tian, Statistics & Actuarial Science				
STAT7614	Advanced statistical modelling	6	Pass in STAT3600 Linear statistical analysis	Y	Y	2	May	---	Dr Y K Chung, Statistics & Actuarial Science				
STAT7615	Advanced quantitative risk management and finance	6	Pass in STAT4608 Market risk analysis	Y	Y	2	May	---	Prof W K Li, Statistics & Actuarial Science				

Course Code	Title	Credit	Pre-requisite	Available in 2015-2016	Available in 2016-2017	Semester offered in 2015-2016 (0=year long, 1=1st sem, 2=2nd sem, S=Summer)	Exam held in 2015-2016	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as): Disciplinary Core Course	Disciplinary Elective	Capstone - Disciplinary Core Course	Capstone - Disciplinary Elective
Common Core Courses													
CCCH9020	Science and Technology: Lessons from China	6	NIL	Y	Y	1	Dec	120	Prof L S Chan, Earth Sciences				
CCGL9016	Feeding the World	6	NIL	Y	Y	1	No exam	132	Prof H Corke, Biological Sciences				
CCGL9017	Food: Technology, Trade and Culture	6	NIL	Y	Y	1	Dec	120	Prof H Corke, Biological Sciences				
CCGL9033	Weapons of Mass Destruction: Science, Proliferation and Terrorism	6	NIL	Y	Y	2	No exam	168	Dr K H Lemke, Earth Sciences				
CCGL9043	Obesity: Beyond a Health Issue	6	NIL	Y	Y	2	No exam	120	Dr E T S Li, Biological Sciences				
CCST9011	Biotechnology - Science and Impacts	6	NIL	Y	Y	1	No exam	120	Prof F C C Leung, Biological Sciences				
CCST9012	Our Place in the Universe	6	NIL	Y	Y	2	May	120	Prof S Kwok, Faculty				
CCST9013	Our Living Environment	6	NIL	Y	Y	2	No exam	120	Dr S C Chang, Earth Sciences				
CCST9014	Science and Music	6	NIL	Y	Y	2	No exam	120	Prof H F Chau, Physics				
CCST9017	Hidden Order in Daily Life: A Mathematical Perspective	6	NIL	Y	Y	1	No exam	120	Prof T W Ng, Mathematics				
CCST9018	Origin and Evolution of Life	6	NIL	Y	Y	2	No exam	120	Dr K H Lemke, Earth Sciences				
CCST9019	Understanding Climate Change	6	NIL	Y	Y	2	No exam	120	Dr Z H Liu, Earth Sciences				
CCST9021	Hong Kong: Our Marine Heritage	6	NIL	Y	Y	2	No exam	120	Prof K M Y Leung, Biological Sciences				
CCST9022	How the Mass Media Depicts Science, Technology and the Natural World	6	NIL	Y	Y	1	No exam	120	Prof H F Chau, Physics				
CCST9023	The Oceans: Science and Society	6	NIL	Y	Y	1	No exam	120	Dr J A King, Earth Sciences				
CCST9026	Scientific Revolutions: Their Continuing Impact on Our World and Society	6	NIL	Y	Y	2	No exam	120	Prof Q A Parker, Physics				
CCST9028	Science and Technology: Facts and Fallacies	6	NIL	Y	Y	1	Dec	120	Prof A B Djurisic, Physics				
CCST9030	Forensic Science: Unmasking Evidence, Mysteries and Crimes	6	NIL	Y	Y	1, 2	No exam	144	Prof D L Phillips, Chemistry				
CCST9036	Material World: Past, Present, and Future	6	NIL	Y	Y	2	No exam	120	Prof W K Chan, Chemistry				
CCST9037	Mathematics: A Cultural Heritage	6	NIL	Y	Y	2	No exam	120	Dr B R Kane, Mathematics				
CCST9038	Science and Science Fiction	6	NIL	Y	Y	1	No exam	120	Prof A B Djurisic, Physics				
CCST9039	Statistics and Our Society	6	NIL	Y	Y	2	May	120	Dr K C Cheung, Statistics & Actuarial Science				
CCST9043	Time's Arrow	6	NIL	Y	Y	2	May	120	Dr Y L Li, Earth Sciences				
CCST9045	The Science and Lore of Culinary Culture	6	NIL	Y	Y	2	No exam	120	Dr A M Y Yuen, Chemistry				
CCST9046	The Science of Mind-body-health Relationship	6	NIL	Y	Y	1	Dec	120	Dr G W Porter, Faculty				
CCST9048	Simplifying Complexity	6	NIL	Y	Y	1	No exam	120	Dr T Bonebrake, Biological Sciences				
CCST9051	What are We Made of - the Fundamental Nature of Matter	6	NIL	Y	Y	2	No exam	120	Prof S Xu, Physics				
CCST9052	Coffee, Cigarettes, and Alcohol	6	NIL	Y	Y	2	No exam	120	Dr G W Porter, Faculty				

SECTION XI

Course Descriptions of BSc and Language Courses

SCIENCE

BIOC1600 Perspectives in biochemistry (6 credits)		Academic Year	2015
Offering Department	Biomedical Sciences	**Quota**	---
Course Co-ordinator	Dr J Tanner, Biomedical Sciences *(jatanner@hku.hk)*		
Teachers Involved	Dr M P M Wong, Biomedical Sciences Dr L Y L Cheng, Biomedical Sciences Dr J Tanner, Biomedical Sciences Dr B C W Wong, Biomedical Sciences		
Course Objectives	- Teach students a biochemical perspective on each of the Basic Sciences focusing on concepts fundamental to the learning of Biochemistry. - Promote deep learning of course material through an integrated programme of practical and collaborative tasks. - Inspire students with a view of the great discoveries and future challenges for Biochemistry. - Help students make the transition from school to university by developing their teamwork, independent study skills and confidence to communicate within a Biochemistry learning environment.		
Course Contents & Topics	A Biochemical Perspective on the Basic Sciences A. Chemistry for Biochemistry The elements and bonding (from carbon to Coenzyme A); Resonance and orbital theory (a focus on the electron); Structure and conformation (thinking in 3 dimensions); Isomerism (from mirrors to thalidomide); Water (the universal biochemical solvent) & buffer; Quantitation in chemistry (who was Avogadro anyway?). B. Biology for Biochemistry The basic building blocks of life (proteins, DNA, lipids, carbohydrate); The Central Dogma of Molecular Biology; Evolution (considering molecular evolution); Origins of life (the chicken-egg paradox of proteins and DNA) C. Physics and Mathematics for Biochemistry Thermodynamics from a Biological Perspective; Introduction to molecular recognition and binding (DNA melting); Statistics for biochemistry (applied statistics for what you really need to know); Thinking numbers (exponentials, logs and the limits of life). D. Inspiring Biochemistry The protein; The gene; Vitamins and disease; Synthetic biology; The challenges of modern-day genetics Drugs-successes and failures.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: describe the basics of biomolecular structure from a chemical perspective, thereby integrating the basic sciences of biology, chemistry and physics into a biochemical perspective CLO 2: apply knowledge of biomolecular structure to review major discoveries and contemporary issues in molecular biology CLO 3: interpret scientific data and discuss major issues in biochemistry using the scientific literature CLO 4: demonstrate skills in working and collaborating together with colleagues in practicals and in presentation of scientific ideas CLO 5: relate how biochemistry intersects with the three basic sciences of biology, chemistry and physics, and recognize the transition from school to university level study		
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in HKDSE Biology, Chemistry, or Combined Science with Biology or Chemistry component, or equivalent		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Exceptionally good performance demonstrating comprehensive understanding of the subject matter; critical insight into use of scientific data and the scientific literature; superior presentation and group collaboration skills. **B**: Good performance demonstrating full understanding of the subject matter; coherent insight into use of scientific data and the scientific literature; good presentation and group collaboration skills. **C**: Satisfactory performance demonstrating adequate understanding of the subject matter; some insight into use of scientific data and the scientific literature; some presentation and group collaboration skills. **D**: Limited performance demonstrating some understanding of basic subject matter; some ability to use scientific data and the scientific literature; limited presentation and group collaboration skills. **Fail**: Poor understanding of subject matter; with little to no insight into use of scientific data; no understanding of the scientific literature and unable to present or collaborate.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	see below		

Activities	Details	No. of Hours
Lectures	or workshops	36
Group work	Practical classess	12
Reading / Self study		50
Assessment	Tasks and preparation	30

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping

Assignments	including practical writeups	20	CLO 1,2,3,4,5
Examination		50	CLO 1,2,3
Project reports	group communication project	30	CLO 2,3,4,5

Required/recommended reading and online materials	TBC

BIOC2600 Basic biochemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	300
Course Co-ordinator	Prof D K Y Shum, Biomedical Sciences *(shumdkhk@hku.hk)*		
Teachers Involved	Prof D K Y Shum, Biomedical Sciences Prof P Engel, Biomedical Sciences Dr Z Cheung, Biomedical Sciences Dr B C W Wong, Biomedical Sciences		
Course Objectives	This course is designed to present an overview of biochemistry of fundamental importance to the life process. We aim to develop appreciation of the basics in biochemistry as a common ground for science and non-science students to progress into their areas of specialization. Students intending to pursue further studies in Biochemistry and Molecular Biology will find this course particularly helpful.		
Course Contents & Topics	Structure and functions of carbohydrates, lipids, nucleic acids, amino acids and proteins; enzymes and co-enzymes; basic bioenergetics; key metabolic processes in a living cell; signaling across cell membranes; flow of genetic information		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	relate structures to functions of biomolecules
CLO 2	explain the functions of key metabolic processes
CLO 3	explain the significance of signaling across cell membranes
CLO 4	explain the flow of genetic information

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells or ENGG1207 Foundation of biochemistry for medical engineering; and Not for students who have passed in BIOL2220 Principles of biochemistry or MEDE2301 Life sciences I (Biochemistry), or have already enrolled in these courses.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrates thorough and complete mastery of the entire range of knowledge and analytical skills as required for maximal attainment in all the course learning outcomes; excellence in critical thinking towards application of the knowledge in a range of contexts.
B	Demonstrates substantial command of a broad range of knowledge and analytical skills as required for attainment of the majority of course learning outcomes; good evidence of critical thinking towards application of the knowledge in a range of contexts.
C	Demonstrates general but incomplete command of knowledge and analytical skills as required for attainment of adequate course learning outcomes; some evidence critical thinking towards application of the knowledge in a range of contexts.
D	Demonstrates partial but limited command of knowledge and analytical skills as required for attainment of some of the course learning outcomes; limited evidence of critical thinking towards application of the knowledge in a range of contexts.
Fail	Demonstrates little or no evidence of command of knowledge and analytical skills as required for attainment of the course learning outcomes; lacking in critical thinking towards application of the knowledge in a range of contexts.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		20	CLO 1,2,3,4
Examination		60	CLO 1,2,3,4
Test		20	CLO 1,2,3,4

Required/recommended reading and online materials	Nelson DL, Cox MM (2008) Lehninger Principles of Biochemistry, 5th ed. W.H. Freeman, New York. Any other Biochemistry textbooks, e.g. Berg JM, Tymoczko JL, Stryer L (2012) Biochemistry, 7th ed. W.H. Freeman, New York.

BIOC3601 Basic metabolism (6 credits)		**Academic Year**	**2015**

Offering Department	Biomedical Sciences	**Quota**	80
Course Co-ordinator	Dr N S Wong, Biomedical Sciences *(nswong@hku.hk)*		
Teachers Involved	Dr N S Wong, Biomedical Sciences Dr L Y L Cheng, Biomedical Sciences		
Course Objectives	This course aims to provide foundation concepts of metabolism. It will enable students of this course to see how some of the basic concepts in biochemistry (specifically those learned in BIOC1600 and BIOC2600) could be applied to explain one of the most important and cardinal issues of biological life: the acquisition of metabolic energy. The course will lay the foundation for the more advanced courses offered in the Biochemistry Major and will also serve as a useful complement to courses on nutrition.		
Course Contents & Topics	This course focuses on the central metabolic pathways involved in the provision of energy needed by living organisms. Major metabolic pathways covered in this course include those that are involved in the synthesis and breakdown of glucose, glycogen, triacylglycerol, and amino acids. The metabolism of purines and pyrimidines will also be considered. Emphasis is on the understanding of the metabolic reactions involved and how they are regulated in relation to environmental cues. Metabolic derangements as a basis of diseases will also be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	explain the significance of individual steps in a metabolic pathway
CLO 2	recognize the importance and the need for regulation of metabolic pathways
CLO 3	discuss the roles of enzymes in the regulation of metabolic pathways
CLO 4	describe how metabolic process are integrated under different physiological and pathological conditions

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life sciences I (Biochemistry)		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrates thorough and extensive knowledge and skills required for attaining all the course learning outcomes. Displays a strong analytical ability and logical thinking and is able to apply knowledge to a wide range of complex situations. Consistently able to communicate sophisticated ideas confidently and clearly.
B	Demonstrates substantial knowledge and skills required for attaining most of the course learning outcomes. Shows evidence of analytical ability and logical thinking and is sometimes able to apply knowledge to complex situations. Often communicates complex ideas clearly.
C	Demonstrates general but incomplete knowledge and skills required for attaining most of the course learning outcomes. Shows evidence of some analytical ability and logical thinking and is sometimes able to apply knowledge to familiar or uncomplicated situations. Sometimes communicates ideas clearly.
D	Demonstrates limited knowledge and skills required for attaining some of the course learning outcomes. Shows poor analytical ability and logical thinking and is rarely able to apply knowledge to solve problems. Has difficulty in expressing ideas coherently.
Fail	Demonstrates little or no evidence of knowledge and skills required for attaining the course learning outcomes. Lacks analytical ability and logical thinking and is unable to apply knowledge to solve problems. Ineffective at communicating ideas.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	glycolysis; gluconeogenesis; pentose phosphate pathway; glycogen metabolis; lipid metabolis; purine and pyrimidine metabolism; regulation and integration of metabolic pathways	36
Tutorials	working on problems relating to the lecture topics	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination		80	CLO 1,2,3,4

Required/recommended reading and online materials

Berg JM, Tymoczko JL, Stryer L (2007) Biochemistry, 6th ed. W.H. Freeman, New York.
Devlin TM (2006) Textbook of Biochemistry: with Clinical Correlations, 6th ed. Wiley-Liss, Hoboken, New Jersey.
Nelson DL, Cox MM (2008) Lehninger Principles of Biochemistry, 5th ed. W.H. Freeman, New York.

BIOC3602 Understanding metabolism diseases (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	40
Course Co-ordinator	Dr L Y L Cheng, Biomedical Sciences *(lcheng@hku.hk)*		
Teachers Involved	Dr L Y L Cheng, Biomedical Sciences		

Course Objectives	To strengthen students' understanding of metabolism. By using a problem-based learning (PBL) approach, students are trained in critical thinking and problem-solving skills. Students will be able to grasp the major effects on metabolic integration and control and they can use these concepts with greater confidence and success in approaching new problems and new areas of study.
Course Contents & Topics	Knowledge of major pathways is applied to the understanding of disease mechanisms. The first part of the course will be delivered in the form of lectures, presentations, etc. and supplemented with audio-visual aids to illustrate the major concepts of metabolic diseases. The second half of the course will be delivered in a tutorial format in which students are given cases to analyse and search for solutions through references. Metabolic disturbances which lead to diabetes will be discussed.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	apply the knowledge of major metabolic pathways to the understanding of disease mechanisms
CLO 2	illustrate the major concepts of metabolic diseases and discuss the metabolic disturbances in diseases
CLO 3	explain the importance of metabolic integration and control
CLO 4	develop critical thinking, problem-solving and presentation skills

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC3601 Basic metabolism		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrates thorough and extensive knowledge and skills required for attaining all the course learning outcomes. Shows strong analytical ability and logical thinking in the critique of scientific data and is able to apply knowledge to a wide range of complex situations. Presents ideas clearly and coherently and collaborates proactively with peers.
B	Demonstrates substantial knowledge and skills required for attaining most of the course learning outcomes. Shows evidence of analytical ability and logical thinking in the critique of scientific data and is often able to apply knowledge to a wide range of complex situations. Presents ideas coherently and collaborates effectively with peers.
C	Demonstrates general but incomplete knowledge and skills required for attaining most of the course learning outcomes. Shows evidence of some analytical ability and logical thinking in the critique of scientific data and is sometimes to apply knowledge to familiar situations. Has difficulty in presenting ideas coherently and collaborates passively with peers.
D	Demonstrates partial but limited knowledge and skills required for attaining some of the course learning outcomes. Shows poor analytical ability and logical thinking in the critique of scientific data and is rarely able to apply knowledge to solve problems. Lacks clarity when presenting ideas and reluctantly collaborates with peers.
Fail	Demonstrates little or no evidence of knowledge and skills required for attaining the course learning outcomes. Lacks of analytical ability and logical thinking in the critique of scientific data and is unable to apply knowledge to solve problems. Incoherent presentation skills and unable to collaborate with others.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		50	CLO 1,2,3,4
Examination		50	CLO 1,2,3

Required/recommended reading and online materials	TBC

BIOC3604 Essential techniques in biochemistry and molecular biology (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	70
Course Co-ordinator	Dr K M Yao, Biomedical Sciences *(kmyao@hku.hk)*		
Teachers Involved	Prof D K Y Shum, Biomedical Sciences Dr B C W Wong, Biomedical Sciences Dr N S Wong, Biomedical Sciences Dr K M Yao, Biomedical Sciences Prof Z J Zhou, Biomedical Sciences		
Course Objectives	To give students a general overview of different experimental approaches and model systems, and to provide students with hands-on experience in basic biochemical and molecular techniques.		
Course Contents & Topics	Basic concepts in experimental science; writing of lab notebooks; experimental approaches - genetic, biochemical, molecular, genomic and others; methods for isolation and analysis of carbohydrates, proteins, lipids and nucleic acids; subcellular fractionation; enzyme assays and spectrophotometry; basic nucleic acid manipulation - PCR, site-directed mutagenesis, blotting and hybridization, cloning strategies, restriction mapping.		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 explain the basic principles of various biochemical and molecular techniques CLO 2 describe different experimental approaches for achieving defined experimental aims CLO 3 apply different techniques to biochemical and molecular analyses CLO 4 write and maintain a scientific laboratory notebook satisfactorily
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life science I
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrates thorough and extensive knowledge and skills required for attaining all the course learning outcomes. Shows strong analytical ability and logical thinking, with evidence of original thought. Competently conducts laboratory skills and techniques with confidence and can critically appraise data to draw appropriate and insightful conclusions. **B** Demonstrates substantial knowledge and skills required for attaining most of the course learning outcomes. Shows evidence of critical thinking and analytical skills. Conducts laboratory skills and techniques with confidence and can appraise data to draw appropriate conclusions. **C** Demonstrates general but incomplete knowledge and skills required for attaining most of the course learning outcomes. Shows some evidence of critical thinking and analytical skills. Conducts laboratory skills and techniques to a satisfactory level of competence and can sometimes correctly appraise data and draw appropriate conclusions. **D** Demonstrates partial but limited knowledge and skills required for attaining some of the course learning outcomes. Shows limited critical thinking and analytical skills. Displays poor laboratory skills and techniques and is rarely able to use data to draw appropriate conclusions. **Fail** Demonstrates little or no evidence of knowledge and skills required for attaining the course learning outcomes. Lacks analytical ability and logical thinking. Displays ineffective lab skills and techniques and is unable to use data to draw appropriate conclusions.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		12
Laboratory		54
Tutorials		6
Reading / Self study		76

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2,3,4
Examination		50	CLO 1,2,3

Required/recommended reading and online materials

Cox MM, Doudna JA and O'Donnell M (2012) Molecular Biology: Principles and Practice, Macmillan.
Scopes RK (1994) Protein Purification: Principles and Practice. Springer Advanced Texts in Chemistry, Springer-Verlag, New York.
Wilson K, Walker KM (2005) Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press, Cambridge.

BIOC3605 Sequence bioinformatics (6 credits)		**Academic Year**	2015
Offering Department	Biomedical Sciences	**Quota**	50
Course Co-ordinator	Dr B C W Wong, Biomedical Sciences *(bcwwong@hku.hk)*		
Teachers Involved	Dr B C W Wong, Biomedical Sciences		
Course Objectives	This course will examine existing bioinformatics tools for DNA and protein sequence analysis. The underlying principles of these analysis programs and services will be presented. Students will learn how to retrieve, analyze, and compare protein and DNA sequences using bioinformatics tools available on the World Wide Web.		
Course Contents & Topics	This course will introduce and discuss the following topics: DNA and protein sequence database, protein family databases; information searching and retrieval - Entrez and SRS; Simple sequence analysis; sequence alignment: pair-wise alignment, multiple sequence alignment, substitution matrices; sequence database searching: algorithm and parameters; sequence patterns and motifs, and profiles; phylogenetic analysis; gene prediction.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 search and retrieve sequence information from biological databases CLO 2 describe the algorithms for pairwise and multiple alignments, BLAST search, and phylogenetic trees construction CLO 3 perform sequence analysis using EMBOSS package and other web-based analysis tools CLO 4 interpret results from sequence alignments and BLAST database searches		

	CLO 5 use results from various sequence analysis tools to annotate a biological sequence
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BBMS2003 Human genetics or BBMS2007 Essential molecular biology or MEDE2301 Life science I
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrates thorough and complete mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes; strong critical thinking; excellent ability to apply bioinformatics skills in a range of context. **B** Demonstrates substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes; evidence of critical thinking; good ability to apply bioinformatics skills in a range of context. **C** Demonstrates general but incomplete command of knowledge and skills required for attaining most of the course learning outcome; some critical thinking; adequate ability to apply bioinformatics skills in a range of context. **D** Demonstrates partial but limited command of knowledge and skills required for attaining some of the course learning outcomes; limited critical thinking; limited ability to apply bioinformatics skills in a range of context. **Fail** Demonstrates little or no evidence of command of knowledge and skills required for attaining the course learning outcomes; lack of critical thinking; little or no ability to apply bioinformatics skills in a range of context.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4,5
Examination		70	CLO 2,4

Required/recommended reading and online materials

Baxevanis AD, Ouellette BFF (2005) Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, 3rd ed. Wiley, Hoboken, N.J.
Mount DW (2004) Bioinformatics: Sequence and Genome Analysis, 2nd ed. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

BIOC3606 Molecular medicine (6 credits)		**Academic Year**	2015
Offering Department	Biomedical Sciences	**Quota**	50
Course Co-ordinator	Prof D Y Jin, Biomedical Sciences *(dyjin@hku.hk)*		
Teachers Involved	Prof K S E Cheah, Biomedical Sciences Prof D Y Jin, Biomedical Sciences Prof M H Sham, Biomedical Sciences Dr B Gao, Biomedical Sciences		
Course Objectives	To provide up-to-date knowledge of the molecular and cellular basis of human diseases including skeletal disorders, cancer and infection with HIV and influenza viruses, thereby preparing the students for a career in biomedical, biotechnological, pharmaceutical and genomic research.		
Course Contents & Topics	This course covers molecular basis of skeletal disorders, cancer and viral diseases, and molecular therapeutics. Specific topics may include mouse model of human diseases, molecular basis of selected skeletal disorders, oncogenes and tumour suppressor genes, genome instability, HIV science, genetics and pathogenesis of influenza viruses, molecular approaches to vaccine development, therapeutic proteins and antibodies, stem cells, gene therapy, and nucleic acid therapeutics. Basic knowledge of biochemistry and molecular cell biology is assumed for students taking this course.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 explain the molecular mechanisms underlying selected human skeletal disorders, cancer and viral diseases CLO 2 illustrate the application of molecular biology in medicine with examples CLO 3 integrate and translate knowledge in molecular biology to new approaches in disease prevention and intervention		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life science I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Displays a comprehensive grasp of the key concepts underlying the molecular basis of human diseases, with few omissions or errors. Able to articulate clearly with examples how knowledge in molecular biology can lead to new		

		strategies in disease prevention and intervention. Evidence of strong analytical and critical thinking when dealing with complex scientific data. Some evidence for additional information beyond what is given in the lectures.
	B	Displays a substantial and near-complete grasp of the key concepts underlying the molecular basis of human diseases, but without depth in some areas and with some omissions and factual errors. An understanding of the topic though is clear. Able to relate knowledge in molecular biology to new strategies in disease prevention and intervention. Able to apply analytical and critical thinking skills when dealing with scientific data.
	C	Displays a general understanding of the key concepts underlying the molecular basis of human disease and is sometimes able to relate knowledge in molecular biology to new strategies in disease prevention and intervention. Sometimes able to apply analytical and critical thinking skills when dealing with scientific data.
	D	Displays a limited understanding of the key concepts underlying the molecular basis of human disease and is rarely able to relate knowledge in molecular biology to new strategies in disease prevention and intervention. Evidence of weak analytical and critical thinking skills when dealing with scientific data.
	Fail	Displays an incorrect or incomplete understanding of the key concepts underlying the molecular basis of human disease and is unable to relate this knowledge to effective treatment strategies. No evidence of analytical or critical thinking skills when dealing with scientific data.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		80	CLO 1,2,3
Test		20	CLO 1,2,3

Required/recommended reading and online materials

Lodish et al: Molecular Cell Biology 7th ed., 2013 (4th ed. is available at NCBI Books)

Alberts et al: Molecular Biology of the Cell 6th ed., 2015 (4th ed. is available at NCBI Books)

Cassimeris et al: Lewin's Cells, 2nd ed., 2011

BIOC3999 Directed studies in biochemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	36
Course Co-ordinator	Prof J D Huang, Biomedical Sciences *(jdhuang@hku.hk)*		
Teachers Involved	Prof J D Huang, Biomedical Sciences All academic staff in Biochemistry Major, Biomedical Sciences		
Course Objectives	To enhance students knowledge of a particular topic and the students self-directed learning and critical thinking skills.		
Course Contents & Topics	The student undertakes a self-managed study on a topic in biochemistry under the supervision of a staff member. The topic is preferably one not sufficiently covered in the regular curriculum. The directed study can be a critical review or a synthesis of published work on the subject. A laboratory or field study may also be involved that would enhance the student's understanding of the subject.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	critically appraise research literature in a specific area of biochemistry and molecular biology
CLO 2	examine the theoretical or experimental basis for existing concepts
CLO 3	identify questions and evaluate issues for further research development

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Biochemistry Major including BIOC2600 Basic biochemistry and BIOL3401 Molecular biology. This capstone course is for Biochemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Produces a sophisticated and detailed appraisal of the biochemical literature, displaying a comprehensive and deep understanding of the selected topic. Able to contextualize all the ideas within a personal framework of knowledge and evaluate relevant issues emerging from the study. Works proactively with a supervisor to enhance understanding and scientific writing skills. Communicates the findings to a broader audience in an effective way and responds knowledgeably to questions. Excellent time-management skills and able to reflect honestly on one's own learning.
B	Produces a coherent appraisal of the biochemical literature, displaying a sound understanding of the selected topic. Able to contextualize many of the ideas within a personal framework of knowledge and identify some relevant issues emerging from the study. Works constructively with a supervisor to enhance understanding and scientific writing skills. Clearly communicates the findings to a broader audience and responds knowledgeably to most questions. Able to time-manage effectively and reflect on one's own learning.
C	Produces a reasonable appraisal of the biochemical literature, displaying an adequate understanding of the selected topic. Able to contextualize a few of the ideas within a personal framework of knowledge and makes some attempt to identify some relevant issues emerging from the study. Works with a supervisor and other co-workers to improve understanding and scientific writing skills. Communicates the findings to a broader audience with reasonable clarity and responds to most questions. Acceptable time-management and self-reflection skills.
D	Produces a superficial appraisal of the biochemical literature, displaying a limited understanding of the selected topic. Able to contextualize a few of the ideas within a personal framework of knowledge but unable to identify any relevant issues emerging from the study. Works reluctantly with a supervisor and other co-workers to develop understanding

		and scientific writing skills. Displays weak communication skills when presenting the findings to a broader audience. Poor time-management and self-reflection skills.
	Fail	Fails to appraise the biochemical literature and thus unable to display any understanding of the selected topic. Unable to contextualize the ideas within a personal framework of knowledge or identify any relevant issues emerging from the study. Works in isolation, thus failing to make progress in understanding and scientific writing skills. Unable to communicate effectively when presenting the findings to a broader audience. No time-management skills or ability to self-reflect.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	at least 120 hours on the project	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation	including mind map (10%)	60	CLO 1,2,3
Oral presentation		25	CLO 1,2,3
Research report	Supervisor comments	15	CLO 1,2,3

Required/recommended reading and online materials	as suggested by project supervisors

BIOC4610 Advanced biochemistry (6 credits)		**Academic Year**	2015
Offering Department	Biomedical Sciences	**Quota**	50
Course Co-ordinator	Dr K M Yao, Biomedical Sciences *(kmyao@hku.hk)*		
Teachers Involved	Prof D Chan, Biomedical Sciences Dr C H Fu, Biomedical Sciences Prof D K Y Shum, Biomedical Sciences Dr K M Yao, Biomedical Sciences		
Course Objectives	This course aims at providing students an in-depth understanding of molecular and cellular signaling in multicellular organisms. This course is particularly useful for students interested in research or intending to develop a career in biomedical sciences.		
Course Contents & Topics	A. Inter and intracellular signal transduction mechanisms Cell-surface receptors and signal transduction proteins; G-Protein-coupled receptors: structure and mechanism; signaling pathways that control gene expression: receptors that activate protein tyrosine kinases, the Ras/MAP kinase pathway, phosphoinositide signaling pathways and receptor serine kinases that activate Smads B. Cytoskeleton as target of signal transduction The microtubule cytoskeleton; kinesin and dynein motor; the actin cytoskeleton; myosin; the intermediate filament; cytoskeletion and cell behavior; roles of the cytoskeleton in vesicular trafficking C. Protein trafficking and sorting pathways Translocation of secretory proteins - insertion into the ER; major protein sorting pathways; protein modification, folding and quality control in the ER; molecular mechanism of vesicular traffic; protein sorting and processing D. Cell-cell and cell-matrix adhesion Cell-cell and cell-extracellular matrix (ECM) junctions and their adhesion molecules; cadherins and integrins; collagens and proteoglycans; when cell meets the matrix; regulation of signaling molecules by ECM		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe the molecular and cellular signal transduction mechanisms that mediate cellular communication to achieve a plethora of cellular responses
CLO 2	illustrate the controls of the metabolic and cellular regulation based on their understanding of cytoskeleton as target of signal transduction, protein trafficking and sorting pathways, and cell-cell and cell-matrix adhesion
CLO 3	develop critical thinking and analytical skills

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC3601 Metabolism or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3404 Protein structure and function		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough and complete mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong critical thinking and analytical skills, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of critical thinking and analytical skills, and ability to apply knowledge to familiar and some unfamiliar situations.
C	

		Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some critical thinking and analytical skills, and ability to apply knowledge to most familiar situations.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some critical thinking, but with limited analytical skills. Show limited ability to apply knowledge to solve problems.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of critical thinking and analytical skills. Show very little or no ability to apply knowledge to solve problems.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3
Examination		70	CLO 1,2,3

Required/recommended reading and online materials

Lodish H et al (2013) Molecular Cell Biology, 7th ed. Freeman (New York) & Macmillan (England).
Alberts B et al (2007) Molecular Biology of the Cell, 5th ed. Garland Science, New York.

BIOC4611 Advanced biochemistry II (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	50
Course Co-ordinator	Prof D Chan, Biomedical Sciences *(chand@hku.hk)*		
Teachers Involved	Prof D Chan, Biomedical Sciences Dr M Kotaka, Physiology Dr C M Qian, Biomedical Sciences Dr J Tanner, Biomedical Sciences Dr N S Wong, Biomedical Sciences		
Course Objectives	This course is aim at providing students with an up-to-date knowledge of protein biochemistry from sequence to structure and disease; realizing the importance of kinetics in cellular function and an appreciation of the technological advances in the characterization of macromolecules.		
Course Contents & Topics	Topics including protein folding and misfolding in diseases; conformation of proteins and the role of conformational changes in protein function; catalytic mechanisms of enzymes and enzyme kinetics; biomolecular interactions; characterization of macromolecules using X-ray crystallography, nuclear magnetic resonance and other spectroscopy methods; protein engineering and therapeutic approaches targeting protein function.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe how protein structures inform functions
CLO 2	recognize the roles of enzyme kinetics in cellular functions
CLO 3	derive structural information of macromolecules from experimental data
CLO 4	apply their knowledge on protein engineering and therapeutics, and on experimental designs in basic and applied research

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC3601 Metabolism; and BIOL3404 Protein structure and function or CHEM2441 Organic chemistry I; and Pass in BIOC4610 Advanced biochemistry, or already enrolled in this course		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Clear and insightful description of how protein structure informs function; clear evidence of ability to recognize mechanisms of enzyme function and interpretation of data; effectual demonstration of applying knowledge to the design of scientific methodologies and cohesive, systematic and creative organization of information for presentation and communication.
B	Clear description of how protein structure informs function; evidence of ability to recognize mechanisms of enzyme function and interpretation of data; capable demonstration of applying knowledge to the design of scientific methodologies; and cohesive and systematic organization of information for presentation and communication.
C	Awareness of how protein structure informs function; some evidence of ability to recognize mechanisms of enzyme function and interpretation of data; some capable demonstration of applying knowledge to the design of scientific methodologies and systematic organization of information for presentation and communication.
D	Superficial awareness of how protein structure informs function; limited evidence of ability to recognize mechanisms of enzyme function and interpretation of data; superficial demonstration of applying knowledge to the design of scientific methodologies and limited organizational skill of information for presentation and communication.
Fail	Lack of awareness of how protein structure informs function; lack of ability to recognize mechanisms of enzyme function and interpretation of data; superficial demonstration of applying knowledge to the design of scientific methodologies; insufficient organizational skill of information for presentation and communication.

Course Type Lecture-based course

Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td></td><td>30</td><td>CLO 1,2,3,4</td></tr><tr><td>Examination</td><td></td><td>70</td><td>CLO 1,2,3,4</td></tr></table>
Required/recommended reading and online materials	Fersht A (1999) Structure and Mechanism in Protein Science: A Guide to Enzyme Catalysis and Protein Folding. W.H. Freeman, New York. To be given.

BIOC4612 Molecular biology of the gene (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	50
Course Co-ordinator	Prof K S E Cheah, Biomedical Sciences *(hrmbdkc@hku.hk)*		
Teachers Involved	Prof K S E Cheah, Biomedical Sciences Dr R K Ng, Biomedical Sciences Dr K M Yao, Biomedical Sciences Prof Z J Zhou, Biomedical Sciences		
Course Objectives	To provide an up-to-date knowledge of molecular biology, especially with respect to the regulation of eukaryotic gene expression, molecular embryology.		
Course Contents & Topics	This is a comprehensive course covering many detailed molecular aspects of gene regulation and gene function. Through this course an understanding of how gene expression can be regulated at levels of transcription and post transcription will be gained.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>describe the mechanisms for regulation of transcription, RNA processing and translation in eukaryotes</td></tr><tr><td>CLO 2</td><td>explain how cellular homeostasis can be maintained by a combination of controls of gene expression at multiple levels</td></tr><tr><td>CLO 3</td><td>illustrate the hierachy of gene expression regulation in stem cells and developmental processes</td></tr><tr><td>CLO 4</td><td>interpret experimental results in gene regulation studies</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC3601 Metabolism or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3404 Protein structure and function or BBMS2007 Essential molecular biology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrates a deep and comprehensive understanding of the regulation of eukaryotic gene expression and its relevance to disease and effectively relates the knowledge to developmental processes. Uses skill and insight to analyse and interpret experimental data from gene regulation studies.</td></tr><tr><td>**B**</td><td>Demonstrates a competent grasp of the key concepts in the regulation of eukaryotic gene expression and its relevance to disease and is able to link the knowledge to developmental processes. Correctly analyses and interprets experimental data from gene regulation studies.</td></tr><tr><td>**C**</td><td>Demonstrates a basic understanding of the regulation of eukaryotic gene expression and its relevance to disease and is sometimes able to relate the knowledge to developmental processes. Displays a limited capacity to analyse and interpret experimental data from gene regulation studies.</td></tr><tr><td>**D**</td><td>Demonstrates a simplistic knowledge of the regulation of eukaryotic gene expression and rarely relates the information to developmental processes. Displays weak analytical skills and is rarely able to interpret experimental data from gene regulation studies.</td></tr><tr><td>**Fail**</td><td>Demonstrates incomplete or incorrect knowledge of the regulation of gene expression and is unable to relate the ideas to developmental processes. Unable to analyse or interpret experimental data from gene regulation studies.</td></tr></table>		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td></td><td>20</td><td>CLO 1,2,3,4</td></tr><tr><td>Examination</td><td></td><td>80</td><td>CLO 1,2,3,4</td></tr></table>		
	Alberts B et al. (2014) Molecular Biology of the Cell, 6th ed. Garland Science, New York. Lewin B (2008) Genes IX. Jones and Bartlett Publishers, Sudbury, Mass.		

Required/recommended reading and online materials	Watson JD et al. (2014) Molecular Biology of the Gene, 7th ed. Pearson/Benjamin Cummings, San Francisco.

BIOC4613 Advanced techniques in biochemistry & molecular biology (6 credits)		**Academic Year**	**2015**
Offering Department	Biomedical Sciences	**Quota**	70
Course Co-ordinator	Prof D Chan, Biomedical Sciences *(chand@hku.hk)*		
Teachers Involved	Prof D Chan & Dr J Tanner, Biomedical Sciences Prof D Y Jin & Dr B C W Wong, Biomedical Sciences Prof J D Huang, Biomedical Sciences Dr K M Yao, Biomedical Sciences Dr V Lui, Surgery		
Course Objectives	This is an advanced experimental-based course for students majoring in Biochemistry and related disciplines. The aim is to provide the necessary training for students to pursuit postgraduate research education and potential employment in a scientific laboratory/industry environment.		
Course Contents & Topics	Hands-on experiments using advanced techniques in biochemistry, molecular and cell biology, and bioinformatics. Students will also have the opportunity to familiarize themselves with modern instruments used in life sciences.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 explain the basic principles of current advanced techniques commonly used in biochemistry and molecular biology CLO 2 apply and perform these techniques in other novel experimental settings CLO 3 critically evaluate experimental data CLO 4 design alternative approaches to test or validate hypotheses CLO 5 write a concise experimental report using correct terminologies and nomenclatures		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC3604 Essential techniques in biochemistry and molecular biology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Comprehensive and in-depth understanding of the principles and applications of advance technologies in biochemistry; clear and effective ability to identify problems and generate solutions relating to applications in a laboratory setting; clear evidence of ability to evaluate experimental data; cohesive and systematic planning and organization of experimental design and presentation of experimental data.
B	Comprehensive understanding of the principles and applications of advance technologies in biochemistry; clear ability to identify problems and generate solutions relating to applications in a laboratory setting; evidence of ability to evaluate experimental data; systematic planning and organization of experimental design and presentation of experimental data.
C	Sound understanding of the principles and applications of advance technologies in biochemistry; sound ability to identify problems and generate solutions relating to applications in a laboratory setting; some evidence of ability to evaluate experimental data; satisfactory planning and organization of experimental design and presentation of experimental data.
D	Superficial understanding of the principles and applications of advance technologies in biochemistry; limited ability to identify problems and generate solutions relating to applications in a laboratory setting; some awareness of ability to evaluate experimental data; some evidence of planning and organization of experimental design and presentation of experimental data.
Fail	Lack of understanding of the principles and applications of advance technologies in biochemistry; lack of ability to identify problems and generate solutions relating to applications in a laboratory setting; lack of evidence of ability to evaluate experimental data; insufficient evidence of planning and organization of experimental design and presentation of experimental data.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		12
Laboratory		54
Tutorials		6
Reading / Self study		76

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		50	CLO 1,2,3,4,5
Examination	One 3-hour written examination	50	CLO 1,2,3,4

Required/recommended reading and online materials	Wilson K, Walker JM (2005) Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press, Cambridge.

BIOC4966 Biochemistry internship (6 credits)		Academic Year	2015
Offering Department	Biomedical Sciences	**Quota**	20
Course Co-ordinator	Prof J D Huang, Biomedical Sciences *(jdhuang@hku.hk)*		
Teachers Involved	Prof J D Huang, Biomedical Sciences All academic staff in Biochemistry Major, Biomedical Sciences		
Course Objectives	This course aims to offer students the opportunities to gain work experience in the industry related to their major of study. The workplace learning experience would be of great benefit to the students to apply their knowledge gained in the study to the real work environments. Students have to take on at least 160 hours of internship work either within the University or outside the University arranged by the School/Departments.		
Course Contents & Topics	1. Within the university: The student will be supervised by a staff member (Supervisor), working on a project or various tasks as instructed by the Supervisor. 2. Outside the university: The student will work in an external agency related to the major of study. The student will be supervised under a staff member of the external agency (the External Supervisor) and a staff member of the Department/School of the student (the Internal Supervisor).		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 recognize the strengths and limitations of their area of training or expertise CLO 2 examine the role of science in our society CLO 3 acquire problem-solving skills to solve novel and ill-defined problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Biochemistry Major including BIOC3604 Essential techniques in biochemistry & molecular biology. This capstone course is for Biochemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.		
Course Type	Internship		
Course Teaching & Learning Activities	(see table below)		
Assessment Methods and Weighting	(see table below)		
Additional Course Information	Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Internship work	it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time)	160

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Written report	written report, employer's feedback and oral presentation	100	CLO 1,2,3

BIOC4999 Biochemistry project (12 credits)		Academic Year	2015
Offering Department	Biomedical Sciences	**Quota**	25
Course Co-ordinator	Dr N S Wong, Biomedical Sciences *(nswong@hku.hk)*		
Teachers Involved	Dr N S Wong, Biomedical Sciences All academic staff in Biochemistry Major, Biomedical Sciences		
Course Objectives	To enable students to acquire the basic skills in scientific research: literature search, critical reasoning, communication (both orally and in writing), teamwork and time management. The course is particularly useful for those students who intend to pursue a career in life science.		
Course Contents & Topics	Project-related topics in biochemistry, cell and molecular biology. Experimental methods in protein and nucleic acid biochemistry; bioinformatics and cell biology. Critical appraisal of current science literature Formulation of research questions Design of experiments. Data analysis and interpretation. Scientific writing		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1 describe recent research development in a defined area of biochemistry and molecular biology CLO 2 formulate research questions and design experiments to address these questions CLO 3 apply appropriate experimental techniques to solve research problems CLO 4 manage and interpret experimental results CLO 5 develop scientific writing skills and logically report their research findings
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Biochemistry Major including 4 of the following 5 courses: BIOL3401 Molecular biology, BIOC3601 Basic metabolism, and BIOC3604 Essential techniques in biochemistry and molecular biology; and BIOC4610 Advanced biochemistry and BIOC4613 Advanced techniques in biochemistry & molecular biology. BIOC4610 Advanced biochemistry and BIOC4613 Advanced techniques in biochemistry & molecular biology can be taken concurrently with this course. This capstone course is for Biochemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y Year long — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Plans and executes a sophisticated and imaginative experimental investigation, framing the research question within existing knowledge. Displays tenacity and commitment, generating a meaningful body of data that is analysed with insight and comprehensively evaluated in the context of the original research question. Works proactively with a supervisor and other co-workers to enhance practical and scientific writing skills. Communicates the findings to a broader audience in an effective way and responds knowledgeably to questions. Excellent time-management skills. **B** Plans and executes a detailed experimental investigation, framing the research question within existing knowledge. Works with commitment, generating a sufficient body of data that is analysed and evaluated in the context of the original research question with skill and understanding. Works constructively with a supervisor and other co-workers to enhance practical and scientific writing skills. Clearly communicates the findings to a broader audience and responds knowledgeably to most questions. Able to time-manage effectively. **C** Plans and executes an experimental investigation, attempting to contextualize the research question. Works with adequate commitment in order to generate sufficient data for a reasonable analysis and evaluation in the context of the original research question. Works with a supervisor and other co-workers to improve practical and scientific writing skills. Communicates the findings to a broader audience with reasonable clarity and responds to most questions. Acceptable time-management skills. **D** Plans and executes a rudimentary experimental investigation, showing a limited ability to contextualize the research question. Displays minimal commitment when collecting data and is only able to undertake a superficial analysis and evaluation. Works reluctantly with a supervisor and other co-workers to develop practical and scientific writing skills. Displays weak communication skills when presenting the findings to a broader audience. Poor time-management skills. **Fail** Plans and executes a flawed or simplistic experimental investigation, which lacks a valid scientific context. Shows no commitment when collecting data and produces an incoherent analysis and evaluation. Works in isolation, thus failing to improve practical and scientific writing skills. Displays weak communication skills when presenting the findings to a broader audience. No time-management skills.
Course Type	Project-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Reading / Self study — 240
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Dissertation — 60 — CLO 1,2,3,4,5 Oral presentation — including continuous assessment (15%) — 40 — CLO 5
Required/recommended reading and online materials	None prescribed

BIOL1110 From molecules to cells (6 credits)		Academic Year	2015
Offering Department	Biological Sciences	**Quota**	169
Course Co-ordinator	Prof B K C Chow, Biological Sciences *(bkcc@hku.hk)*		
Teachers Involved	Prof B K C Chow, Biological Sciences Dr C S C Lo, Biological Sciences Dr K W Y Yuen, Biological Sciences Dr J W Zhang, Biological Sciences		
Course Objectives	This course aims to provide basic conceptual understanding of the biology of molecules and cells to underpin later studies in applied biology, genetics, biochemistry, nutrition, biotechnology, microbiology, plant and animal physiology and developmental biology.		
Course Contents & Topics	An issue-based approach will be adopted to enable students to integrate basic concepts in molecules and cells and to inspire further investigation through the exploration of contemporary biological issues. The course is divided into 4 parts and the following is a list of some of the questions to be asked and discussed: Genes and inheritance: How do children resemble their parents? What is the central dogma of biology? What are the rules of genetic inheritance? What determines gender and sexuality? Why is that children resemble, but not identical to, their parents? What happen if some genes are non-functional or mutated? Metabolism and Health: How are diets related to good health? Do all humans have the same dietary requirements? Why can't we live without plants? Cells and cell division: What are the common features in a cell? How do cells communicate and assemble themselves to form tissues and organs? What is a cell cycle and how it is regulated? What happens if cell-cycle control system goes wrong? How newly formed cells commit themselves for differentiation? Genetic engineering and modern biology: To what extent can genes be modified? Is gene therapy the future of medicines? Is genetically modified food safe for consumption? What are the Genome Projects and why have they been important?		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the relationships between genes in a genome and the inherited phenotypes expressed in a living organism
CLO 2	learn the underlying principle on how mutation of a gene can lead to the development of a genetic disease
CLO 3	understand the importance of dietary intake of biomolecules in relationship to good health
CLO 4	describe various stages in a cell division and that disturbance of this process may result in cancer development
CLO 5	describe concepts used in genetic engineering
CLO 6	know some applications of genetic engineering in gene therapy and production of genetically modified food

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding.
D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level.
Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping

	Examination		60	CLO 1,2,3,4,5,6
	Test		40	CLO 1,2,3,4,5,6
Course Website	http://moodle.hku.hk/			

BIOL1111 Introductory microbiology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	TBC, Biological Sciences *()*		
Teachers Involved	TBC, Biological Sciences		
Course Objectives	To introduce students to the diversity and function of microorganisms; and relate this to their importance in the natural environment, disease and public health, food production and spoilage and the biotechnology industry.		
Course Contents & Topics	Evolutionary diversity of bacteria, archaea, eukarya and viruses; Metabolic strategies, cell biology and genetics; Microbial ecology, marine microbiology, terrestrial microbiology; Microbial interactions with animals and plants; The human microbiome; Medical microbiology and immunology; Biotechnology applications; Food spoilage and food fermentations.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe the key features of the major microbial phyla and place them in an evolutionary context CLO 2 explain the major physiological and genetic processes in prokaryotes and eukaryotic microorganisms and compare the similarities and differences between these two domains CLO 3 identify the microorganisms involved and their role in ecological processes, human disease and medicine, food production and spoilage, and biotechnology		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A** (85-100%) Meets the standard of excellence. All criteria are addressed. Organization of ideas and clarity are excellent. Additional reading or research is evident. Ideas show an exceptional understanding of concepts. Arguments are highly persuasive and show excellent judgment and prioritization of issues. Presentation is highly creative and appealing. **B** (70-84%) Approaches the standard of excellence. All criteria are addressed. Organization of ideas and clarity are very good. Ideas show a complete understanding of concepts. Arguments are persuasive and prioritize major issues. Presentation is creative and appealing. **C** (55-69%) Meets an acceptable standard. All criteria are addressed. Organization of ideas and clarity are sufficient. Ideas show an effective understanding of concepts. Arguments identify major issues. Presentation is appealing but may lack clarity. **D** (45-54%) Below acceptable standard. Most criteria are addressed. Organization of ideas and clarity are weak. Ideas show an incomplete understanding of concepts. Arguments are not persuasive. Presentation lacks creativity or is not appealing. **Fail** (<45%) Unacceptable. Inability to identify major criteria. Very weak organization of ideas and clarity. Ideas show a lack of understanding of concepts. No coherent argument. Presentation lacks creativity or is unappealing.		
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports		30	CLO 3

Required/recommended reading and online materials	Brock Biology of Microorganisms, Pearson Benjamin Cummings, 12th Edition, 2009 [HKU library call number 576.B86].
Course Website	http://moodle.hku.hk/

BIOL1201 Introduction to food and nutrition (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	110
Course Co-ordinator	Prof N P Shah, Biological Sciences *(npshah@hku.hk)*		
Teachers Involved			

	Dr E T S Li, Biological Sciences Dr J W F Wan, Biological Sciences Prof N P Shah, Biological Sciences
Course Objectives	To enable student to appreciate the multidisciplinary nature of the study of Food and Nutrition. From the farmer's field to the dinner table, a basic understanding of food production, processing and storage will be covered. Food safety, food selection behaviour as well as balanced nutrition as part of life style instrumental to good health will be discussed. This is an independent course which can be taken by students from various disciplines. It also prepares students for further studies in Food and Nutritional Science.
Course Contents & Topics	Topics will include food composition and functional properties of major components; food additives; food hygiene, safety and regulation; determinants of food choice; examples of complex processed foods; healthy eating-concepts and practice; essential nutrients; dietary supplements; fad diets.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	understand the key components of food and be able to discuss their functional properties
CLO 2	understand the significance of food safety and be able to identify sources of contamination
CLO 3	understand the concept of a balanced diet
CLO 4	critically assess and identify quack or fad diets

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show exceptional ability to articulate concepts and integrate knowledge. Demonstrate highly effective organization / writing skills.
B	Demonstrate substantial grasp of the subject matter covered. Show full capacity to use the appropriate concepts and assimilate the materials to solve problems. Demonstrate effective organization / writing skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show ability to apply concepts to solve simple problems. Demonstrate adequate organization / writing skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Misunderstanding of the materials is not uncommon. Ability to apply concepts and solve simple problems is limited. Demonstrate basic organization / writing skills.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Fail to understand concepts and show minimal competence in problem solving. Demonstrate poor organization and writing skills.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	student-centered learning	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4

Required/recommended reading and online materials	Hotchkiss J.H. & Porter N.N. Food Science. Chapman & Hall, 1995 Fenema O.R. Food Chemistry. Marcel Dekker, 1996 Brown A. Understanding Food : Principles and Preparation. Wadsworth, Cengage Learning, 2011 Whitney E. & Rolfes S.R. Understanding Nutrition. Wadsworth, Cengage Learning, 2011
Course Website	http://moodle.hku.hk/

BIOL1309 Evolutionary diversity (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	105
Course Co-ordinator	Prof R M K Saunders, Biological Sciences *(saunders@hku.hk)*		
Teachers Involved	Prof R M K Saunders, Biological Sciences Prof Y Sadovy, Biological Sciences Dr M Yasuhara, Biological Sciences TCB, Biological Sciences		
Course Objectives	To provide students with an introduction to the diversity of plant and animal life. Recent research has resulted in fundamental changes in our understanding of evolutionary history (phylogeny). Current evolutionary trees will be used as the basis for a survey of different groups in phylogenetic sequence, and for understanding how structures, processes and behaviours have changed through time.		
Course Contents & Topics	Introduction to the methodology for reconstructing the sequence of past evolutionary events (cladistics); algae (Rhodophyta, Phaeophyta and Chlorophyta); non-vascular plants (Hepatophyta, Anthocerophyta and Bryophyta); seedless vascular plants (Lycophyta, Psilophyta, Sphenophyta and Pterophyta); seed plants		

	(Cycadophyta, Ginkgophyta, Coniferophyta, Gnetophyta and Anthophyta); invertebrates (Cnidaria, Platyhelminthes, Annelida, Mollusca, Nematoda, Arthropoda and Echinodermata); fish (Chondrichthyes and Actinopterygii); amphibians (Batrachomorpha); reptiles (Anapsida, Lepidosauromorpha and Archosauromorpha); and mammals (Monotremata, Metatheria and Eutheria).
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 interpret phylogenies in order to understand the relatedness of taxonomic groups and the pattern of evolutionary changes in structures, processes and behaviours CLO 2 describe the characteristics of different evolutionary lineages of plants and animals and recall the names of the main taxonomic groups CLO 3 explain the possible selective advantages of the highlighted structures, processes and behaviours
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining most or all of the course learning outcomes, with extensive use of named examples. Show evidence of significant critical abilities and logical thinking. Apply highly effective presentation skills. **B** Demonstrate substantial command of knowledge required for attaining most of the course learning outcomes, with some use of named examples. Show evidence of critical abilities and logical thinking. Apply effective presentation skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes, with only limited use of named examples. Show evidence of some critical abilities and logical thinking. Apply moderately effective presentation skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes, with insufficient use of named examples. Show evidence of limited critical abilities and logical thinking. Apply limited presentation skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes, without use of named examples. Show little or no evidence of critical abilities and logical thinking. Presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports		30	CLO 1,2,3

Required/recommended reading and online materials	P. H. Raven, R. F. Evert & S. E. Eichhorn: Biology of Plants (Freeman & Worth, New York, 2005, 7th ed.) E. E. Ruppert & R. D. Barnes: Invertebrate Zoology (Saunders, 2003, 7th ed.) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL1501 Bioethics (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof F C C Leung, Biological Sciences *(fcleung@hku.hk)*		
Teachers Involved	Prof F C C Leung, Biological Sciences		
Course Objectives	The aim is to explore the ethical implications of the latest major advances in biology and medicine.		
Course Contents & Topics	The course will discuss research ethic between student and mentor, and ethical implications in recent major advancements in biological and medical sciences. Major areas to be discussed include but are not limited to: genetics, reproduction, disease diagnosis and therapy, development, transplantation, aging, dying, environment, and the use of animals in research. Ethical and moral principles and implications for social framework and public policy raised by these advances will be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 familiarize with the current ethical theories, discussions, and arguments taking place in the field of bioethics specifically related to the advancement of modern molecular biology and genomics CLO 2 reflect upon and formulate in a professional manner their own opinions on these matters as well as to understand and enter into a respectful dialogue with those who possess another point of view CLO 3 understand the basis of one's own position, as well as the basis of another person's opinion CLO 4 deal with the quandaries that arise when facing modern medical technology and advancements		

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use communication skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective individual as well as collaborative-based organizational and presentational skills.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective individual as well as collaborative-based organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately individual as well as collaborative-based organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate individual as well as collaborative-based organizational and presentational skills of limited effectiveness.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness individual as well as collaborative-based organizational and presentational skills.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Assessment		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	continuous assessment of essays, presentation and debate exercises	60	CLO 1,2,3,4
Examination		40	CLO 1,2,3,4

Required/recommended reading and online materials	NIL Library & web-based reading materials
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL1502 The gene (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Prof F C C Leung, Biological Sciences *(fcleung@hku.hk)*		
Teachers Involved	Prof F C C Leung, Biological Sciences		
Course Objectives	The objective is to expose students to the impacts of genes to the society. Recent completion of the human genome and many agricultural crops and animals genomes, it brings not only promises of a better quality of life as well as lots of technical and ethical issues/challenges that general public need to deal with. The goal of this course is to open up students from all backgrounds to this basic unit of inheritance called the gene and its impact on various scientific and social disciplines.		
Course Contents & Topics	Content/topics include: Introduction and review of basic cell biology Basic genetic - The gene Basic Molecular Biology and Biotechnology - Recombinant DNA and cloning Bacterial Genes - Gene and Environment Human Genes/Human genome - history and its Impacts! Human Genome - The Amazing discovery! Genes and Biotechnology Genes and Disease Genes and Cancer Animal and Plant Cloning Genes and Agricultural/Food Biotechnology Genes and Human Behavior		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	demonstrate understanding and to explain the principle of inheritance, recombinant DNA and cloning

	CLO 2	gain deep understanding about the advancement of biotechnology
	CLO 3	determine and explain the benefits and shortcomings of the application of biotechnology knowledge

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL Not for students with level 3 or above in HKDSE Biology or Combined Science with Biology component or equivalent.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use communication skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective individual as well as collaborative-based organizational and presentational skills.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective individual as well as collaborative-based organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately individual as well as collaborative-based organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate individual as well as collaborative-based organizational and presentational skills of limited effectiveness.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use communication skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness individual as well as collaborative-based organizational and presentational skills.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study	including 45 hours on 15 essay/report writing, 30 presentation (include preparation)	93

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	discussion forum	35	CLO 1,2,3
Essay	essays & written reports	25	CLO 1,2,3
Presentation	poster & oral presentation	30	CLO 1,2,3
Test	in-class participation & quizzes	10	CLO 1,2,3

Required/recommended reading and online materials	Library & web-based reading materials
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL2102 Biostatistics (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	135
Course Co-ordinator	Dr G Panagiotou, Biological Sciences *(gipa@hku.hk)*		
Teachers Involved	Dr G Panagiotou, Biological Sciences		
Course Objectives	The purpose of this course is to familiarise students with probability and statistics. The course will give to students the skills to read, interpret, and critically evaluate the statistics used in medical and bioinformatic studies. The course will also introduce the students to the fundamental principles and planning techniques to be able to analyze their own data, choose the correct statistical test and avoid common statistical pitfalls.		
Course Contents & Topics	Introduction to Statistics; Describing, Exploring and Comparing Data; Probability; Probability Distributions; Normal Probability Distribution; Relations between Distributions; Interval estimation; Hypothesis Testing; Correlation and Regression; Statistical tests; Non-Parametric Inference.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	formulate biological questions into statistical questions
CLO 2	design experiments effectively
CLO 3	make quantitative estimation of biologically meaningful parameters

	CLO 4	use R to carry out some of the statistical computations
	CLO 5	understand the assumptions of commonly used statistical methods
	CLO 6	use Virtual Laboratories for Next Generation Sequencing experiments
	CLO 7	evaluate critically the medical literature
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells or BIOL2306 Ecology and evolution or ENVS1301 Environmental life science or ENVS2002 Environmental data analysis	
Offer in 2015 - 2016	Y 2nd sem	**Examination** May
Offer in 2016 - 2017	Y	
Course Grade	A+ to F	

Grade Descriptors

A	Demonstrate thorough grasp of the subject and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective computational skills and techniques for basic statistical analyses. Be able to critically use data and statistical results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject and skills required for attaining at least most of the course learning outcomes. Present evidence of analytical and critical abilities and logical thinking. Apply effective computational skills and techniques for basic statistical analyses. Be able to correctly use data and statistical results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some analytical and critical abilities and logical thinking. Apply moderately effective computational skills and techniques for basic statistical analyses. Demonstrate mostly correct but some erroneous use of data and statistical results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial and limited grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective computational skills and techniques for basic statistical analyses. Demonstrate limited ability to use data and statistical results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate evidence of little or no grasp of the subject and skills required for attaining any of the course learning outcomes. Present evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective computational skills and techniques for basic statistical analyses. Demonstrate misuse of data and statistical results and/or unable to draw appropriate conclusions. Apply minimally effective or ineffective organizational and presentational skills.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	including projects	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2,3,4,5,6,7
Examination		50	CLO 1,3,5,7

Required/recommended reading and online materials	Zar, J. H.: Biostatistical Analysis (Prentice-Hall / Englewood Cliffs, N.J., 1999, 4th edition)
Course Website	http://moodle.hku.hk/

BIOL2103 Biological sciences laboratory course (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	215
Course Co-ordinator	Dr W Y Lui, Biological Sciences *(wylui@hku.hk)*		
Teachers Involved	Dr W Y Lui, Biological Sciences Prof B K C Chow, Biological Sciences Dr A Yan, Biological Sciences		
Course Objectives	The objective is to provide students a comprehensive training in basic laboratory techniques used in modern biological studies. The course will cover a number of techniques used by molecular biologists and microbiologists to conduct scientific research.		
Course Contents & Topics	This course will be divided into three modules and each module will have 3 laboratory sessions. Module one: Nucleic acid analysis DNA & RNA isolation, spectrometry, gel electrophoresis, restriction enzyme analysis and DNA sequence analysis. Module two: Protein analysis Centrifugation, chromatography and SDS-PAGE electrophoresis. Module three: Microbiology Microscopy, observation of microorganisms and staining of bacteria, isolation of pure cultures by streaking and serial dilution, enumeration of microbial cells by Petroff-Hausser counting chamber, and turbidity. Identification and classification of microbes from natural source and statistical analysis.		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge in proper use of simple research equipment CLO 2 demonstrate knowledge and understanding of how and why certain techniques are used in a research setting CLO 3 master some basic laboratory techniques for carrying out experiments CLO 4 understand the different ways that microorganisms were categorized according to their size, shape, colour and response to dye etc. and how they were counted
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL1110 From molecules to cells
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Laboratory and workshop course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Course Website	http://moodle.hku.hk/
Additional Course Information	Quota 80 - 1st Semester Lab A on Wed. with 40 students and Lab. B on Thurs. with 40 students Quota 135 - 2nd Semester Lab C on Wed. with 25 students; Lab. D on Thurs. with 65 students and Lab. E on Fri. with 45 students

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Laboratory	11 laboratory sessions (4 hours each)	44
Tutorials	lecture/tutorials	18
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Laboratory reports	plus lab performance	60	CLO 1,2,3,4
Test	1 hour final examination	40	CLO 1,2

BIOL2220 Principles of biochemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	100
Course Co-ordinator	Dr C S C Lo, Biological Sciences *(clivelo@hku.hk)*		
Teachers Involved	Dr C S C Lo, Biological Sciences		
Course Objectives	This course is designed to provide undergraduate (non-biochemistry major) an overview of fundamental concepts in biochemistry as well as hands-on experience in biochemical techniques.		
Course Contents & Topics	An introduction to various biomolecules in terms of their structures, functions, syntheses and metabolisms, with emphasis on amino acids, proteins, enzymes, carbohydrates, lipids and nucleic acids. The correlations between their biochemical properties and their roles in various life processes will be illustrated.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe the key structural features of carbohydrates, proteins, lipids and nucleotides CLO 2 understand the basic enzyme kinetic properties CLO 3 explain how the common sugars, fatty acids and amino acids are metabolized and synthesized in living cells		

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL1110 From molecules to cells; and Not for students who have passed in BIOC2600 Basic biochemistry or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Integration of the full range of appropriate theories, principles, evidence and techniques
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. General integration of theories, principles, evidence and techniques
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Some partial integration of theories, principles, evidence and techniques
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited integration of theories, principles, evidence and techniques
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Little or no or inapt integration of theories, principles, evidence and techniques

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	3 laboratory sessions	24
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		60	CLO 1,2,3
Laboratory reports		10	CLO 1,2,3
Test		30	CLO 1,2,3

Required/recommended reading and online materials	L.A. Moran, H.R. Horton, K.G. Scrimgeour, M.D. Perry: Principles of Biochemistry 5th edition (Pearson International Edition)
Course Website	http://moodle.hku.hk/

BIOL2306 Ecology and evolution (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Prof D Dudgeon, Biological Sciences *(ddudgeon@hku.hk)*		
Teachers Involved	Prof D Dudgeon, Biological Sciences Prof G A Williams (Field course component only), Biological Sciences		
Course Objectives	The interaction between organisms and their environment is addressed using an issue-based approach in order to explains how the ecology of plants and animals has been shaped by evolution through interactions with their living and non-living environment. The course also demonstrates how we can understand and explain the significance of what we see in nature using scientific methods. A field course component provides the opportunity to investigate how the environment influences community composition, biodiversity and adaptive radiation in a variety of habitats.		
Course Contents & Topics	The environment influences organisms profoundly. It affects their present-day ecology (determining where they live and how many can survive there) and, through natural selection acting over past generations, influences their form and adaptations. Present day human-induced changes to the environment are also responsible for endangering species and degrading their habitats. This introductory course introduces some basic scientific principles of ecology and evolution, showing how they are linked to the environment by physiological tolerances and evolutionary adaptation which, in turn, lead to specialization and generate biodiversity. Individuals and their interactions will be a major focus of the course together with discussion of population dynamics, community structuring, life histories, and niche dynamics. The principles of ecology and evolution resulting from interaction with the environment will also be demonstrated by describing the origins of modern humans, including our fossil record and relationship to other primates, and the main ecological transformations caused by humans and their environmental impacts. The course will conclude with an account of the importance of biodiversity, and the factors that threaten it globally. Lectures are complemented by a 5-day residential field course during the Reading Week when students visit a variety of Hong Kong habitats to study their biodiversity, community composition and the relationship between organisms and their environment		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand how scientific methods (hypotheses, experiments, comparisons) are used to investigate ecological and evolutionary processes

CLO 2	understand the basic mechanism of natural selection, and how interactions with the environment lead to adaptation and generate biodiversity
CLO 3	understand that ecology and behaviour can be interpreted in the light of selective pressures from the environment upon individual organisms
CLO 4	understand the ecological factors influencing evolution, using the human evolutionary tree as an example
CLO 5	understand the community ecology and biodiversity of selected Hong Kong habitats, and typical adaptations of organisms found there

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL1309 Evolutionary diversity or BIOL1110 From molecules to cells or ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of complete or near-complete understanding and a thorough grasp of the subject as demonstrated by attainment of all learning outcomes, and excellent use of named (organism) examples, including local species and habitats. Show excellent organizational, presentational and/or analytical skills and fieldwork techniques. Excellent or outstanding (for A+) work relative to what is required at degree level.
B	Evidence of substantial understanding and a good grasp of the subject as demonstrated by attainment of the majority of learning outcomes, and use of named (organism) examples, including local species and habitats. Show good organizational, presentational and/or analytical skills and fieldwork techniques. Work more than sufficient for what is required at degree level.
C	Evidence of general understanding with an adequate (but incomplete) grasp of the subject, as demonstrated by general but incomplete attainment of most of the learning outcomes, with limited use of named (organism) examples. Show fair organizational, analytical, presentational and/or analytical skills and fieldwork techniques. Work sufficient for what is required for degree level.
D	Evidence of retention of a minimum of relevant information and incomplete understanding of the subject (i.e. knowledge is very incomplete), as demonstrated by partial but limited attainment of learning outcomes. Insufficient familiarity with fieldwork techniques, habitats or organisms. Work merely (for D+) or barely (D) adequate for what is required at degree level.
Fail	Evidence of poor or inadequate knowledge and understanding of the subject such that the majority of learning outcomes cannot be attained. Little or no evidence of familiarity with fieldwork techniques, habitats or organisms. Work fails to reach degree level.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	24 hours lectures, plus 10 hours of lectures during residential field course	34
Laboratory	at least 36 hours field and laboratory work, as groups and individuals	36
Reading / Self study	during the semester in the form of internet tutorials, assigned reading and a laboratory workshop	80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 5
Examination		70	CLO 1,2,3,4

Required/recommended reading and online materials	Boyd, R. & Silk, J.B. (1997) How Humans Evolved (4th Edition). Norton, NY. (5th Edition e-book available in HKU library.) Stiling, P. (2002) Ecology: Theories and Applications (4th Edition). Prentice Hall, Singapore. An up-to-date list of references to the primary scientific literature, background reading and/or internet resources relevant to each lecture will be provided on the course website.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	A compulsory 5-day residential field component during the reading week. Details of the location and cost of the residential field course, which will be held in the Reading week of semester 1, will be made available at the start of the semester. Cost per head in 2015-2016 was $820 (not refundable).

BIOL3105 Animal physiology and environmental adaptation (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof A O L Wong, Biological Sciences *(olwong@hku.hk)*		
Teachers Involved	Prof A O L Wong, Biological Sciences Prof A S T Wong, Biological Sciences Dr W Y Lui, Biological Sciences		
Course Objectives			

	The course covers the major aspects of animal physiology for environmental adaptation in terrestrial & aquatic habitats. Stress will be given to the functional interactions between animals and the environment, especially on the mechanisms by which animals obtain resources for survival from the environment, detect environmental changes via sensory structures, and respond to adversities in the environment by altering their body forms & functions.
Course Contents & Topics	Basic concepts of animal adaptation to environmental changes/extreme environment; Modification of energy metabolism according to oxygen availability; Different models of gaseous exchange for aquatic, inter-tidal, and terrestrial habitats; Cross-adaptation to different environment: air-breathing fish vs diving adaptations in mammals; Visual signals & differential levels of photoreception from protozoa to mammals; Background adaptation: functions & mechanisms for color presentation; Sound wave as environmental signals: functions & mechanisms of detection in aquatic & terrestrial habitats; Echo sounding in bats for navigation without visual signals; Behavioral, morphological & physiological adaptations in hostile environment: extreme hot vs freezing cold; salinity changes in aquatic habitats & water availability in terrestrial habitats on osmoregulation, water balance & nitrogenous metabolism.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: have a broad understanding on functional interactions between animals and their environment CLO 2: appreciate the role of the environment in shaping the evolution of animal structures & functions CLO 3: comprehend a wide range of physiological adaptations (both structurally & functionally) in coping with environmental stress and environmental changes
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOL2102 Biostatistics or BIOL2306 Ecology and evolution
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts. **B**: Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts. **C**: Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding. **D**: Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level. **Fail**: Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		75	CLO 1,2,3
Test	test & continual assessment	25	CLO 1,2,3

Required/recommended reading and online materials	(1) E. N. Marieb (2012) Essentials of Human Anatomy & Physiology. Benjamin Cummings. (2) C. L. Stanfield (2011) Principles of Human Physiology, Benjamin Cummings. (3) R. W. Hill, G. A. Wyse & M. Anderson (2008) Animal Physiology, Sinauer Associate, Inc., Sunderland (4) C. D. Myoyes & P. M. Schulte (2008) Principles of Animal Physiology. Benjamin Cummings.
Course Website	http://moodle.hku.hk/
Additional Course Information	Refer to the Website of School of Biological Sciences. This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3107 Plant physiology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr W K Yip, Biological Sciences *(wkyip@hku.hk)*		
Teachers Involved	Dr W K Yip, Biological Sciences		
Course Objectives			

	To give an understanding of plant processes such as plant growth and development and their regulatory mechanisms.
Course Contents & Topics	Discovery, assay, chemical nature, mechanism, structure-activity relationships, physiological effects, and signal transduction of plant hormones. Hormonal transport. Selected topics on plant growth and development including photo-morphogenesis, seed germination, dormancy, apical dominance, fruit ripening, leaf abscission, and plant defense.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — understand the study of plant biology using mutants in model plant Arabidopsis CLO 2 — understand biotechnological opportunities by manipulating plant gene expression CLO 3 — understand the regulation of plant growth and development by various plant hormones
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** In written examination: Exceptionally good organization and presentation, the discussion would be very clearly written and show evidence of originality. In practical sessions: excellent insight in to the practical aims; submit good reports. **B** In written examination: coherent organization and clear presentation, the discussion would be a complete and critical response to questions. In practical sessions: full understanding of the practical aims; submit accurate reports. **C** In written examination and practical sessions: Good in parts, but important points omitted. Might also have defects in presentation or be not very well written. Reasonably competent, but might show misunderstanding of the material: significant inaccuracies or errors. **D** In written examination and practical sessions: Some knowledge of the material is evident, but there are serious deficiencies in understanding, organization, clarity or accuracy. Write-ups that are unduly brief would fall into this category. **Fail** In written examination and practical sessions: Poor knowledge and understanding of the subject, a lack of coherent and organization, and answers are largely irrelevant.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		75	CLO 1,2,3
Laboratory reports		25	CLO 3

Required/recommended reading and online materials	P. J. Davis: Plant Hormones: Physiology, Biochemistry and Molecular Biology (Martinus Nijhoff Publishers, 1995, 2nd ed.) Lecturing materials and journal articles will be posted on WebCT
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3108 Microbial physiology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr A Yan, Biological Sciences *(ayan8@hku.hk)*		
Teachers Involved	Dr A Yan, Biological Sciences		
Course Objectives	Microbes are amazing and important entities on earth. Knowledge of microbes is widely applied in food, pharmaceutics, biotechnologies, diseases control, and biogeochemical processes. Microbial Physiology provides molecular basis for understanding of these important processes and applications, and to serve as essential foundations for sub-disciplines of Microbiology, such as environmental, industrial, and medicinal Microbiology. Upon completion, students will acquire fundamental knowledge and methodologies for microbial studies and be able to relate knowledge to various microbial applications.		
Course Contents & Topics	Serving as a fundamental course for the understanding of the world of microorganisms, Microbial Physiology is organized and presented in three themes: 'Microbial Rules', 'Microbial Breath', and 'Microbial Adaption'. Under these three themes, a broad range of highly educational and interesting topics are presented including: 'Microorganisms and their position in the living world', 'Fundamental methodologies for the study of microbes', 'Microbial structures and functions', 'Microbial growth and control', 'Energy Generation', 'Central metabolism', and 'Regulation and control of metabolic Activities'. Topics are taught in a coherent manner with a highly interactive tutorial session following each of the topics such that students will achieve a high quality, stimulating, and problem-based learning experiences.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	appreciate the diversity of microbial metabolisms and the strategies for their adaptive responses
	CLO 2	comprehend the principles underlying the dynamic nature of microbial physiology
	CLO 3	relate knowledge to practical application of microbes in industry and medicine
	CLO 4	develop abilities to read and assess scientific literature in microbiology area

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills.
C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills.
D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills.
Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Project work		2
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination		50	CLO 1,2,3
Test	mid-term	30	CLO 1,2,3

Required/recommended reading and online materials	Primary Text Book: Prescott, Harley, and Klein's Microbiology, by Joanne M. Willey, Linda M. Sherwood, and Christopher J. Woolverton, published by McGraw-Hill Supplementary Reading: On-line textbook of Bacteriology: Kenneth Tobar, U. of Wisconsin-Madison, Department of Bacteriology. URL (http://www.textbookofbacteriology.net/)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3109 Environmental microbiology (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr J D Gu, Biological Sciences *(jdgu@hku.hk)*		
Teachers Involved	Dr J D Gu, Biological Sciences		
Course Objectives	To familarize students with the role of various microorganisms in natural process which affect our environment, such as cycling of chemical elements, interactions with plants and animals, and the way in which they carry out biodegradation of environmentally important pollutants. Selective groups of microorganism will be examined in detail for their biochemical processes. Key concepts are illustrated with known examples and cases		
Course Contents & Topics	1. Advanced aspects of microbial diversity, ecology and growth 2. Contribution of microbial metabolism to biogeochemical processes important in cycling of nutrients 3. Microbial interactions with plants and animals 4. Microbial metabolism of organic compounds, metals and man-made polymers 5. Training in laboratory and field microbiological research technique		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	understand a range of microorganisms in the environment in terms of their roles and function as well as biochemical capability and host range
	CLO 2	know the specific biochemical processes, enzymes involved and reactions carried by selective microorganisms and their distribution in the environment

	CLO 3 apply the appropriate techniques in environmental and microbial research		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject matter. Show very strong analytical and critical abilities and high logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	General but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Field work		2
Project work		2
Tutorials		4
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3
Examination		50	CLO 1,2,3
Laboratory reports		25	CLO 1,2,3
Presentation	including report	10	CLO 1,2,3
Test		5	CLO 1,2,3

Required/recommended reading and online materials

M.T. Madigan, J. M. Martinko, P.V. Dunlap and D.P. Clark: Brock Biology of Microorganisms (Pearson/Benjamin Cummings, 2009, 12th ed.)
R.M. Atlas and R. Bartha: Microbial Ecology: Fundamentals and Applications (Benjamin Cummings, 1998, 4th ed.)
References
Molecular Biology of the Cell - Fifth Edition by Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (December 2007)
R. Mitchell and J.-D. Gu: Environmental Microbiology (Wiley-Blackwell, 2009, 2nd ed.)

Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3110 Environmental toxicology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Dr J D Gu, Biological Sciences *(jdgu@hku.hk)*		
Teachers Involved	Dr J D Gu, Biological Sciences Prof R S S Wu, Biological Sciences		
Course Objectives	To introduce students to the basic principles of environmental and ecological toxicology by analysis of the fate of pollutants in lithosphere, hydrosphere, atmosphere and biosphere. Mechanisms of toxicity as dose-response will be analyzed through adsorption, metabolism, toxicity and elimination. Major metabolic processes and enzymes involved will be highlighted. Specific cases of toxicity will be presented and discussed.		
Course Contents & Topics			

	1. Environmental chemistry of pollutants and their toxicity and factors governing toxic effects, bioaccumulation and biomagnification 2. Partitioning and transformation of environmental pollutants 3. Quantitative toxicology using dose-response approaches 4. Emerging endocrine-disrupting chemicals and carcinogens at molecular levels 5. Elimination of pollutants from the environments 6. Laboratory testing of toxicity and review various adsorption isotherm models
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand fate and distribution of chemicals in various compartments of the ecosystem CLO 2 understand toxicity through adsorption, metabolism, elimination and target site and quantitative analysis CLO 3 understand mechanism of toxicity from specific pollutants of choice CLO 4 understand specific biochemical processes and enzymes involved in pollutants transformation and mineralization CLO 5 understand appropriate techniques in environmental cleaning up
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or ENVS3042 Pollution or CHEM3141 Environmental chemistry
Offer in 2015 - 2016	Y 1st sem; **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject matter. Show very strong analytical and critical abilities and high logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B** Substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C** General but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D** Partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail** Little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	laboratory, assignment; and seminar	36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		60	CLO 1,2,3,4,5
Laboratory reports	student-based assessment includes laboratory report, assignment, presentations or other forms	40	CLO 1,2,3,4,5

Required/recommended reading and online materials	D.G. Crosby: Environmental Toxicology and Chemistry (Oxford, 1998) W. Stumm, J.J. Morgan: Aquatic Chemistry: Chemical Equlibria and Rates in Natural Waters (Wiley, 1995, 3rd ed.) R. Mitchell and J.-D. Gu: Environmental Microbiology (Wiley-Blackwell, 2009, 2nd ed.)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3201 Food chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Dr J C Y Lee, Biological Sciences *(jettylee@hku.hk)*		
Teachers Involved	Dr J C Y Lee, Biological Sciences		

Course Objectives	To provide a basic understanding of chemistry in food systems, and to provide practical training in chemistry related to food science and nutrition.
Course Contents & Topics	The course will cover the components of food, including water, proteins, carbohydrates and lipids, and minor components such as enzymes, vitamins, minerals, colorants, flavorants and additives. The physical and chemical properties of these important constituents of foods are covered in detail, and form the basis for understanding the reactions which occur during the production, processing, storage and handling of foods, and in understanding the methods used in analyzing foods. A series of laboratory sessions will cover analysis of food components, protein chemistry, lipid oxidation, properties of sugars and starches, enzymatic and non-enzymatic browning reactions, and sensory analysis of foods.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the functions and properties of major and minor food components CLO 2 understand the basic chemistry behind food processing CLO 3 have integrated their knowledge of biological and chemical principles into a food science and nutrition context
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry
Offer in 2015 - 2016	Y 2nd sem; **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show extensive knowledge and understanding of the topics covered and can readily apply this knowledge. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial grasp of the subject matter covered. Show thorough knowledge and understanding of the content and a high level of competence in the topics covered and able to apply this knowledge and skills to most situations. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions.
C	Demonstrate general but incomplete grasp of the subject matter covered. The student has a sound knowledge and understanding of the main areas of content and has achieved an adequate level of competence in the topics covered. Use lab skills and techniques and analysis of data and results to draw moderately appropriate conclusions.
D	Demonstrate partial but limited grasp, with retention of some relevant information of the subject matter covered. Show a basic knowledge and understanding of the content and has achieved a limited level of competence in the topics covered. Use lab skills and techniques and analysis of data and results to draw appropriate conclusions occasionally.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show elementary knowledge and understanding in few areas of the content and has achieved very limited competence in some of the topics covered. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3
Examination		50	CLO 1,2,3
Test		20	CLO 1,2,3

Required/recommended reading and online materials	Fennema OR, Food Chemistry (Marcel Dekker 4th Ed, 2008) Belitz HD, Grosch W, Schieberle, P, Food Chemistry (Springer 4th Ed, 2009)
Course Website	http://moodle.hku.hk/

BIOL3202 Nutritional biochemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	100
Course Co-ordinator	Dr E T S Li, Biological Sciences *(etsli@hku.hk)*		
Teachers Involved	Dr E T S Li, Biological Sciences		
Course Objectives	To introduce the fundamental concepts of nutrition through an integrated approach in discussing the interactions between diet and intermediary metabolism.		
Course Contents & Topics	Essential nutrients and their requirements. Energy balance and caloric value of foods. Metabolic control of macronutrient utilization. Nutritional impacts of hexoses, long chain polyunsaturated fatty acids and amino acids. Dietary recommendations.		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 understand the concept of nutrient requirements CLO 2 explain how different organs coordinate to achieve metabolic control of glucose homeostasis CLO 3 understand the metabolic pathways of various polyunsaturated fatty acids CLO 4 understand the theoretical constructs of nitrogen requirement and the importance of the urea cycle CLO 5 assess the impacts of dietary inadequacy
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry or MEDE2301 Life science I
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject matter covered. Show exceptional ability on knowledge integration, problem identification and solving. Show outstanding ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate highly effective organization / writing skills. **B** Demonstrate substantial grasp of the subject matter covered. Show full ability on knowledge integration, problem identification and solving. Show reasonable ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate effective organization / writing skills. **C** Demonstrate general but incomplete grasp of the subject matter covered. Might show misunderstanding of the materials. Show some ability on knowledge integration, problem identification and solving. Show some ability to analyze and interpret scientific data and draw proper conclusions. Demonstrate adequate organization / writing skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Misunderstanding of the materials is not uncommon. Show limited ability on knowledge integration, problem identification and solving. Use elementary approaches to analyze and interpret scientific data and draw sometimes erroneous conclusions. Demonstrate basic organization / writing skills. **Fail** Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in problem solving. Fail to integrate information and identify problems. Seriously deficient in ability to analyze and interpret scientific data and draw conclusions. Demonstrate poor organization / writing skills.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/guided studies	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 2,3,4,5
Examination		70	CLO 1,2,3,4,5
Test		15	CLO 1,2,3,4

Required/recommended reading and online materials	Frayn K.N. Metabolic regulation: A Human Perspective. Wiley-Blackwell, 2010 Champe P.C., Harvey R.A. & Ferrier D.R. Lippincott's Illustrated Reviews: Biochemistry. Lippincott, 2008 Gibney M.J., Macdonald I.A. & Roche H.M. Nutrition & Metabolism. Blackwell Science, 2003
Course Website	http://moodle.hku.hk/

BIOL3203 Food microbiology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Dr H S El-Nezami, Biological Sciences *(elnezami@hku.hk)*		
Teachers Involved	Dr H S El-Nezami, Biological Sciences		
Course Objectives	This course provides the key concepts and principles of food microbiology with special emphasis on the interaction between microorganisms and food., microbial food spoilage and foodborne diseases will be discussed in detail.		
Course Contents & Topics	Detection and enumeration of microbes in foods, Factors that influence microbes in foods, Spores and their significance, Physical methods of food preservation, Chemical preservation and natural antimicrobials, Foodborne pathogens.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe methods for evaluating microorganisms and their products in foods CLO 2 demonstrate an understanding of the causes of food spoilage, and predict response of a microorganism that can spoil a given food CLO 3 develop and implement appropriate measures to control the spoilage and pathogenic microorganisms in a food CLO 4 demonstrate the ability to work in a team to investigate and solve problems in food microbiology		

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills. **B** Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness. **Fail** Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	seminars & continuous assessment	40	CLO 2,4
Examination		40	CLO 1,2
Laboratory reports		20	CLO 1,3

Required/recommended reading and online materials	Food Microbiology: An Introduction, 2005, Thomas J. Montville and Karl Matthews, American Society for Microbiology (ASM) Press, Washington, DC Food Microbiology: Fundamentals and Frontiers, 2007, Edited by Michael P. Doyle, Larry R. Beuchat, and Thomas J. Montville, 3rd edition, American Society for Microbiology (ASM) Press, Washington, DC
Course Website	http://moodle.hku.hk/

BIOL3204 Nutrition and the life cycle (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	70
Course Co-ordinator	Dr E T S Li, Biological Sciences *(etsli@hku.hk)*		
Teachers Involved	Dr E T S Li, Biological Sciences		
Course Objectives	Nutritional needs vary throughout different stages of the life cycle. This course aims to cover the functional roles of essential nutrients and highlight the nutritional concerns during specific times of growth, development, and aging.		
Course Contents & Topics	Teaching and learning will take place through an evidence-based approach and will be organized around key issues: vitamin and mineral needs and their metabolism; physiological and psychological determinants that influence nutrient requirements at different stages of the human life cycle; socio-economic factors that influence dietary habit and nutritional status.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 have fundamental knowledge of essential micronutrient metabolism CLO 2 be able to critically assess and identify the specific needs at different stages of the life cycle CLO 3 relate the concept of requirement to physiological needs CLO 4 understand the impact of socio-cultural factors on nutritional status		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3202 Nutritional biochemistry		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		

Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject matter covered. Show exceptional ability on knowledge integration, problem identification and solving. Show outstanding ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate highly effective team-based organization and presentation skills. **B** Demonstrate substantial grasp of the subject matter covered. Show full ability on knowledge integration, problem identification and solving. Show reasonable ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate effective team-based organization and presentation skills. **C** Demonstrate general but incomplete grasp of the subject matter covered. Might show misunderstanding of the materials. Show some ability on knowledge integration, problem identification and solving. Show some ability to analyze and interpret scientific data and draw proper conclusions. Demonstrate adequately effective team-based organization and presentation skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Misunderstanding of the materials is not uncommon. Show limited ability on knowledge integration, problem identification and solving. Use elementary approaches to analyze and interpret scientific data and draw sometimes erroneous conclusions. Demonstrate team-based organization and presentation skills of limited effectiveness. **Fail** Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in problem solving. Fail to integrate information and identify problems. Seriously deficient in ability to analyze and interpret scientific data and draw conclusions. Demonstrate poor organization and presentation skills.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see table below

Activities	Details	No. of Hours
Lectures		36
Tutorials	student-centered learning	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3
Essay		20	CLO 2,3,4
Examination		60	CLO 1,2,3,4

Required/recommended reading and online materials	Brown J.E. Nutrition Through the Life Cycle. Thomson, 2011 Edelstein S. & Sharlin J. Life Cycle Nutrition: An Evidence-based Approach. Jones & Bartlett Publishers, 2009 Gropper S.S., Smith J.L.. & Groff J.L. Advanced Nutrition and Human Metabolism (Wadsworth, 2009) L. Kathleen Mahan & Sylvia Escott-Stump: Krause's Food, Nutrition, & Diet Therapy (Saunders, 2004, 11th edition)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3205 Human physiology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	120
Course Co-ordinator	Dr W Y Lui, Biological Sciences *(wylui@hku.hk)*		
Teachers Involved	Dr W Y Lui, Biological Sciences Prof F C C Leung, Biological Sciences Prof A O L Wong, Biological Sciences Dr E T S Li, Biological Sciences		
Course Objectives	The course covers major aspects of the physiology of the human body using an integrated approach. After completing this course, students will have acquired fundamental principles of how the body works. Students interested in nutrition and human biology will find this course most useful.		
Course Contents & Topics	Overview of the physiological systems and homeostasis; Neural and hormonal communication; Nervous system physiology; The digestive system; Cardiac physiology, the blood vessels and blood pressure; The respiratory system; The urinary system; The skeletal & muscular system; Sensory mechanisms; Biological rhythms; Central-peripheral communication in energy homeostasis.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 comprehend the essence of how the body meets changing conditions while maintaining a relatively constant internal environment CLO 2 understand the functions of various body systems CLO 3 explain normal body functions through integration of basic physiologic concepts		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought,		

		and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills.
	B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills.
	C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills.
	D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills.
	Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Test		30	CLO 1,2,3

Required/recommended reading and online materials	Silverthorn D. U.: Human Physiology: An integrated Approach (Pearson, 2008) Sherwood L.: Human Physiology: From Cells to Systems (Thomson, 2007) Johnson M. D.: Human Biology (Pearson, 2006) Siegel G. J. et al.: Basic Neurochemistry (Academic Press, 2006) Mulroney S.E. & Myers A.K. Netter's Essential Physiology (Saunders, 2009)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3206 Clinical nutrition (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	70
Course Co-ordinator	Dr J M F Wan, Biological Sciences *(jmfwan@hku.hk)*		
Teachers Involved	Dr J M F Wan, Biological Sciences		
Course Objectives	This course aims to provide understanding and insight into diseases associated with diet and basic dietetics, specifically to: 1. Explain the relationships between diet and disease. 2. Describe the role of diet in the development and prevention of common chronic diseases such as diabetes, obesity and anorexia, cardiovascular disease, cancer, immune deficiency and renal failure. 3. Differentiate risk factors that influence dietary choice. 4. Describe the rationales for postoperative nutritional support for hospitalized patients.		
Course Contents & Topics	The basics of nutrition for health and fitness and medical nutrition therapy. The role of diet in the development and prevention of chronic diseases such as cancer, diabetes, obesity and anorexia as well as bulimia nervosa, cardiovascular diseases, renal failure, etc. Malnutrition. Nutrition and immune function. Medical nutrition therapy for food allergy and food intolerance. Nutrition in pregnancy and lactation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	discuss the different relationships between diet and disease
CLO 2	describe the role of diet in the development and prevention of diabetes, obesity and anorexia, cardiovascular disease, cancer, immune deficiency, and renal failure
CLO 3	clearly differentiate and interpret risk factors that influence dietary choice
CLO 4	describe the rationales for postoperative nutritional support for hospitalized patients

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3202 Nutritional biochemistry or BIOL3203 Food microbiology or BIOL3204 Nutrition and the life cycle or BIOL3205 Human physiology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective laboratory/fieldwork skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and

		logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective laboratory /fieldwork skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective laboratory / fieldwork skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp of the subject, retention of some relevant information of the subject. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab / fieldwork skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective laboratory / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2
Examination		60	CLO 1,2,3,4
Presentation		20	CLO 1,2,3,4

Required/recommended reading and online materials	Selected readings will also be available on the class website. S. Rodwell Williams: Nutrition and Diet Therapy (7th ed.) Suitor & Hunter: Nutrition: Principles and Application in Health Promotion Wardlaw Gordon: Perspectives in Nutrition (2nd ed.)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3207 Food and nutritional toxicology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Dr H S El-Nezami, Biological Sciences *(elnezami@hku.hk)*		
Teachers Involved	Dr H S El-Nezami, Biological Sciences		
Course Objectives	To introduce students to methods used in assessing the toxicity of food contaminants, and to develop their confidence in the handling and interpretation of toxicological data. Students will also be introduced to the basic concepts behind toxicological evaluation, and the criteria for setting guidance values for dietary and nondietary exposure to chemicals. Students will understand the role of biochemical, metabolic and toxicokinetic studies in toxicological evaluation. This course aims to equip students with basic skills in conducting food toxicological studies.		
Course Contents & Topics	Topics include a discussion on exposure and entry routes, fates of toxic substances in the body (toxicokinetics), concepts in experimental toxicology, the dose response relationship, actions of toxic substances, target organ effects, the actions and types of carcinogens. A survey of the health effects of common classes of toxic substances is also presented.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	demonstrate an understanding of the processes involved in absorption, distribution, metabolism and excretion of toxicants, including an understanding of the toxicokinetic behavior of toxicants in mammals
CLO 2	demonstrate an understanding of the various effects induced after exposure to toxicants
CLO 3	demonstrate an understanding of the factors which underlie species differences in response to potential toxicants
CLO 4	demonstrate the ability to work in a team to investigate and solve toxicological problems of importance in human health

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3205 Human physiology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab

		skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	seminars & continuous assessment	40	CLO 2,4
Examination		40	CLO 1,2,3
Laboratory reports		20	CLO 2

Required/recommended reading and online materials	S. S. Deshpande: Handbook of Food Toxicology (Marcel Dekker Inc., NY, 2002)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3208 Food safety and quality management (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof H Corke, Biological Sciences *(harold@hku.hk)*		
Teachers Involved	Prof H Corke, Biological Sciences		
Course Objectives	To provide exposure to some key management concepts used to produce safe high-quality food products that will succeed in the marketplace. To introduce students to analysis and problem-solving of realistic business situations in food safety management.		
Course Contents & Topics	- The regulatory, social and business imperative for food safety. - Basic concepts in TQM - Statistical Process Control - Quality Function Deployment - Quality management standards (ISO 9000) - Development and implementation of a Hazard Analysis Critical Control Point (HACCP) plan (within an ISO 22000 food safety management system/ supply chain approach) - Role of environmental management systems (ISO 14000) in the food industry - Intellectual Property issues in the food industry - Religious, ethical, and cultural food choices - Illustrative business case studies on food safety management will be discussed		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the historical development of government regulation of food safety
CLO 2	be familiar with a set of management techniques applicable in the food industry
CLO 3	be able to analyze food production problems and make recommendations for action to improve quality and safety

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3201 Food chemistry or BIOL3203 Food microbiology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

	A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use quality management skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use quality management skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use quality management skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use quality management skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use quality management skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	including presentation	12
Group work		30
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 2
Examination		60	CLO 1,2,3
Project reports	including presentation	30	CLO 2,3

Required/recommended reading and online materials	Jones, J. M.: Food Safety (Eagan Press, 1992) Mortimore, S. and Wallace, C.: HACCP: A Practical Approach (Chapman and Hall, 1994) Forsythe, S. J.: The Microbiology of Safe Food (2nd Ed., Wiley-Blackwell, 2010)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3209 Food and nutrient analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	70
Course Co-ordinator	Dr M F Wang, Biological Sciences *(mfwang@hku.hk)*		
Teachers Involved	Dr M F Wang, Biological Sciences Dr J C Y Lee, Biological Sciences		
Course Objectives	To introduce basic principles and provide practical training in food and nutrient analysis. To help students to understand the principles behind analytical instruments used in food analysis. To train students to analyze major and minor food components as well as some food adulterants.		
Course Contents & Topics	The key concepts in professional food analysis in an industry context will be introduced. Basic analytical techniques for macronutrients (e.g. protein, carbohydrate and fats), micronutrients (vitamins and minerals) and adulterants in food will be covered. A variety of classical and instrumental techniques used in food analysis will be discussed: rheology and texture measurement, thermal analysis, color, spectroscopy, chromatography and electrophoresis.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the basic principles of food and nutrient analysis
CLO 2	be familiar with a variety of classical and instrumental analytical techniques
CLO 3	understand the principles behind analytical instruments associated with food
CLO 4	be able apply their knowledge and laboratory skills in novel situations to measure and analyze the macronutrient and micronutrient of food products
CLO 5	be able to select and justify an appropriate analytical technique to solve practical food analysis problems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3201 Food chemistry		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	practical work & assignment	40	CLO 1,2,3,4,5
Examination		60	CLO 1,2,3,4,5

Required/recommended reading and online materials	Y. Pomeranz and C.E. Meloan: Food Analysis: Theory and Practice (Van Nostrand Reinhold, 1994, 3rd ed.) S. S. Nielsen: Introduction to the Chemical Analysis of Foods (Jones & Barlett, 2000, 2nd ed.)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3210 Grain production and utilization (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof H Corke, Biological Sciences *(harold@hku.hk)*		
Teachers Involved	Prof H Corke, Biological Sciences		
Course Objectives	To provide a broad understanding of the utilization and significance of the major grains in the food industry and in human health and nutrition.		
Course Contents & Topics	- Global grain production and consumption - The Green Revolution and its aftermath - International grain trade - Wheat: flour milling, dough rheology, the baking process, baking quality - Wheat: quality of Asian products including steamed bread and noodles - Wheat: small-scale tests for quality - Rice: nutritional quality, consumer preferences, milling, quality, quality testing, products - Maize: products of wet milling, animal feed development - Biofuels focusing on bioethanol - Illustrative business case studies on the grain processing industry will be discussed		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the major production, import, and export patterns that support the global utilization of grain
CLO 2	understand the technology behind the production of grain-based foods
CLO 3	understand the scope and nature of professional level quality testing for grain products
CLO 4	appreciate the constraints to global food sufficiency
CLO 5	appreciate the ethical issues behind the diversion of grain into meat and biofuel production

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in any level 2 BIOL course		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3,4,5
Project reports	including presentation	30	CLO 2,3

Required/recommended reading and online materials	Encyclopedia of Grain Science, edited by Wrigley CW, Corke H, and Walker CE (2004) 3 Volumes, 1,700 pages. Elsevier, Oxford. (selected chapters only) Other readings to be provided
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3211 Nutrigenomics (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr K C Tan-Un, Biological Sciences *(kctanun@hku.hk)*		
Teachers Involved	Dr K C Tan-Un, Biological Sciences		
Course Objectives	Recent advances in the understanding of the human genome have resulted in the emergence of a new science called Nutrigenomics. This course aims to provide students with an understanding of the biochemical mechanisms underpinning the science of nutrition and the relation between genes and diet-related diseases. It explains the role of nutrition at the molecular level and the concepts of nutrigenomics and nutrigenetics.		
Course Contents & Topics	Concepts of nutrigenomics, nutrigenetics, metabolomics and nutritional biochemistry. Regulation of gene expression; Single Nucleotide Polymorphisms and relation to diseases. Overview of lipid metabolism; cholesterol metabolic pathway; hyperlipidaemia, LDL receptor mutations. Relevance of folate, vitamin B12; hyperhomocysteinemia and gene polymorphisms in diseases. Epigenetics, Barker s hypothesis, influence of maternal nutrition in fetal gene expression. Obesity, genetic predisposition, candidate genes like leptin, FTO and other hormones involved in the control of appetite Polyunsaturated fatty acid and their roles in the control of gene expression example lipogenesis and lipid oxidation pathways; Inborn errors of metabolism in the context of genetic mutations and personalized diet therapy		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	explain the principles of the control of gene expression
CLO 2	demonstrate understanding of the role of metabolic pathways in relationship to diet, gene expression and disease
CLO 3	discuss how genetic variations are used to study the role of genes in nutrient-related cellular processes
CLO 4	explain the relationship between genotype, epigenetics and diet-related diseases
CLO 5	critically evaluate current theories of personalized nutrition based on individual genetic variation

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough grasp of the subject matter covered. Show extensive ability of knowledge integration and problem solving skills. Show excellent ability to critically analyze and interpret complex scientific data and draw appropriate conclusions. Demonstrate highly effective organization and writing skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show substantial ability of knowledge integration and problem solving skills. Show substantial ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate effective organization and writing skills.
	C	Demonstrate general and acceptable grasp of the subject matter covered. Show acceptable ability of knowledge integration and problem solving skills. Show moderate ability to analyze and interpret scientific data and draw proper conclusions. Demonstrate moderate organization and writing skills.
	D	Demonstrate marginal grasp of the subject matter covered. Show limited ability on knowledge integration and problem solving skills. Show limited ability to analyse and interpret scientific data. Demonstrate basic organization and writing skills.
	Fail	Demonstrate little or no grasp, with little retention of information of the subject matter covered. Show lack of coherent and logical thinking, and minimal evidence in problem solving. Fail to integrate information and identify problems. Show little or minimal ability to analyze and interpret scientific data and draw conclusions. Demonstrate poor organization and writing skills.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	student-centered learning	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5
Examination		60	CLO 1,2,3,4,5
Test		20	CLO 1

Required/recommended reading and online materials	Lehninger Principles of Biochemistry Ordovas: Nutrigenetics and Nutrigenomics. Wiley. 2004 Brigelius-Flohe, Joost: Nutritional Genomics. Wiley. 2006. Rimbach, Fuchs, Packer: Nutrigenomics, CRC Press. 2005 Journals in Nutrition, Molecular Biology and Genetics
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3301 Marine biology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr M Yasuhara, Biological Sciences *(yasuhara@hku.hk)*		
Teachers Involved	Dr M Yasuhara, Biological Sciences Prof Y Sadovy, Biological Sciences Prof R S S Wu, Biological Sciences Dr T Vengatesen, Biological Sciences		
Course Objectives	To develop a basic understanding and appreciation of the field of marine biology, including the fascinating diversity of marine life, their function, ecology and inter-relationships. Contemporary issues including the benefits we derive from marine biological resources and threats to their long-term sustainability will also be discussed with case studies highlighting key issues.		
Course Contents & Topics	The topics cover: 1. The physical and chemical environments (e.g., light, current, atmospheric -ocean interactions, salinity, temperature, pH, dissolved oxygen, nutrients) and how these may affect the marine biota 2. Important groups of marine organisms (e.g., phytoplankton, zooplankton, benthos, nekton, marine mammals) and marine food web 3. Major marine habitats and ecosystems (e.g., intertidal, benthic, pelagic, deep sea, coral reefs, mangroves) 4. Exploitation of marine biological resources (e.g., fisheries and bioactive compounds) 5. Contemporary issues (e.g. climate change, marine pollution, sustainable use of marine living resources, invasive species)		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	demonstrate a basic understanding of the diversity and function of marine biota
CLO 2	recognize the interactions of marine biota and their environments
CLO 3	appreciate the importance of marine ecosystems and the threats of human activities on their long-term sustainability as well as possible solutions

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution or ENVS2002 Environmental data analysis		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Field work	field trip, laboratory practical & tutorials	30
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3
Examination		80	CLO 1,2,3

Required/recommended reading and online materials	Levinton, J. S. 2001. Marine Biology; function, biodiversity, ecology 2nd edition. 515 pp. Oxford University Press Nybakken, J.W. and Bertness, M.D., 2004. Marine Biology: An Ecological Approach, 6th Edition, Benjamin Cummings. H. V. Thurman and E. A. Burton: Introductory Oceanography (Prentice Hall, 2001, 9th ed.) J. W. Nybakken: Marine Biology: An Ecological View (Benjamin Cummings, 2000) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL3302 Systematics and phylogenetics (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Prof R M K Saunders, Biological Sciences *(saunders@hku.hk)*		
Teachers Involved	Prof R M K Saunders, Biological Sciences		
Course Objectives	To give students an understanding of the principles of systematics and phylogenetics and an appreciation of current trends and controversies. Systematics forms an invaluable grounding for many fields of biology (including anatomy, ecology, population biology and evolutionary biology), and enables the integration of a wide range of techniques (including anatomy, biochemistry, chemistry, molecular biology, cytology, palaeontology and ethology).		
Course Contents & Topics	Currrent classificatory theories: phenetic systematics (classifications based on overall resemblances) and cladistics (evolutionary reconstruction). The species concept. Sources of taxonomic data: morphology & anatomy, biochemistry, chemistry, molecular biology, cytology, and ethology. Causes of taxonomies complexity: environmental factors; hybridization; breeding systems. Principles of nomenclature. Laboratory sessions will be aimed at illustrating taxonomic procedures and problems; students will not be expected to memorize large numbers of scientific names.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	explain taxon concepts (with particular reference to species) and show how multivariate statistical methods can be applied below the species level
CLO 2	describe the principles behind maximum parsimony methods of phylogenetic reconstruction (including sister-group relationships, out-group comparison, homoplasy and the assessment of clade stability)
CLO 3	evaluate the diversity of sources of taxonomic data, and explain the importance of specific data sources
CLO 4	recognise the main causes of taxonomic complexity, and identify appropriate solutions
CLO 5	understand the principles of nomenclature in order to interpret the previous application of scientific names are validly publish new names

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		

Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining most or all of the course learning outcomes, with evidence of extensive background reading and use of named examples. Show evidence of significant critical abilities and logical thinking. Apply highly effective presentation skills. Demonstrate effective use of data and results to draw appropriate and insightful conclusions. Show evidence of integration of a wide range of appropriate theories, principles, evidence and techniques. **B** Demonstrate substantial command of knowledge required for attaining most of the course learning outcomes, with evidence of some background reading and use of named examples. Show evidence of critical abilities and logical thinking. Apply effective presentation skills. Demonstrate use of data and results to draw appropriate and insightful conclusions. Show evidence of general integration of appropriate theories, principles, evidence and techniques. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes, with evidence of limited background reading and use of named examples. Show evidence of some critical abilities and logical thinking. Apply moderately effective presentation skills. Demonstrate mostly correct use of data and results to draw appropriate and insightful conclusions. Show evidence of partial integration of appropriate theories, principles, evidence and techniques. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes, with insufficient evidence of background reading and use of named examples. Show evidence of limited critical abilities and logical thinking. Apply limited presentation skills. Demonstrate limited ability to use data and results to draw appropriate and insightful conclusions. Show evidence of limited integration of appropriate theories, principles, evidence and techniques. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes, with no evidence of background reading or use of named examples. Show little or no evidence of critical abilities and logical thinking. Presentational skills are minimally effective or ineffective. Misuse of data and results to draw appropriate conclusions. Little or no evidence of integration of appropriate theories, principles, evidence and techniques.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	see table below

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Project work		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,3,4,5
Examination		70	CLO 1,2,3,4,5
Laboratory reports		15	CLO 1,3

Required/recommended reading and online materials	E. Mayr & P. D. Ashlock: Principles of Systematic Zoology (McGraw-Hill, 1991, 2nd ed.) W. S. Judd et al.: Plant Systematics - A Phylogenetic Approach (Sinauer, 1999) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL3303 Conservation ecology (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr T C Bonebrake, Biological Sciences *(tbone@hku.hk)*		
Teachers Involved	Dr T C Bonebrake, Biological Sciences Prof Y Sadovy, Biological Sciences Dr T Vengatesen, Biological Sciences Dr L Karczmarski and TBC, Biological Sciences		
Course Objectives	To introduce students to the theory and practice of conservation and to provide students with a thorough understanding of practical, economic and management skills required for proficiency in conservation biology. Our ultimate aim is to promote an understanding of the natural biodiversity, the threats to it, and the best ways to manage them. We hope these will be your aims too, and that you will be able to use the skills and knowledge you learn from the course to reduce the local, regional and global loss of biodiversity.		
Course Contents & Topics	Among the many environmental issues, the most serious is the increasingly rapid loss of biodiversity. This loss is irreversible on a human timescale and will reduce the options available to all future human generations. Conservation Biology/Ecology is the science of preserving biological diversity. This course also provides insights to the many benefits and services that nature offers and explores strategies for management options to sustain ecological integrity and production. It is an inexact, applied, mission-orientated, multidisciplinary science which, like medicine, has built-in values: to a conservation biologist, as to a doctor, it matters whether the patient lives or dies. It is also a very new science, bringing together elements from ecology, environmental science, forestry, resource management and many other fields. The course is designed to provide the knowledge, theories, and research related to biodiversity conservation. Our teaching focuses on biodiversity conservation, conservation issues associated with climate change, the key theoretical underpinning of biodiversity conservation and an introduction to conservation legislation and economics. We emphasis on the integration of knowledge, skills and abilities that are required to practice conservation. Our problem based learning approach will require students to actively participate in their group project/class room debate by researching.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	develop a framework for critical thinking about biodiversity, environment and human interaction
CLO 2	understand why species are becoming extinct and predict which ones will be most vulnerable

	CLO 3	understand the importance of the threat of tropical deforestation, marine and coastal degradation, and habitat fragmentation in species extinction, and explain the main forces behind habitat and biodiversity loss
	CLO 4	understand the principles of population viability analysis, the basis of single-species conservation management and the role of ex situ conservation, ecological restoration and reintroduction in conservation
	CLO 5	outline the legal and administrative basis for conservation in Hong Kong and the world
	CLO 6	appreciate the roles and relationships of economic, social and environmental sciences in the conservation of biodiversity

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Field work		10
Group work		8
Tutorials		14
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5,6
Examination		60	CLO 1,2,3,4,5,6
Presentation	group presentation	10	CLO 1,2,3,5,6
Test		10	CLO 1,2,3

Required/recommended reading and online materials	R. B. Primack: Essentials of Conservation Biology (Sinauer, 2006, 4th ed.) V. D. Fred: Conservation biology [electronic resource]: foundations, concepts, applications (Springer, 2008) M.L. Hunter and J.P. Gibbs: Fundamentals of Conservation Biology (Blackwell, 2007, 3rd Ed) William J. Sutherland: The Conservation Handbook: Research, Management and Policy (Blackwell Science, 2008) NIL
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL3313 Freshwater ecology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Prof D Dudgeon, Biological Sciences *(ddudgeon@hku.hk)*		
Teachers Involved	Prof D Dudgeon, Biological Sciences		
Course Objectives	This course introduces freshwater science by integrating the physical and biological components of rivers and their drainage basins in the context of sustaining human livelihoods and biodiversity. Conservation and management of lakes and maintenance of water quality are considered also. Case studies are used to illustrate the principles of river science and human use of drainage basins. Emphasis will be placed upon conservation of freshwater biodiversity in Asia in the context of increasing human modification of ecosystems, habitat degradation and water scarcity.		

Course Contents & Topics	The amount of water on Earth is fixed. Less than 0.01% of the world's water is in lakes and rivers, yet this water hosts 10% of the Earth's species. Global water use has increased 300% since 1950 and is growing faster than the Earth's population; many people in Asia already face water stress. This course introduces the physicochemical processes involved in the hydrological cycle and flow of water in drainage basins, as well as their seasonal fluctuations, and describes the main longitudinal changes that occur along rivers and their floodplains. Energy flows in freshwater ecosystems are described with particular reference to the transfer of materials between water and land and the relative importance of aquatic primary production versus energy derived from detrital inputs from the land. The range of organisms associated with Asian fresh waters is introduced and their functional roles explained, and students will become familiar with some common Hong Kong species in field trips and laboratory sessions. The dependence of humans on freshwater ecosystems and the role they play in sustaining livelihoods is explained, together with the causes and consequences of human modification of fresh waters, and the implications for conservation of aquatic biodiversity. Finally the range of management strategies used to reduce or mitigate human impacts on freshwater ecosystems and maintain water quality is introduced.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	describe the global water cycle, the main sources and pathways of energy in freshwaters, and the influence of land-water interactions on aquatic productivity
CLO 2	describe the composition of the freshwater biota (major groups) and their functional roles in aquatic ecosystems, and identify some of the common animals that occur in Hong Kong fresh waters
CLO 3	describe the results of modification of freshwater ecosystems by humans, list the main threats to freshwater biodiversity in Asia, explain why freshwater biota are vulnerable to human impacts, and indicate the management strategies used to reduce or mitigate them

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics and BIOL2306 Ecology and evolution		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of original logical (or coherent) thought, strong analytical (or critical) abilities and a thorough grasp of the subject as demonstrated by background reading and excellent use of named (organism) examples. Show excellent presentational, analytical skills and/or lab/field skills, and substantial knowledge of general freshwater biodiveristy or selected taxa. Excellent or outstanding (for A+) work relative to what is required at degree level.
B	Evidence of analytical (or critical) abilities and logical (or coherent) - but not necessarily original - thinking, a good grasp of the subject as demonstrated by background reading and use of named (organism) examples. Show good presentational, analytical and/or lab/field skills, and knowledge of general freshwater biodiversity or selected taxa. Work more than sufficient for what is required at degree level.
C	Evidence of some analytical (or critical) abilities and logical (or coherert) thinking with an adequate (but incomplete) grasp of the subject, but little or no evidence of original thinking, with limited background reading and use of named (organism) examples. Show fair presentational, analytical and/or lab/field skills, and some knowledge of general freshwater biodiversity or selected taxa. Work sufficient for what is required for degree level.
D	Evidence of retention of a minimum of relevant information of the subject (i.e. knowledge is very incomplete), with limited organizational, analytical or presentational skills. Shows insufficient evidence of background reading, or familiarity with lab/field techniques or freshwater biodiversity. Work merely (for D+) or barely (D) adequate for what is required at degree level.
Fail	Evidence of poor or inadequate knowledge and understanding of the subject, and a lack of coherence, poor organization and/or excessive irrelevancy. Little or no evidence of familiarity with relevant reading material and lab/field techniques, or any knowledge of freshwater biodiversity. Work fails to reach degree level.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		26
Laboratory	project and laboratory work; field trips to local streams and wetlands	40
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		30	CLO 2
Examination		60	CLO 1,2,3
Laboratory reports		10	CLO 3

Required/recommended reading and online materials	Allan, J.D. & Castillo, M.M. (2007). Stream Ecology. Springer. The Mekong River Awareness Kit (RAK) http://www.mrcmekong.org/RAK/html/rak_frameset.html An online training tool developed by an international team (including the course coordinator) that contains information on the physical and biological features of rivers, and shows how human livelihoods depend on river health. A list of references available in HKU library will be provided for each lecture on the course website.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3314 Plant structure and evolution (6 credits)		Academic Year	2015
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Prof R M K Saunders, Biological Sciences *(saunders@hku.hk)*		
Teachers Involved	Prof R M K Saunders, Biological Sciences		
Course Objectives	To survey the form and function of the vascular plant body, with particular emphasis on the evolutionary significance of structures. This course forms a basis for understanding plant physiology, ecology, systematics and phylogenetics.		
Course Contents & Topics	The course will investigate various cell, tissue and organ types in the vascular plant body, with functional explanations for their diversity and discussions of the value of such knowledge in understanding plant phylogeny. Information on plant structure will be integrated with our current understanding of developmental genetics and taxonomic relationships derived from molecular phylogenetic research. Topics such as food storage, strength, water conduction, growth and development, pollination, fertilization, fruit and seed dispersal, germination, etc., will be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

Course Learning Outcomes

CLO 1	recognise the main plant cell types and explain how cells are integrated to form specific primary tissues (such as the xylem and phloem)
CLO 2	describe the developmental changes that occur in primary tissues with the onset of secondary growth
CLO 3	describe the structure, function and development of secondary vegetative structures (wood and bark)
CLO 4	integrate knowledge of the genetic control of floral development with the evolution of organ diversity
CLO 5	describe the structure of fruits from a functional perspective, and recognise how these structures are derived from the flower
CLO 6	explain how seeds develop after fertilization of the ovule, and how differences in seed structure influences germination patterns

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining most or all of the course learning outcomes, with evidence of extensive background reading and use of named examples. Show evidence of significant critical abilities and logical thinking. Apply highly effective presentation skills. Demonstrate effective use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of knowledge required for attaining most of the course learning outcomes, with evidence of some background reading and use of named examples. Show evidence of critical abilities and logical thinking. Apply effective presentation skills. Demonstrate use of data and results to draw appropriate and insightful conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes, with evidence of limited background reading and use of named examples. Show evidence of some critical abilities and logical thinking. Apply moderately effective presentation skills. Demonstrate mostly correct use of data and results to draw appropriate and insightful conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes, with insufficient evidence of background reading and use of named examples. Show evidence of limited critical abilities and logical thinking. Apply limited presentation skills. Demonstrate limited ability to use data and results to draw appropriate and insightful conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes, with no evidence of background reading or use of named examples. Show little or no evidence of critical abilities and logical thinking. Presentational skills are minimally effective or ineffective. Misuse of data and results to draw appropriate conclusions.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3,4,5,6
Laboratory reports		30	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	P. Rudall: Anatomy of Flowering Plants, 3rd ed. Cambridge Univ. Press (2007) P.H. Raven, R.F. Evert & S.E. Eichhorn: Biology of Plants, 7th ed. Freeman (2005) A list of additional reading material will be provided during the course.
Course Website	http://www.biosch.hku.hk/ecology/lsc/

Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3318 Experimental intertidal ecology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	20
Course Co-ordinator	Prof G A Williams, Biological Sciences *(hrsbwga@hku.hk)*		
Teachers Involved	Prof G A Williams, Biological Sciences		
Course Objectives	To examine the communities of coastal systems: their distribution, composition and the factors which regulate them. This course will examine, using an experimental approach, patterns exhibited by a range of shores and the deterministic and stochastic processes that create and sustain them. Hong Kong shores will be used as examples but comparisons will be drawn from the coastlines of the world.		
Course Contents & Topics	The first part of this course describes shores of the marine to brackish water continuum and the communities found on them. Lectures will cover the physical environment of the intertidal (e.g. tides; waves; geological and hydrological processes) the resultant variations in exposure and shore types and consequent distribution of animals and algae on these shores (vertical and horizontal zonation patterns) with specific Hong Kong examples. The second part of the course uses an experimental approach (e.g. sampling methodology; manipulative techniques; experimental design and data analysis) to investigate the factors (e.g. predation; herbivory; competition; disturbance; succession; patchiness and recruitment; supply side ecology) that structure these shores, with particular focus on rocky intertidal shores.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe the physical environmental factors (e.g., waves, tides) shaping the intertidal environment and how they interact with geographic features to produce different kinds of shores (e.g., sandy shores, mangroves)
CLO 2	understand the factors limiting species distribution patterns on the vertical intertidal gradient and appreciate methods to measure and investigate these patterns
CLO 3	identify and quantify the distribution of a variety of local species on different Hong Kong shores
CLO 4	review, critique and design experimental studies to investigate patterns (e.g., zonation) and processes (e.g., herbivory, competition) in intertidal areas
CLO 5	explain the role of biological processes (e.g., predation, succession) and their interaction with the physical environment in shaping intertidal communities
CLO 6	plan, design, execute, analyse and present a simple experimental study on intertidal ecology

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics or BIOL3301 Marine biology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of original, logical (or coherent) thought, strong analytical and critical abilities and a thorough grasp of the subject as demonstrated by background reading and excellent use of named (organism) examples. Show excellent presentational, analytical skills and/or lab/field skills, and demonstrate substantial knowledge of general intertidal ecology and excellent experimental design and analysis skills.
B	Evidence of analytical (or critical) abilities and logical (or coherent), but not necessarily original, thinking, a good grasp of the subject as demonstrated by background reading and use of named (organism) examples. Show good presentational, analytical and/or lab/field skills, and demonstrate knowledge of general intertidal ecology and good experimental design and analysis skills.
C	Evidence of some analytical (or critical) abilities and logical (or coherent) thinking with an adequate (but incomplete) grasp of the subject, but little or no evidence of original thinking, limited background reading and use of named (organism) examples. Show fair presentational, analytical and/or lab/field skills, and demonstrates some knowledge of general intertidal ecology and adequate abilities of experimental design and analysis.
D	Evidence of retention of a minimum of relevant information of the subject (i.e. knowledge is very incomplete), with limited organizational, analytical or presentational skills. Show insufficient evidence of background reading, or familiarity with lab/field techniques. Poor knowledge of general intertidal ecology and misunderstanding of experimental design and analysis.
Fail	Evidence of poor or inadequate knowledge and understanding of the subject, and a lack of coherence, poor organization and/or excessive irrelevancy. Limited or no evidence of familiarity with relevant reading material and lab/field techniques, or knowledge of general intertidal ecology, and misuse of experimental design and analysis skills.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		16
Field work	field trip/project work	28
Project work		6
Tutorials		4
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		40	CLO 1,2,3,4,5,6
Examination		60	CLO 1,2,3,4,5

Required/recommended reading and online materials	Morton, B. & Morton, J.: The Seashore Ecology of Hong Kong (Hong Kong University Press, 1983) Little, C. & Williams, G.A. & Trowbridge, C.D.: The Biology of Rocky Shores (Oxford University Press, 2009) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3319 Terrestrial ecology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr B Guenard, Biological Sciences *(bguenard@hku.hk)*		
Teachers Involved	Dr B Guenard, Biological Sciences		
Course Objectives	To enable motivated students to acquire the knowledge and skills needed to solve real problems in terrestrial ecology.		
Course Contents & Topics	This course will focus on the ecology of terrestrial habitats. The emphasis will be on the tropics, especially tropical East Asia, but the course will also include an overview of patterns and processes on a global scale. Students will first learn about the geological history of the land mass on earth, the biogeography and broad distribution of major terrestrial ecosystems, especially in Tropical East Asia. Then, students will begin to learn different important processes including herbivory, carnivory, pollination, seed dispersal and energy flow in terrestrial ecosystems. The second half of the course will start with the degraded terrestrial ecosystems nowadays and the important process of ecological succession. Restoration ecology and how tropical forests can be restored will then be introduced. Two other major threats to terrestrial ecosystems including alien invasive species and wildfire will also be addressed. Two problem-based learning exercises are included to provide students with an alternative mode of learning. The practical component of the course will introduce students to the basic field techniques used in terrestrial ecology. Students will participate to a group project, collect and analyze data, and write a short scientific paper.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand evolution of biodiversity patterns and shaping processes within terrestrial ecosystems at different geographic and time scales CLO 2 understand the current patterns that sustain biodiversity in their pristine form and disturbed state CLO 3 understand the various threats to terrestrial ecosystems and some of the methods to evaluate and reduce the impacts of those threats CLO 4 plan and conduct baseline study of terrestrial biodiversity CLO 5 develop the skill to be an active learner through the problem-based learning exercises		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3303 Conservation ecology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities			

Activities	Details	No. of Hours
Lectures		24
Laboratory	laboratory & field work	24
Tutorials		14
Reading / Self study		100

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td></td><td>10</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Examination</td><td></td><td>40</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Presentation</td><td></td><td>25</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Project report</td><td></td><td>25</td><td>CLO 1,2,3,4,5</td></tr></table>
Required/recommended reading and online materials	Corlett R.T. : The Ecology of Tropical East Asia (Oxford University Press, 2009). Dudgeon D. and Corlett R. T.: Ecology and Biodiversity of Hong Kong (Friends of the Country Parks, Hong Kong) To be provided in classes
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3320 The biology of marine mammals (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr L Karczmarski, Biological Sciences *(leszek@hku.hk)*		
Teachers Involved	Dr L Karczmarski, Biological Sciences		
Course Objectives	Few other groups of animals have captured the public's imagination the way marine mammals, especially whales and dolphins have. This course covers the evolutionary biology, ecology, behaviour, and conservation of marine mammals: whales, dolphins and porpoises (cetaceans), seals and walruses (pinnipeds), manatees and dugongs (sirenians) and sea otters. Students will learn to understand the ecology of mammalian life in the aquatic environment, their role in the marine ecosystem, their behavioural complexity and socio-ecology, and the current threats to these animals in the human-dominated world.		
Course Contents & Topics	The course begins with an overview of marine mammal species and their global distribution, followed by a review of the various adaptations that have evolved to meet the challenges of the marine environment. Next, the course discusses the life history, reproductive strategies, ecology and population dynamics of marine mammals, highlighting the similarities and differences between species in this taxonomically diverse group of animals. This is followed by sessions on behaviour and behavioural ecology; here we discuss animal movement, diving and ranging behaviour, foraging strategies, ecology of group living and social behaviour, behavioural complexity, cognition, and social strategies that guide the daily lives of these animals. The course concludes with a discussion of human influences on the fate of marine mammals, examples of critically endangered species and populations, and a review of conservation and management strategies; our emphasis is on the importance of applying the knowledge of population ecology, behaviour and behavioural ecology in ensuring long-term effective conservation of marine mammal populations. This course is designed for 3rd and 4th year students; it includes field trips, discussions of current scientific research, innovative research techniques and recent discoveries. Students will undertake independent literature-searches and will discuss their projects during classroom debates, training their skills in conceptual and analytical approaches to science.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>appreciate marine mammal diversity and biogeography</td></tr><tr><td>CLO 2</td><td>understand how mammals adapt and function in an aquatic environment and their role in the marine ecosystem</td></tr><tr><td>CLO 3</td><td>understand and appreciate the complexity of interactions between environmental selective pressures and marine mammal behaviour, population structure and demography</td></tr><tr><td>CLO 4</td><td>appreciate the socio-ecological diversity and behavioural complexity of marine mammals</td></tr><tr><td>CLO 5</td><td>think analytically in terms of marine mammal ecology and anthropogenic impacts in the rapidly changing world</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Evidence of a thorough grasp of the subject in a broader comparative perspective as demonstrated by background reading and excellent use of named examples and case studies. Evidence of independent critical thought with excellent use of a broad range of fundamental concepts to draw insightful and logical conclusions. Show eagerness to learn, great abilities of independent work, effective presentation skills with excellent analytical argumentation. Excellent or outstanding work relative to what is required at degree level.</td></tr><tr><td>**B**</td><td>Evidence of a good grasp of the subject as demonstrated by some background reading and appropriate use of named examples and some case studies. Evidence of good critical thought, although not necessarily original. Good and very good (but not outstanding) abilities of independent work, effective presentation skills with good analytical and logical argumentation. Good general command of acquired knowledge to draw meaningful and logical conclusions. Work more than sufficient for what is required at degree level.</td></tr><tr><td>**C**</td><td>Demonstrate an adequate, but not coherent and incomplete grasp of the subject, with limited background reading and limited use of named examples and case studies. Some abilities of logical critical thinking, but not insightful and/or independent; only partial abilities to use acquired knowledge and work independently to draw meaningful conclusions. Fair presentation skills, with mostly correct argumentation, but limited (or no) abilities to integrate broader concepts. Work sufficient for what is required for degree level.</td></tr><tr><td>**D**</td><td>Demonstrate some grasp of the subject, but partial and limited to the most basic concepts, examples, and limited (or none) case studies. Insufficient evidence of background reading, limited abilities of critical independent thinking, and</td></tr></table>		

		not particularly effective presentation skills with generally weak logical argumentation and restricted ability of drawing appropriate conclusions. Work barely meets what is required at degree level.
	Fail	No evidence of basic minimum knowledge and understanding of the subject. No evidence of background reading and no familiarity with any relevant examples and case studies. Inadequate evidence of coherent logical thought; ineffective presentation skills with poor argumentation and no abilities to draw meaningful conclusions. Work fails to reach degree level.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	including field trips, research site vists, demonstration of research techniques, interactive classroom debates	32
Project work	project work review	8
Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	including active participation/continuous assessment/presentation	55	CLO 1,2,3,4,5
Examination		45	CLO 1,2,3,4,5

Required/recommended reading and online materials	Hoelzel AR (ed). Marine mammal biology: An evolutionary approach (Blackwell Science 2002) Reynolds JE & Rommel SA (eds). Biology of marine mammals (Smithsonian Institution Press 1999) Perrin WF, Wursig B & Thewissen JGM (eds). Encyclopedia of marine mammals (Academic Press 2008) Mann J, Connor RC, Tyack PL & Whitehead H (eds). Cetacean societies (The University of Chicago Press 2000)
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course is offered in alternate year. This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3401 Molecular biology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	130
Course Co-ordinator	Prof B K C Chow, Biological Sciences *(bkcc@hku.hk)*		
Teachers Involved	Prof B K C Chow, Biological Sciences Dr K W Y Yuen, Biological Sciences		
Course Objectives	To provide students with recent knowledge in molecular biology with special emphasis on the study of gene structure and function at the molecular level.		
Course Contents & Topics	The course includes a detailed account of the molecular processes in eukaryotic and prokaryotic cells, from DNA replication, RNA transcription, protein translation, to post-translational modifications with special emphasis on the regulation of prokaryotic and eukaryotic gene expression. Recently developed biochemical techniques including oligonucleotide synthesis, DNA sequencing, complementary screening and DNA cloning, site-directed mutagenesis, polymerase chain reaction and transgenic technology will also be discussed.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	know the basic structures of DNA, RNA and protein, and how DNA is package in the nucleus of eukaryotic cells
CLO 2	understand the biochemical processes involved in DNA replication, transcription, translation and post-translational modifications in prokaryotes and eukaryotes
CLO 3	explain and describe the regulation of gene transcription in prokaryotes and eukaryotes
CLO 4	demonstrate knowledge and understanding of the underlying concepts associated with recently developed techniques including PCR, site-directed mutagenesis, DNA sequencing

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry or MEDE2301 Life science I		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.

	C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assessment of practical work	20	CLO 1,2,4
Examination		80	CLO 1,2,3,4

Required/recommended reading and online materials	R. Weaver: Molecular Biology (McGraw-Hill, 2005 or 2008) J. Watson et al.: Molecular Biology of the Gene (Benjamin Cummings, 2004) B. Lewin: Gene IX (Jones and Bertlett, 2008) Selected journal articles and web learning materials. TBC
Course Website	http://moodle.hku.hk/

BIOL3402 Cell biology and cell technology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	120
Course Co-ordinator	Prof A S T Wong, Biological Sciences *(awong1@hku.hk)*		
Teachers Involved	Prof A S T Wong, Biological Sciences Prof M L Chye, Biological Sciences Dr W Y Lui, Biological Sciences		
Course Objectives	To provide a coherent understanding of the structure and function of cells, and the principles and applications of cell culture and instrumentation in biology and biotechnology		
Course Contents & Topics	I. Cell Biology Cell membranes. Organelles. Cellular transport: ions transport and ions channels. Protein and RNA transport. Membrane potentials, Action potentials. Cell junctions. Extracellular Matrix. Cell-cell interactions. Cell-matrix interactions. II. Techniques in animal cell culture Mammalian cells in culture. Primary and continuous cell lines. Cell types and cell growth parameters. Media formulation, growth factors and design of serum-free media. Culture lab facilities and sterilization. Mechanism of cryopreservation. III. Techniques in plant cell culture Root and shoot cultures. Explant regeneration. Protoplasts. Secondary metabolites.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	acquire fundamental knowledge on cell biology and cell technology
CLO 2	demonstrate basic laboratory techniques on cell culture
CLO 3	gain insight into real-life applications in cell biology and cell technology

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry or MEDE2301 Life science I		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply

		knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
	C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding.
	D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level.
	Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assessment of practical work	30	CLO 1,2,3
Examination		70	CLO 1,3

Required/recommended reading and online materials	Textbooks: Alberts, B. et al.: Molecular Biology of the Cell (Garland, 2008, 5th ed.) Mather, J. P.: Introduction to Cell and Tissue Culture, Theory and Techniques (Plenum, 1998) Collins, H.A. & Edwards, G.S.: Plant Cell Culture (Oxford: Bios Scientific, 1998) References: TBC
Course Website	http://moodle.hku.hk/

BIOL3403 Immunology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	100
Course Co-ordinator	Prof W W M Lee, Biological Sciences *(hrszlwm@hku.hk)*		
Teachers Involved	Dr W B L Lim, Biological Sciences Prof W W M Lee, Biological Sciences		
Course Objectives	To provide a broad understanding of the animal immune system. Topics will also include the application of a variety of immunological methods to research and disease diagnosis.		
Course Contents & Topics	Immunological functions in the vertebrates and analogous activities in invertebrates. Structures and biological properties of immunoglobulins and T-cell receptors. Divergence of antibody genes. Emergence and characteristic of lymphoid tissues. Major histocompatibility complex. Complement pathways. Immunity against bacteria, viruses and parasites. AIDS, Vaccination, hypersensitivity, and autoimmunity. Immunological tests and immunochemical techniques using non mammalian and mammalian antibodies and their application to various biological problems.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe the structure and function of the immune molecules which are involved in the body defense mechanisms, including antibody, T-cell receptor, cytokines, MHC and complement proteins
CLO 2	describe the organization of the mammalian immune system in terms of genes, cells and tissues
CLO 3	explain the underlying mechanisms associated with transplant rejection, transfusion reaction and vaccination
CLO 4	explain how the immune system responds to infections by bacteria, viruses and parasites
CLO 5	understand antigen-antibody interaction and the principle of immunoassays

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL2103 Biological sciences laboratory course or MEDE2301 Life science I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	1. Exceptionally good performance demonstrating comprehensive understanding of the subject matter. 2. Critical insight and analysis into the scientific literatures. 3. Superior writing, presentation and group communication skills.
B	1. Good performance demonstrating full understanding of the subject matter. 2. Coherent insight and analysis into the scientific literatures. 3. Good writing, presentation and group communication skills.
C	

		1. Satisfactory performance demonstrating adequate understanding of the subject matter. 2. Some insight into the scientific literatures. 3. Adequate writing and communication skills.
	D	1. Limited performance demonstrating some understanding of basic subject matter. 2. Some ability to use the scientific literatures. 3.Limited writing and communication skills.
	Fail	1. Poor understanding of subject matter. 2. Little to no insight into use of the scientific literatures. 3. Unable to write or communicate.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		30
Laboratory	during reading week	16
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		80	CLO 1,2,3,4,5
Laboratory reports		20	CLO 1,2,3,4,5

Required/recommended reading and online materials	J. Kuby: Immunology (Freeman and Company, 2003 or 2007-6thd ed., or 2013-7th ed.) Benjamin & Leskowitz: Immunology: A Short Course (Wiley-Liss, 2007, 6th edition. Or the latest edition) I. Roitt, J. Brostoff and D. Male: Immunology (Mosby, latest 2 editions)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3404 Protein structure and function (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	160
Course Co-ordinator	Dr W K Yip, Biological Sciences *(wkyip@hku.hk)*		
Teachers Involved	Dr W K Yip, Biological Sciences Prof W W M Lee, Biological Sciences Dr C M Qian, Biomedical Sciences		
Course Objectives	To provide students with a good understanding of protein structure, how structure subserves function, and the methods for study of both. This course provides a strong foundation for advanced courses in biochemistry and biotechnology.		
Course Contents & Topics	Elements of macromolecular structure: sequencing, prediction and determination of secondary, tertiary and quaternary structures; The relationship of protein structure and function: molecular motifs,binding and recognition, enzyme catalysis and specificity; Methods for protein structure determination: X-ray crystallography and nuclear magnetic resonance; Enzymology: enzyme nomenclature, enzyme assay, kinetics and energetics of binding, transition state and molecular mechanisms of catalysis; Protein purification and characterization: various liquid chromatographical methods and their uses in combination, separation techniques, methods of determination of molecular mass, activity and purity, optical methods in protein determination, ultracentrifugation, protein polishing, stability and storage, methods and devices for protein delivery.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	fundamental understanding of principles of protein structure
CLO 2	demonstrate a basic understanding of the relationship between protein structure and function
CLO 3	design assaying methods for enzymes
CLO 4	find out kinetic parameters of proteins or enzymes by graphically techniques
CLO 5	learn about the ways to purify protein and the many industrial uses of proteins

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or MEDE2301 Life science I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	1. Exceptionally good performance demonstrating comprehensive understanding of the subject matter. 2. Critical insight into the scientific literature. 3. Superior writing and group communication skills.
B	1. Good performance demonstrating full understanding of the subject matter. 2. Coherent insight into the scientific literature. 3. Good writing and group collaboration skills.
C	1. Satisfactory performance demonstrating adequate understanding of the subject matter. 2. Some insight into the scientific literature. 3. Adequate writing and group collaboration skills.
D	1. Limited performance demonstrating some understanding of basic subject matter. 2. Some ability to use the scientific literature. 3. Limited writing and group collaboration skills.
Fail	1. Poor understanding of subject matter. 2. Little to no insight into use of the scientific literature. 3. Unable to write or collaborate.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4,5
Examination		70	CLO 1,2,3,4,5

Required/recommended reading and online materials	None prescribed To be announced.
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3405 Molecular microbiology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr J S H Tsang, Biological Sciences *(jshtsang@hku.hk)*		
Teachers Involved	Dr J S H Tsang, Biological Sciences		
Course Objectives	This course is intended for biology, biotechnology and biochemistry students who would like to understand the modern fundamentals of microbiology. At the end of the course the students are expected to know the physiological, biochemical and molecular aspects of microbiology.		
Course Contents & Topics	The basic biochemistry of microorganisms will be described. The intrinsic factors that affect the growth of microbes in the environment will be examined. The adaptation of the microbes to the environment by means of physiological changes and genetical alterations will be illustrated. The molecular biology of bacteria and viruses will be considered. The molecular biology of plasmids and transposable elements and their association with medical aspect will be discussed. The use of modern technology in studying microorganisms will be explored.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the intrinsic reorganization of microbes in response to the changing environments
CLO 2	comprehend the major modes of regulation in the microbe
CLO 3	explain the biology of bacteriophages and plasmids
CLO 4	realize the importance of transposable elements in the survival of the microbes
CLO 5	appreciate the development of modern techniques in studying microorganisms

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Demonstrate substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		24

	Laboratory		20
	Tutorials		6
	Reading / Self study		100

Assessment Methods and Weighting			
Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		70	CLO 1,2,3,4
Laboratory reports		20	CLO 3,4,5
Presentation		10	CLO 1,2,5

Required/recommended reading and online materials	TBC Maloy S.R., Cronan J.E. & Freifelder D. Microbial Genetics (Jones & Bartlett 1994, 2nd ed.) Willey, Sherwood & Woolverton: Prescott's Principles of Microbiology (McGraw Hill 2009) Watson, Baker, Bell, Gann, Levine & Losick: Molecular Biology of the Gene (CSHL Press 2008, 6th ed.) Madigan, Martinko, Dunlap & Clark: Brock Biology of Microorganisms (Pearson 2009, 12th ed.)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3406 Reproduction and reproductive biotechnology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof A O L Wong, Biological Sciences *(olwong@hku.hk)*		
Teachers Involved	Prof A O L Wong, Biological Sciences		
Course Objectives	To provide a comprehensive overview on modern concepts and recent advance in reproductive biology & reproductive biotechnology in human and animal models.		
Course Contents & Topics	- Basic concepts of reproduction, evolution of sex, human & animal reproductive strategies and sexual behavior. - Molecular mechanisms for sex determination, developmental aspects of gametogenesis and reproductive systems. - Neuroendocrinology of reproductive system and recent advances in kisspeptin & GnRH system and steroid feedback. - Environmental endocrine disruptors and recent advances in biotechnology for fertility control & assisted reproduction in human. - Embryonic stem cells & induced pluripotent stem cells and their applications in regenerative medicine/therapeutic cloning. - Germ line engineering & gene therapy, animal cloning and primordial germ cell transplantation in animal models.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	have a broad understanding of reproductive biology ranging from evolution of sex, different reproductive strategies & sexual behaviors in animals to the regulatory mechanisms for sex determination & development of reproductive systems
	CLO 2	have an appreciation of the neuroendocrine control of reproductive functions & reproductive cycle, sexual behavior, parental care, and pregnancy & giving birth to baby in human & mammalian models
	CLO 3	have a basic understanding on the concept of environmental endocrine disruptors for reproductive functions and the causes of human infertility & assisted reproduction
	CLO 4	comprehend a wide range of modern technologies for germ line engineering, animal cloning & primordial germ cell transplantation and the applications of embryonic stem cells/induced pluripotent stem cells in regenerative medicine/therapeutic cloning

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOL2102 Biostatistics or BIOL2306 Ecology and evolution		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors		
	A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use

		data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3,4
Laboratory reports		20	CLO 2,3,4
Test	Test & Continuous Assessment	10	CLO 1,2,3,4

Required/recommended reading and online materials

1. 'Reproduction System at a Glance' by L.J. Heffner & D.J. Schust, Wiley-Blackwell (2014).
2. 'Yen and Jaffe's Reproductive Endocrinology' (e-Book) by J.F. Strauss III & R. Barbieri, Elsevier/Saunders (2014)
3. 'Stem Cells in Reproductive Medicine: Basic Science & Therapeutic Potential' by C. Simon et al, Cambridge University Press (2013)
4. 'Essential Reproduction' by M.H. Johnson, Wiley-Blackwell (2013)
5. 'Pregnancy after Assisted Reproductive Technology' by E.R.M. Jauniaux & B.R.M.B. Rizk, Cambridge University Press (2012)
6. 'Assisted Reproduction Techniques: Challenges & Management Option' by K. Sharif & A. Coomarasamy, Wiley-Blackwell (2012)
7. 'Reproductive and Developmental Toxicology' by R.C. Gupta, Academic Press (2011)
8. 'The Reproductive system' by Randolph W. Krohmer, New York, Chelsea House (2010).
9. 'Reproductive Endocrinology and Infertility' (e-Book) by D. T. Carrell & C. M. Peterson, New York, Springer (2010).

Course Website	http://moodle.hku.hk/
Additional Course Information	Refer to the Website of School of Biological Sciences This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3408 Genetics (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr C S C Lo, Biological Sciences *(clivelo@hku.hk)*		
Teachers Involved	Dr C S C Lo, Biological Science Dr J Zhang, Biological Sciences		
Course Objectives	This course aims to provide students with fundamental knowledge of classical, molecular and population genetics		
Course Contents & Topics	Topics will include cellular reproduction, principles and chromosomal basis of Mendelian genetics, linkage analysis and mapping, concept and definition of the gene, molecular mechanisms of mutation, DNA repair and recombination, DNA transposition, extranuclear inheritance, developmental genetics, quantitative and population genetics. Students are strongly encouraged to take BIOL2303 Molecular Biology to get a more comprehensive coverage of topics in molecular genetics.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	appreciate the beauty of genetic organizations in nature
CLO 2	use different genetic principles to explain hereditary traits observed in nature and laboratories
CLO 3	apply qualitative and quantitative experimental methodologies for genetic analysis at individual and population levels

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Integration of the full range of appropriate theories, principles, evidence and techniques
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. General integration of theories, principles, evidence and techniques

	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Some partial integration of theories, principles, evidence and techniques
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited integration of theories, principles, evidence and techniques
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Little or no or inapt integration of theories, principles, evidence and techniques

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials	tutorials & laboratories	6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	laboratory reports, assignments	30	CLO 1,2,3
Examination		70	CLO 1,2,3

Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3409 Business aspects of biotechnology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr W B L Lim, Biological Sciences *(bllim@hku.hk)*		
Teachers Involved	Dr W B L Lim, Biological Science Dr G Panagiotou, Biological Science		
Course Objectives	The course will give an overview of the innovative developments in biotech industry and provide the students with useful tools in learning how an exciting research idea can be turned into a viable business model.		
Course Contents & Topics	The course will first introduce the history and current development of the biotechnology industry. Leading companies in healthcare biotechnology, protein pharmaceuticals, vaccines, diagnostics, industrial enzymes, transgenic animals and crops, will be taken as examples to illustrate the underlining technology principles. Topics on 4P of biotechnology industry, intellectual properties, patent laws, patent application process, licensing, start-up and fundraising will be covered. Research and development of products, scale-up, clinical trials, field tests, regulatory agencies, good laboratory practice and good manufacturing practice will be illustrated. Throughout the course, guest entrepreneurs, managers and directors of the biotech industry will be presenting case studies and explain their involvement in various biotech and pharmaceutical companies.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand and demonstrate knowledge of the development and management of biotechnology businesses
CLO 2	understand and demonstrate how discoveries and inventions are commercialized
CLO 3	navigate the various steps in the development of a biotechnology derived product: from bench, to scale-up, to market
CLO 4	gain technical and business knowledge of the biotechnology and bioprocessing industries
CLO 5	participate and contribute to the business side of scientific enterprises

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in any level 2 BIOL or BIOC course		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Students acquire exceptional skills and knowledge from the course and are capable of independently analyzing the business and technological developments of various biotechnology ventures.
B	Students demonstrate a broad and in-depth understanding of the current developments in biotechnology industry and are capable of analyzing the business and technological developments of various biotechnology ventures under guidance.
C	Students demonstrate a broad and in-depth understanding of the current developments in biotechnology industry.
D	Students demonstrate a moderate understanding of the current developments in biotechnology industry.
Fail	Students fail to demonstrate a moderate understanding of the current developments in biotechnology industry.

Course Type	Lecture-based course

Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Group work</td><td>group work/project/visit</td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td>patent (10%), licensing agreement (10%), business plan (35%)</td><td>70</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Presentation</td><td>learn yourself (5%), team building (10%)</td><td>15</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Test</td><td></td><td>15</td><td>CLO 1,2,3,4,5</td></tr></table>
Required/recommended reading and online materials	TBC
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3419 Insect ecology: the little things that run the world (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	25
Course Co-ordinator	Dr B Guenard, Biological Sciences *(bguenard@hku.hk)*		
Teachers Involved	Dr B Guenard, Biological Sciences		
Course Objectives	This course introduces the students with the biology of terrestrial arthropods. With a main focus on insects and arachnids, students will be introduced to various aspects of their anatomy and physiology, systematics, and ecology to understand the fundamental roles that arthropods play in natural and human-shaped ecosystems. The course will focus particularly on the diversity and importance of insects in South East Asia.		
Course Contents & Topics	With about 1.1 million and 110,000 species described respectively, insects and arachnids represent nearly 80% of all species known on the planet. A diversity also reflected in the diversity of behaviours, evolutionary adaptations or ecological interactions played at all trophic levels within ecosystems. As herbivores, pollinators, seed-dispersal agents, predators, parasitoids, disease vectors or decomposers, arthropods are major components in the stability and functioning of most ecosystems. Yet their importance is often underestimated by many fields of biology to the profit of larger "charismatic" vertebrates. However, arthropods offer incredible opportunities for scientific discoveries, revealing sometimes attributes in morphology, reproduction or behaviour beyond the most prolific imagination, and challenging existing paradigms in ecology and evolution. This course will propose an introduction to these extremely successful organisms and give them the value they deserve. A first step to the study of arthropods is to learn how to identify them correctly. Part of this course will present the main criteria to recognize major insects and arachnids groups. The second part will focus on their diversity, distribution and ecological functions within ecosystems. Finally the last part of the course will present the impacts of human activities on arthropods, how they have been used historically and nowadays, and what kind of problems or solution they represent for human societies?		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>identify major groups of insects and arthropods</td></tr><tr><td>CLO 2</td><td>understand and use the main collecting methods to sample arthropod diversity</td></tr><tr><td>CLO 3</td><td>understand the ecological diversity of arthropod groups and their importance in ecosystems</td></tr><tr><td>CLO 4</td><td>understand the biotic and abiotic factors that drive terrestrial arthropod species richness and abundance</td></tr><tr><td>CLO 5</td><td>understand how human activities modify insect diversity</td></tr><tr><td>CLO 6</td><td>describe the multiple roles played by insects on human activities</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL1309 Evolutionary diversity and BIOL2306 Ecology and evolution		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstration of an excellent understanding of the biological concepts and theories developed during the course. Master the identification skills and use of taxonomic keys of the different groups of arthropods studied. Present an active and participative attitude in class. Curation and identification of the collection reaching international scientific standard as presented during the course.</td></tr><tr><td>**B**</td><td>Demonstration of a good understanding of the biological concepts and theories developed during the course. Master most of the identification skills and use of taxonomic keys of the different groups of arthropods. Participation in class more limited. Curation and identification of the collection satisfactory for the course.</td></tr><tr><td>**C**</td><td>Demonstration of a general but incomplete understanding of the biological concepts and theories developed during the course. Identification skills and use of taxonomic keys of the different groups of arthropods insufficient to provide reliable identification. Participation in class very limited or irrelevant. Curation and identification of the collection not reaching academic level.</td></tr></table>		

	D — Demonstration of a limited understanding of the biological concepts and theories developed during the course. Identification skills and use of taxonomic keys of the different groups of arthropods inadequate and mostly inaccurate. No participation in class or unsettling. Poor curation and identification of the collection. **Fail** — Fail to provide evidence of knowledge on the biological concepts and theories developed during the course. No identification skills and lack of knowledge on how to use taxonomic keys. No participation in class or unsettling. Curation and identification highly unsatisfactory or work not delivered on time.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	(see table below)

Activities	Details	No. of Hours
Lectures		24
Laboratory	This part includes 4 hours of lectures about identification and curation of arthropod collection.	28
Project work	Students will collect independently their own insect collection, curate and identify the specimen collected	48
Reading / Self study		50

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,5,6
Examination		40	CLO 1,2,3,4,5,6
Laboratory reports		30	CLO 1,2,3

Required/recommended reading and online materials	Price et al. 2011. Insect Ecology: behavior, populations and communities. Cambridge University Press, New York, USA. 801 pages. Schowalter T. D. 2011. Insect Ecology, an ecosystem approach. Elsevier, China. 633 pages.
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL3501 Evolution (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr M Sun, Biological Sciences *(meisun@hku.hk)*		
Teachers Involved	Dr M Sun, Biological Sciences		
Course Objectives	Evolution is the cornerstone of modern biology. The course aims to introduce students to the major themes of contemporary evolutionary biology, including the history of evolutionary biology, evolutionary processes, adaptation, speciation, and evolution as an explanatory framework at all levels of biological organization. The course emphasizes the interplay between theory and empirical tests of hypotheses, thus acquainting students with the process of science.		
Course Contents & Topics	Introduction to Evolution - The relevance of evolution to everyday life - Cases for evolutionary thinking Evolution as Fact - Patterns of evolutionary change - The evidence for evolution Evolution as Theory - Before Darwin - Darwinism - The Modern Synthesis & beyond The Mechanisms of Evolution - The origin of genetic variation: mutation - Genetic drift: evolution at random. - Natural selection, sexual selection, and adaptation. - Migration Evolution and Biodiversity - Species - Speciation - Evolution and development - The history of life - Estimating Evolutionary Trees		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	familiar with the facts and theory of evolution
CLO 2	describe Darwin's theory of evolution by natural selection and how the process of natural selection can lead to speciation
CLO 3	have an advanced understanding of the modern evolutionary theory
CLO 4	apply evolutionary thinking to real world problems in agriculture, medicine, and biodiversity conservation

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution

Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Exceptionally good performance demonstrating excellent understanding of the subject matter, extensive knowledge over a wide range of topics covered by the course, and skillful applications of concepts/theories in solving new or unfamiliar problems, showing strong abilities in critical thinking and logical reasoning, with evidence of significant insight and original thought in dealing with the critical issues in the field.
B	Good performance demonstrating capacity to use the appropriate concepts, a good understanding of the subject matter, and an ability to handle the problems and materials encountered in the subject, showing evidence of attaining most of the course learning outcomes.
C	Adequate performance demonstrating some understanding of the subject matter, an ability to handle relatively simple problems, but showing incomplete command of knowledge required for attaining most of the expected course learning outcomes.
D	Minimally acceptable performance demonstrating at least partial familiarity with the subject matter and some capacity to deal with relatively simple problems, but also demonstrating serious deficiencies in knowledge required for attaining most of the expected course learning outcomes.
Fail	Poor performance in all aspects of the course, showing little evidence of learning, lacking real understanding of the subject matter, demonstrating deficiencies serious enough to make it inadvisable to proceed further without additional course work.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Project work		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Essay		5	CLO 1,2,3,4
Examination		50	CLO 1,2,3,4
Presentation		10	CLO 1,2,3,4
Project reports	including computer lab	15	CLO 1,2,3,4
Test		10	CLO 1,2,3,4

Required/recommended reading and online materials	J.C. Herron and S. Freeman: Evolutionary Analysis (5th ed. Pearson, 2013) Douglas J. Futuyma: Evolution, (3rd Edition, Sinauer Associates, 2013) eBooks available.
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3502 Conservation genetics (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr M Sun, Biological Sciences *(meisun@hku.hk)*		
Teachers Involved	Dr M Sun, Biological Sciences		
Course Objectives	The course aims to familiarize students with fundamental principles and recent advances in conservation genetics. The theories and methods will be taught with a balanced range of examples - mammals, birds, reptiles, amphibians, fish, invertebrates, as well as plants - to demonstrate how genetic data can be used to answer a range of important questions in real world conservation practice.		

Course Contents & Topics

Introduction to conservation genetics.

Part I. Evolutionary Genetics of Natural Populations:
- genetic diversity
- characterizing genetic diversity: single loci and quantitative variation;
- evolutionary impacts of natural selection, mutation, migration and their interactions in large populations;
- genetic consequences of small population sizes;
- maintenance of genetic diversity;
- population genomics.

Part II. Effects of Population Size Reduction:
- loss of genetic diversity in small populations;
- inbreeding;
- inbreeding depression;
- population fragmentation;
- genetically viable populations.

Part III. From Theory to Practice:
- resolving taxonomic uncertainties and defining management units;
- genetic management of wild populations;
- genetic issues in introduced and invasive species;

	- genetic management of captive populations; - genetic management for reintroduction; - use of molecular genetics in forensics and understanding species biology.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate an advanced understanding of the concepts of conservation genetics CLO 2 understand the criteria for determining the conservation status of endangered, vulnerable, or threatened species CLO 3 know the methods for characterizing genetic diversity at population and species levels CLO 4 comprehend the relationships between genetic diversity, inbreeding, reproductive fitness, and evolutionary potential in wild populations CLO 5 describe the effects of habitat fragmentation and population size reduction on genetic diversity and the implications in managing nature reserves CLO 6 gain ability to integrate genetic information in resolving taxonomic uncertainties, in understanding species biology, in setting conservation priorities, and in developing management strategies for wild and captive populations
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution or BIOL3303 Conservation ecology or BIOL3408 Genetics
Offer in 2015 - 2016	Y 2nd sem **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Exceptionally good performance demonstrating excellent understanding of the subject matter, extensive knowledge over a wide range of topics covered by the course, and skillful applications of concepts/theories in solving new or unfamiliar problems, showing strong abilities in critical thinking and logical reasoning, with evidence of significant insight and original thought in dealing with the critical issues in the field. **B** Good performance demonstrating capacity to use the appropriate concepts, a good understanding of the subject matter, and an ability to handle the problems and materials encountered in the subject, showing evidence of attaining most of the course learning outcomes. **C** Adequate performance demonstrating some understanding of the subject matter, an ability to handle relatively simple problems, but showing incomplete command of knowledge required for attaining most of the expected course learning outcomes. **D** Minimally acceptable performance demonstrating at least partial familiarity with the subject matter and some capacity to deal with relatively simple problems, but also demonstrating serious deficiencies in knowledge required for attaining most of the expected course learning outcomes. **Fail** Poor performance in all aspects of the course, showing little evidence of learning, lacking real understanding of the subject matter, demonstrating deficiencies serious enough to make it inadvisable to proceed further without additional course work.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	See table below
Assessment Methods and Weighting	See table below
Required/recommended reading and online materials	Frankham et al: Introduction to Conservation Genetics (Cambridge University Press, 2009, 2nd ed.) e-book available
Course Website	http://moodle.hku.hk/
Additional Course Information	Website - to be listed This course will be offered subject to a minimum enrollment number and availability of teachers.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		12
Project work		12
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,3,4,5,6
Essay		5	CLO 1,2,3,4,5
Examination		50	CLO 1,4,5,6
Laboratory reports		10	CLO 3
Presentation		10	CLO 1,4,5,6
Project report		5	CLO 1,4,6
Test		10	CLO 1,4,5,6

BIOL3503 Endocrinology: human physiology II (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	120
Course Co-ordinator	Prof B K C Chow, Biological Sciences *(bkcc@hku.hk)*		

<table>
<tr><td>Teachers Involved</td><td>Prof B K C Chow, Biological Sciences
Prof A S T Wong, Biological Sciences</td></tr>
<tr><td>Course Objectives</td><td>To provide an advanced course on hormones and how they regulate metabolism/growth, reproduction and water/salt homeostasis in our body.</td></tr>
<tr><td>Course Contents & Topics</td><td>History: discovery of blood borne factor or hormone. Chemical nature of hormones. Mechanisms of cell-cell signaling. Secondary messengers. Responsivity and hormonal effects.
The hypothalamic pituitary axis
The GHRH-GH-IGF axis. The TRH-TSH-thyroid hormone axis. The CRH-ACTH-cortisol axis. Cortisol and stress. Catecholamine effects and their pathways.
The gastrointestinal system
The enteric nervous system. The cephalic phase, stomach phase and intestinal phase of food digestion. Regulation of acid secretion. Regulation of pancreatic exocrine and endocrine secretion. Gut hormones: gastrin, GIP, CCK, secretin, GLP-1, GLP-2 and motilin. Regulation of feeding, energy balance and food intake.
Insulin and glucagon.
Reproduction
The GnRH-gonadotropin-sex hormone axis. Regulation of LH and FSH release. Male reproductive system. Interaction of hormones produced by various cells in the testis to regulate spermatogenesis. Biological actions of testosterone. The erection reflex. Female reproductive system. Development of ovarian follicles. The menstrual cycle: hormonal control: Ovulation, fertilization and implantation. The placenta as an endocrine organ. Endocrine regulation of parturition. Hormonal control of milk secretion. Prolactin and broodiness.
Osmoregulation
Posterior pituitary hormone, ADH. Aldosterone and sodium balance. Angiotensin's effect on blood pressure. Atrial natriuretic peptide and its function in water and sodium balance.</td></tr>
<tr><td>Course Learning Outcomes</td><td>On successful completion of this course, students should be able to:
<table>
<tr><td>CLO 1</td><td>understand the definition and natures of hormones</td></tr>
<tr><td>CLO 2</td><td>explain and describe secondary messenger pathways for hormones</td></tr>
<tr><td>CLO 3</td><td>describe the connection between pituitary the master gland with higher brain centers and peripheral organs</td></tr>
<tr><td>CLO 4</td><td>explain and describe hormones involved in the regulation of 3 most important body functions including metabolism/growth, reproduction and water/salt homeostasis</td></tr>
</table></td></tr>
<tr><td>Pre-requisites
(and Co-requisites and Impermissible combinations)</td><td>Pass in BIOL2103 Biological sciences laboratory course</td></tr>
<tr><td>Offer in 2015 - 2016</td><td>Y 2nd sem   Examination   May</td></tr>
<tr><td>Offer in 2016 - 2017</td><td>N</td></tr>
<tr><td>Course Grade</td><td>A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td>
<table>
<tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills.</td></tr>
<tr><td>B</td><td>Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills.</td></tr>
<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills.</td></tr>
<tr><td>D</td><td>Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills.</td></tr>
<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td>Lecture with laboratory component course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td>
<table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>24</td></tr>
<tr><td>Laboratory</td><td>a 5-hour laboratory session per week for 5 weeks</td><td>25</td></tr>
<tr><td>Tutorials</td><td></td><td>6</td></tr>
<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
</table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td>
<table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr>
<tr><td>Examination</td><td></td><td>80</td><td>CLO 1,2,3,4</td></tr>
<tr><td>Laboratory reports</td><td>lab performance & report</td><td>20</td><td>CLO 1,3,4</td></tr>
</table></td></tr>
<tr><td>Required/recommended reading
and online materials</td><td>Williams textbook of Endocrinology, (Elsevier, 11th Edition, 2009).
Silverthorn: Human Physiology, An Integrated Approach (Pearson, 2006, 4'" edition).</td></tr>
<tr><td>Course Website</td><td>http://moodle.hku.hk/</td></tr>
</table>

Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers. This course will be offered in alternative year.

BIOL3505 Oyster aquaculture and restoration (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	20
Course Co-ordinator	Dr T Vengatesen, Biological Sciences *(rajan@hku.hk)*		
Teachers Involved	Dr T Vengatesen, Biological Sciences		
Course Objectives	Introduce larval biology and hatchery technology; Provide scientific basis for coastal aquaculture through field demonstrations and laboratory exercises; Enable students to design, construct and maintain larval hatchery for production of seeds for aquaculture and restoration of wild oysters; Understand the reasons for restoration of marine, estuarine and coastal ecosystems; Facilitate transfer of academic knowledge to aquaculture for sustainable food production.		
Course Contents & Topics	This experiential learning course is to enhance students' knowledge in applied larval biology techniques and advanced coastal aquaculture production systems that will enable them to design, construct, operate and maintain oyster aquaculture facilities for food production and restoration of wild population. This is an interdisciplinary endeavor encompassing larval hatchery technology and aquaculture. After reading about basic oyster biology and coastal aquaculture, we will focus on hatchery technology and aquaculture. Environmental issues, legislation pertaining to coastal aquaculture will also be covered using oyster farming in Hong Kong as an example. Students will learn why oyster habitat is declining in HK and would also explore scientific and management ways to restore oyster habitat. Students will be exposed to few aquaculture facilities in Hong Kong & will be taken to Penang (Malaysia) to learn practical skills of oyster farming. This course is designed to meet the needs of an expanding sustainable aquaculture in Hong Kong. Students will be exposed to a unique learning environment involving not only HKU but also teachers from Universiti Sains Malaysia (USM), bringing with them diverse range of expertise, culture, and learning opportunities. Career and small scale business opportunities in aquaculture industry will be discussed. Thus, students will be provided adequate knowledge & analytical capabilities for a successful career in larval biology research and aquaculture.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: examine the influence of environmental variables on larval development and recruitment, and consider the potential effects of these variables on hatchery and farming CLO 2: acquire skills and experiential learning opportunities (e.g. hands-on experiences at laboratories and farms) in oyster hatchery and farming CLO 3: explain the importance of oyster farming in coastal habitat restoration CLO 4: plan and execute a commercially important research project in larval biology and aquaculture		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2306 Ecology and evolution or BIOL3301 Marine biology or BIOL3303 Conservation ecology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Evidence of original thought during the analysis of larval biology issues. Show evidence of analytical, critical and multidimensional thinking about the study subject. Extensive knowledge and skills required for attaining all the course learning outcomes. Demonstrate excellent ability to apply what you have learned in the class room to critically analyze the larval biology project data. Show highly effective organizational, presentational and field trip skills. **B**: Show substantial knowledge and thought during the analysis of marine life science issues. Show substantial knowledge and thought during the analysis of marine life science issues. Show some evidence of some analytical, critical and multidimensional thinking about the study subject. Good knowledge and skills required for attaining all the course learning outcomes. Demonstrate good ability to apply what you have learned in the class room to critically analyze the real marine life science issues. Show effective organizational, presentational and field trip skills. **C**: Show general but incomplete knowledge and original thought during the analysis of marine life science issues. Fair knowledge and skills required for attaining all the course learning outcomes. Demonstrate fair ability to apply what you have learned in the class room to critically analyze the real marine life science issues. Show considerable organizational, presentational and field trip skills. **D**: Evidence to show a minimum knowledge (i.e. knowledge is very incomplete) and thought during the analysis of marine life science issues. Show insufficient knowledge and skills required for attaining all the course learning outcomes. Demonstrate poor ability to apply what you have learned in the class room to critically analyze the real marine life science issues. Show very little organizational, presentational and field trip skills. **Fail**: Evidence of meager or inadequate knowledge and understanding of marine life science issues. Show no evidence of knowledge and skills required for attaining all the course learning outcomes. Demonstrate no ability to apply what you have learned in the class room to critically analyze the real marine life science issues. Show no evidence of familiarity with relevant reading material and field trip demonstrations, or any knowledge of organizational and presentational skills.		
Course Type	Field camps		
Course Teaching & Learning Activities			

Activities	Details	No. of Hours
Lectures		25
Field work		25
Laboratory work		25
Tutorials		10
Presentation		5

	Reading / Self study		20
	Assessment		10

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 3,4
Report	Presentation: developing innovative ideas for sustainable and economically viable aquacultre in Hong Kong	50	CLO 4
Test		25	CLO 1,2

Required/recommended reading and online materials	Ecology of Marine Invertebrate Larvae (Larry McEdward, CRC Press) Shellfish Aquaculture and the Environment (S.E. Shumway, John Wiley & Sons) Molluscan Shellfish Farming (Brian Spencer, John Wiley & Sons)
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3951 Ecology & biodiversity field course (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	20
Course Co-ordinator	Dr L Karczmarski, Biological Sciences *(leszek@hku.hk)*		
Teachers Involved	Dr L Karczmarski, Biological Sciences		
Course Objectives	This course is offered as a capstone experience and will require intense study of a topic relevant to the Ecology & Biodiversity Major during a field course, inside or outside Hong Kong.		
Course Contents & Topics	Every year a number of different potential courses may be offered. The precise contents will be tailored to best suit the topic and locality involved and will therefore vary according to the specific course being held. The basic contents will involve lectures, seminars and extensive field and follow-up laboratory work. It is essential that students contact the course coordinator for further information on the courses available.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand of the biodiversity and primary habitats in the ecosystem studied
CLO 2	establish the basic skills needed to identify target species associated with the field course
CLO 3	be knowledgeable about and able to implement sampling techniques for organisms in the particular ecosystems studied
CLO 4	understand the basic ecology of target species and how biotic and abiotic factors shape focal communities

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of a thorough grasp of the subject and relevant research techniques. Eagerness and enthusiasm to learn and excellent familiarity with relevant background reading and case studies. Exemplary handling of field data collection and excellent analytical skills. Ample evidence of independent critical thought with excellent use of a broad range of fundamental concepts and broader comparative perspective to draw insightful and logical conclusions. Show outstanding abilities of independent work, effective presentation skills with excellent analytical argumentation. Excellent or outstanding work relative to what is required at degree level.
B	Evidence of a good grasp of the subject and relevant research techniques. Interest in learning and good-to-moderate familiarity with relevant background reading and case studies. Good handling of field data collection and commendable analytical skills. Good evidence of critical thought (although not always independent), with an appreciable use of fundamental concepts and consideration of broader comparative perspective in drawing logical conclusions. Good abilities of independent work, effective presentation skills with logical and analytical argumentation. Work more than sufficient for what is required at degree level.
C	Demonstrate an adequate, but incomplete grasp of the subject and relevant research techniques. Moderate familiarity with relevant background reading and case studies, but no interest in learning beyond the adequate average level. Evidence of logical critical thinking (although not always independent), with mostly good use of fundamental concepts to draw logical conclusions. Fair presentation skills, with mostly correct argumentation, but limited (or no) abilities to integrate broader concepts. Work sufficient for what is required for degree level.
D	Demonstrate some grasp of the subject, but only partial and with limited understanding of relevant research concepts and research techniques. Some familiarity with relevant case studies, but insufficient evidence of background reading and limited abilities of critical independent thinking. Ineffective presentation skills with generally weak logical argumentation with restricted ability of drawing appropriate conclusions. Work barely meets what is required at degree level.
Fail	No evidence of basic a minimum grasp of the subject and the minimum relevant research techniques. No evidence of background reading and no familiarity with any relevant examples and case studies. Inadequate evidence of coherent logical thought; ineffective presentation skills with poor argumentation and no abilities to draw meaningful conclusions. Work fails to reach degree level.

Course Type	Field camps

Course Teaching & Learning Activities

Activities	Details	No. of Hours

	Field work		42
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		35	CLO 1,2,3,4
	Report	project report (35%), group investigation & presenation (30%)	65	CLO 1,2,3,4

Required/recommended reading and online materials	Students will be directed to relevant scientific literautre and websites
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	Students can choose either one of the following courses: Subclass A: Marine Mammal Field Course Subclass B: Animal Behaviour Field Course Enrollment Procedure: The course is open to enrollment only during the add/drop period of the 2nd semester. Students are required to submit a brief (maximum 1-page) application letter (PDF file) via e-mail to the Course Coordinator (leszek@hku.hk) not later than 11 January 2016. The application shall include the following: 1. Personal and academic details 2. ID photograph 3. Brief description of academic interests 4. GPA 5. Pre-requisite courses taken and grades received (if pre-requisites are not met, a reasoned request for waiver) All applications will be reviewed prior to the commencement of the 2nd semester and results will be announced within the 1st week of the add/drop period of the 2nd semester.

BIOL3991 Directed studies in ecology & biodiversity (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Prof G A Williams, Biological Sciences *(hrsbwga@hku.hk)*		
Teachers Involved	All academic staff in Ecology & Biodiversity Major, Biological Sciences		
Course Objectives	Students will undertake a dissertation on a topic related to the field of ecology and biodiversity. The dissertation will not involve any practical research in terms of laboratory or fieldwork, but will take the form of a desk-top study. Conducting a dissertation is an independent learning experience and will enable students to develop skills including the use of library and Web-based resources; the logical development of scientific arguments; written presentation skills; and personal time management.		
Course Contents & Topics	An appropriate dissertation topic will be selected from a predetermined list and following discussion with a member of Ecology & Biodiversity staff, who will act as the student's supervisor. Formal teaching will be limited and aimed at introducing students to the techniques necessary for successful completion of their dissertation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	identify a relevant scientific question or knowledge gap
	CLO 2	establish a desk-top literature approach to test the question posed / address the knowledge gap
	CLO 3	undertake the appropriate research to test the question / address the knowledge gap using sound scientific principles; including statistical analyses where appropriate
	CLO 4	draw appropriate scientific conclusions from their research
	CLO 5	present their research as a scientific paper

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Evidence of complete or near-complete understanding and a thorough grasp of the subject matter as demonstrated by attainment of all learning outcomes. Excellent critique and knowledge of relevant literature and identification of research hypothesis. Well designed scientific approach to test research hypothesis. Show excellent organizational and/or analytical skills. Demonstrate comprehensive, critical, assessment of findings and professional presentation of research work.
	B	Evidence of near-complete understanding and a good grasp of the subject matter as demonstrated by attainment of the majority of learning outcomes. Good critique and knowledge of relevant literature and identification of research hypothesis. Appropriately designed scientific approach to test research hypothesis. Show good organizational and/or analytical skills. Demonstrate effective, critical, assessment of findings and good presentation of research work.
	C	Evidence of adequate understanding and grasp of the subject matter as demonstrated by general but incomplete attainment of most of the learning outcomes. Acceptable critique and knowledge of relevant literature and identification of research hypothesis. Adequately designed scientific approach to test research hypothesis. Show fair organizational

		and/or analytical skills. Demonstrate adequate but not necessarily critical, assessment of findings and presentation of research work.
	D	Evidence of limited understanding and grasp of the subject matter as demonstrated by incomplete attainment of many of the learning outcomes. Limited critique and knowledge of relevant literature and identification of research hypothesis. Poorly designed scientific approach to test research hypothesis. Show fair organizational and/or analytical skills. Demonstrate confused and poorly organized assessment of findings and limited presentation of research work.
	Fail	Evidence of poor or inadequate understanding and grasp of the subject matter such that most of the learning outcomes are not attained. Poor critique and knowledge of relevant literature and identification of research hypothesis. Badly designed scientific approach to test research hypothesis. Show little evidence of appropriate organizational and/or analytical skills. Demonstrate incorrect interpretation and assessment of findings and poor presentation of research work.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	at least 120 hours on the dissertation or project	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Research report	Mid-term written essay plan (20%), Written report 6000-7000 words (excluding figures and references) (80%)	100	CLO 1,2,3,4,5

Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	Regular meetings between the supervisor and student. Guidance from the supervisor on the scientific methods, and on how to think and write scientifically. Students should spend at least 120 hours on the dissertation or project. Recommended reading may be assigned.

BIOL3992 Directed studies in food & nutritional science (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Prof H Corke, Biological Sciences *(harold@hku.hk)*		
Teachers Involved	All academic staff in Food & Nutritional Science Major, Biological Sciences		
Course Objectives	This course aims to provide a stimulating capstone experience for all Food & Nutritional Science Major undergraduates to integrate and apply their knowledge and skills obtained from the Major.		
Course Contents & Topics	The directed study can be a review of literature on a specific topic, or a lab or field study that enhances the student's understanding of the topic in the field of food & nutritional science. The student should obtain the commitment of a supervisor in the area of the dissertation topic before submitting the registration form for the course (available from the General Office of School of Biological Sciences). Supervisor will introduce various methodologies/techniques and guide students to completion of the dissertation. Teaching will be informal and students will gain knowledge through discussion and feedback from their supervisors.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	acquaint with the process of scientific enquiry
CLO 2	have a better understanding of the nature of food & nutritional science
CLO 3	apply scientific methods to address important issues in various biological disciplines
CLO 4	develop the key intellectual skills that will be valubale for all scientific studies

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutritional Science Major. This capstone course is for Food & Nutritional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Work displaying a high level of scholarship and originality; virtually flawless presentation with excellent introduction to dissertation topic, showing a thorough grasp of the topic from background reading and analysis; clear statement of the objectives of the research; comprehensive exploration of the topic, personal synthesis of the issues with detailed support from the literature; comprehensive and up-to-date references integrated into argument or logical reasoning; critical evaluations of the main points or problems and their solutions and implications; thought-provoking discussions; accurate summary. All chapters/paragraphs are well-connected and presented logically with clarity of goals, demonstrating excellent organizational, rhetorical and presentational skills. The length of the dissertation meet the specified requirements. All other aspects of the dissertation conform to a high academic standard.
B	Work showing some evidence of originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; demonstrating substantial understanding of fundamental concepts of the field of study; adequate grasp of the topic from background reading and analysis; a systematic exploration of the topic which may include an attempt at critical comment or appraisal; regular support provided from the literature; comprehensive and up-to-date references included; main points fully elaborated; summary given in the final chapter/paragraphs; communicating information and ideas clearly and fluently, demonstrating good organizational, rhetorical and presentational skills. The length of the dissertation meet the specified requirements. Most aspects conform to a high academic standard.
C	Work showing no evidence of originality and insight, but the presentation demonstrated adequate understanding and comprehension of most aspects of the dissertation topic; essential topic materials have been read and acknowledged; the main points presented in logically sequential paragraphs; reasonably balanced discussion of the major issues; acceptable interpretation of the topic, some explanation, illustration and support provided from the literature; summary given in the final chapter/paragraphs; most presentation details met (front page, margin, legibility, citations correctly

		reported and tabulated, etc.); few typos or grammatical errors; Most aspects conform to an acceptable academic standard.
	D	Demonstrating superficial or partial or faulty understanding of the fundamental concepts of the field of study; showing the bare minimum of information, poorly digested and not very well organized in presentation; irrelevant material; showing no evidence of critical thinking; arguments undeveloped or inappropriate or unsupported; lack of clarity or structure in communicating information or ideas. dissertation topic not fully covered; discussion too brief or just repeating the data or findings; overuse quotations with little explanation; insufficient support from literature; reading not well incorporated into the text; limited acknowledgements and light bibliography; some major points missed. Minimum conform to an acceptable academic standard.
	Fail	The dissertation topic was not covered acceptably; demonstrating evidence of poor knowledge, clear deficiencies in understanding fundamental concepts; materials largely irrelevant; incomplete or confusing communication of information or ideas; unreflective; incoherent argument; complete misinterpretation of the topic or data; no evidence of reading (no acknowledgements or bibliography); structure confused or not discernible; Fail to meet most or all of the basic requirements of the course. The written work is not of an academic standard.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	at least 120 hours on the dissertation or project	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	15 minutes (Plus 5 minutes for questions and answers).	20	CLO 1,2,3,4
Research report	Written report 6000-8000 words (excluding figures and references).	80	CLO 1,2,3,4

Course Website	http://moodle.hku.hl/
Additional Course Information	Regular meetings between the supervisor and student. Guidance from the supervisor on the scientific methods, and on how to think and write scientifically. Students should spend at least 120 hours on the dissertation or project. Recommended reading may be assigned.

BIOL3993 Directed studies in Molecular biology & biotechnology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr W K Yip, Biological Sciences *(wkyip@hku.hk)*		
Teachers Involved	All academic staff in Molecular Biology & Biotechnology Major, Biological Sciences		
Course Objectives	This course aims to provide a stimulating capstone experience for all Molecular Biology & Biotechnology Major undergraduates to integrate and apply their knowledge and skills obtained from the Major.		
Course Contents & Topics	The directed study can be a review of literature on a specific topic, or a lab or field study that enhances the student's understanding of the topic in the field of molecular biology & biotechnology. The student should obtain the commitment of a supervisor in the area of the dissertation topic before submitting the registration form for the course (available from the General Office of School of Biological Sciences). Supervisor will introduce various methodologies/techniques and guide students to completion of the dissertation. Teaching will be informal and students will gain knowledge through discussion and feedback from their supervisors.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	acquaint with the process of science
CLO 2	have a better understanding of the nature of molecular biology & biotechnology
CLO 3	apply scientific methods to address important issues in various biological disciplines
CLO 4	develop the key intellectual skills that will be valubale for all scientific studies

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Molecular Biology & Biotechnology Major. This capstone course is for Molecular Biology & Biotechnology Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Work displaying a high level of scholarship and originality; virtually flawless presentation with excellent introduction to dissertation topic, showing a thorough grasp of the topic from background reading and analysis; clear statement of the objectives of the research; comprehensive exploration of the topic, personal synthesis of the issues with detailed support from the literature; comprehensive and up-to-date references integrated into argument or logical reasoning; critical evaluations of the main points or problems and their solutions and implications; thought-provoking discussions; accurate summary. All chapters/paragraphs are well-connected and presented logically with clarity of goals, demonstrating excellent organizational, rhetorical and presentational skills. The length of the dissertation meet the specified requirements. All other aspects of the dissertation conform to a high academic standard.
B	Work showing some evidence of originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; demonstrating substantial understanding of fundamental concepts of the field of study; adequate grasp of the topic from background reading and analysis; a systematic exploration of the topic which may include an attempt at critical comment or appraisal; regular support provided from the literature; comprehensive and up-to-date references included; main points fully elaborated; summary given in the final chapter/paragraphs; communicating information and ideas clearly and fluently, demonstrating good organizational, rhetorical and presentational skills. The length of the dissertation meet the specified requirements. Most aspects conform to a high academic standard
C	

		Work showing no evidence of originality and insight, but the presentation demonstrated adequate understanding and comprehension of most aspects of the dissertation topic; essential topic materials have been read and acknowledged; the main points presented in logically sequential paragraphs; reasonably balanced discussion of the major issues; acceptable interpretation of the topic, some explanation, illustration and support provided from the literature; summary given in the final chapter/paragraphs; most presentation details met (front page, margin, legibility, citations correctly reported and tabulated, etc.); few typos or grammatical errors; Most aspects conform to an acceptable academic standard.
	D	Demonstrating superficial or partial or faulty understanding of the fundamental concepts of the field of study; showing the bare minimum of information, poorly digested and not very well organized in presentation; irrelevant material; showing no evidence of critical thinking; arguments undeveloped or inappropriate or unsupported; lack of clarity or structure in communicating information or ideas. dissertation topic not fully covered; discussion too brief or just repeating the data or findings; overuse quotations with little explanation; insufficient support from literature; reading not well incorporated into the text; limited acknowledgements and light bibliography; some major points missed. Minimum conform to an acceptable academic standard.
	Fail	The dissertation topic was not covered acceptably; demonstrating evidence of poor knowledge, clear deficiencies in understanding fundamental concepts; materials largely irrelevant; incomplete or confusing communication of information or ideas; unreflective; incoherent argument; complete misinterpretation of the topic or data; no evidence of reading (no acknowledgements or bibliography); structure confused or not discernible; Fail to meet most or all of the basic requirements of the course. The written work is not of an academic standard.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	at least 120 hours on the dissertation or project	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	15 minutes (Plus 5 minutes for questions and answers).	20	CLO 1,2,3,4
Research report	Written report 6000-8000 words (excluding figures and references).	80	CLO 1,2,3,4

Course Website	http://moodle.hku.hk/
Additional Course Information	Regular meetings between the supervisor and student. Guidance from the supervisor on the scientific methods, and on how to think and write scientifically. Students should spend at least 120 hours on the dissertation or project. Recommended reading may be assigned.

BIOL3994 Directed studies in biological sciences (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr J S H Tsang, Biological Sciences *(jshtsang@hku.hk)*		
Teachers Involved	All academic staff in Biological Sciences Major, Biological Sciences		
Course Objectives	This course aims to provide a stimulating capstone experience for all Biological Sciences Major undergraduates to integrate and apply their knowledge and skills obtained from the Major.		
Course Contents & Topics	The directed study can be a review of literature on a specific topic, or a lab or field study that enhances the student's understanding of the topic in the field of biological sciences. The student should obtain the commitment of a supervisor in the area of the dissertation topic before submitting the registration form for the course (available from the General Office of School of Biological Sciences). Supervisor will introduce various methodologies/techniques and guide students to completion of the dissertation. Teaching will be informal and students will gain knowledge through discussion and feedback from their supervisors.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	acquaint with the process of science
CLO 2	have a better understanding of the nature of biological sciences
CLO 3	apply scientific methods to address important issues in various biological disciplines
CLO 4	develop the key intellectual skills that will be valuable for all scientific studies

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Biological Sciences Major. This capstone course is for Biological Sciences Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Work displaying a high level of scholarship and originality; virtually flawless presentation with excellent introduction to dissertation topic, showing a thorough grasp of the topic from background reading and analysis; clear statement of the objectives of the research; comprehensive exploration of the topic, personal synthesis of the issues with detailed support from the literature; comprehensive and up-to-date references integrated into argument or logical reasoning; critical evaluations of the main points or problems and their solutions and implications; thought-provoking discussions; accurate summary. All chapters/paragraphs are well-connected and presented logically with clarity of goals, demonstrating excellent organizational, rhetorical and presentational skills. The length of the dissertation meet the specified requirements. All other aspects of the dissertation conform to a high academic standard.
B	Work showing some evidence of originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; demonstrating substantial understanding of fundamental concepts of the field of study; adequate grasp of the topic from background reading and analysis; a systematic exploration of the topic which may include an attempt at critical comment or appraisal; regular support provided from the literature; comprehensive and up-to-date references included; main points fully elaborated; summary given in the

		final chapter/paragraphs; communicating information and ideas clearly and fluently, demonstrating good organizational, rhetorical and presentational skills. The length of the dissertation meet the specified requirements. Most aspects conform to a high academic standard.
	C	Work showing no evidence of originality and insight, but the presentation demonstrated adequate understanding and comprehension of most aspects of the dissertation topic; essential topic materials have been read and acknowledged; the main points presented in logically sequential paragraphs; reasonably balanced discussion of the major issues; acceptable interpretation of the topic, some explanation, illustration and support provided from the literature; summary given in the final chapter/paragraphs; most presentation details met (front page, margin, legibility, citations correctly reported and tabulated, etc.); few typos or grammatical errors; Most aspects conform to an acceptable academic standard.
	D	Demonstrating superficial or partial or faulty understanding of the fundamental concepts of the field of study; showing the bare minimum of information, poorly digested and not very well organized in presentation; irrelevant material; showing no evidence of critical thinking; arguments undeveloped or inappropriate or unsupported; lack of clarity or structure in communicating information or ideas. dissertation topic not fully covered; discussion too brief or just repeating the data or findings; overuse quotations with little explanation; insufficient support from literature; reading not well incorporated into the text; limited acknowledgements and light bibliography; some major points missed. Minimum conform to an acceptable academic standard.
	Fail	The dissertation topic was not covered acceptably; demonstrating evidence of poor knowledge, clear deficiencies in understanding fundamental concepts; materials largely irrelevant; incomplete or confusing communication of information or ideas; unreflective; incoherent argument; complete misinterpretation of the topic or data; no evidence of reading (no acknowledgements or bibliography); structure confused or not discernible; Fail to meet most or all of the basic requirements of the course. The written work is not of an academic standard.

Course Type	Project-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Reading / Self study	at least 120 hours on the dissertation or project	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	15 minutes (Plus 5 minutes for questions and answers).	20	CLO 1,2,3,4
Research report	Written report 6000-8000 words (excluding figures and references).	80	CLO 1,2,3,4

Course Website	http://moodle.hku.hk/
Additional Course Information	Regular meetings between the supervisor and student. Guidance from the supervisor on the scientific methods, and on how to think and write scientifically. Students should spend at least 120 hours on the dissertation or project. Recommended reading may be assigned.

BIOL4201 Public health nutrition (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	90
Course Co-ordinator	Dr J M F Wan, Biological Sciences *(jmfwan@hku.hk)*		
Teachers Involved	Dr J M F Wan, Biological Science		
Course Objectives	Public health nutrition unites social sciences and biomedical sciences in preventing disease and improving human health through programs aimed at enhancing good nutritional practices. This course presents a broad overview of the professional practice and essential skills required of a public health nutritionist.		
Course Contents & Topics	Public health nutrition : overview, nature and identification of problems, objectives of intervention programs. The epidemiological study of diet : disease associations. Development of dietary guidelines. Undernutrition and overnutrition : definitions, prevalence, public health consequences, and interventions. Epidemiology, public health consequences, and elimination of vitamin and mineral deficiencies. Disease prevention. Educating the public for healthy eating and food safety.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	have a broad knowledge of the scope and methodologies of public health nutrition
CLO 2	have a clear technical understanding of a range of selected examples of public health nutrition cases in less-developed and developed countries
CLO 3	be able to formulate recommendations for action for nutritional interventions at the community level
CLO 4	understand the impact of socio-cultural factors on community food choices and consequently on health outcomes

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3201 Food chemistry or BIOL3202 Nutritional biochemistry		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective laboratory/fieldwork skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.

	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective laboratory /fieldwork skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective laboratory / fieldwork skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp of the subject, retention of some relevant information of the subject. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab / fieldwork skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective laboratory / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		24
Tutorials	30 hours student investigative report, & 12 hours of tutorials/presentations	42
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4

Required/recommended reading and online materials	Public Health Nutrition (The Nutrition Society Textbook Series, 2004) MJ Gibney, BM Margetts, JM Kearney, L Arab (Eds)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4204 Diet, brain function and behavior (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr E T S Li, Biological Sciences *(etsli@hku.hk)*		
Teachers Involved	Dr E T S Li, Biological Sciences		
Course Objectives	To highlight the impact of nutrient provision on brain structure and function, and to discuss various effects of nutrition and diet on mental function and behaviour.		
Course Contents & Topics	Fundamentals of the central nervous system; Nutrition & brain development; Diet, learning & memory function; Dietary CNS stimulants; Neurotransmitters, drugs & behaviour; Physiological and socio-cultural determinants of dietary behaviour.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the basic structure and functions of the brain and how nutrition influences its development
CLO 2	be able to explain the consequences of nutrient inadequacy on cognition
CLO 3	understand the differences between bioactive food ingredients and drugs
CLO 4	critically evaluate and interpret the internal and external cues that determine dietary behaviour

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3204 Nutrition and the life cycle or already enrolled in this course		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough grasp of the subject matter covered. Show exceptional ability on knowledge integration, problem identification and solving. Show outstanding ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate highly effective presentation / writing skills.
B	Demonstrate substantial grasp of the subject matter covered. Show full ability on knowledge integration, problem identification and solving. Show reasonable ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate effective presentation / writing skills.
C	

		Demonstrate general but incomplete grasp of the subject matter covered. Might show misunderstanding of the materials. Show some ability on knowledge integration, problem identification and solving. Show some ability to analyze and interpret scientific data and draw proper conclusions. Demonstrate adequate organization / writing skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Misunderstanding of the materials is not uncommon. Show limited ability on knowledge integration, problem identification and solving. Use elementary approaches to analyze and interpret scientific data and draw sometimes erroneous conclusions. Demonstrate basic organization / writing skills.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in problem solving. Fail to integrate information and identify problems. Seriously deficient in ability to analyze and interpret scientific data and draw conclusions. Demonstrate poor organization / writing skills.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/group discussions/seminars	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,4
Examination		60	CLO 1,2,3,4
Presentation		20	CLO 2,4

Required/recommended reading and online materials	Copper J. R., Bloom F. E. & Roth R. H.: The Biochemical Basis of Neuropharmacology. Oxford University Press, 2003 Lieberman H. R., Kanarek R. B. & Prasad C.: Nutritional Neuroscience. CRC Press, 2005 Nutritional Neuroscience (Journal) Physiology and Behavior (Journal)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4205 Food processing and engineering (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Dr J C Y Lee, Biological Sciences *(jettylee@hku.hk)*		
Teachers Involved	Dr J C Y Lee, Biological Sciences Prof N P Shah, Biological Sciences		
Course Objectives	To provide students with basic principles and methodologies of food processing and preservation technology. To cover key engineering principles relevant to the food industry. Students will gain hands-on experience with selected food processing and preservation techniques.		
Course Contents & Topics	Food processing is a multidisciplinary field combining applied physical sciences with knowledge of product properties and requirements. This course introduces the technical knowledge required to implement cost-effective production and commercialization of food products and services. The design and development of processes, equipment and machinery used to convert raw agricultural materials and ingredients into safe, convenient, and nutritious consumer food products are covered. We discuss the basic engineering principles and applications of methods in food processing and preservation. Techniques discussed will include those for high and low temperature processing, concentration, dehydration, baking and extrusion.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand basic principles of food processing methods and preservation technology
CLO 2	be able to apply their knowledge and practical skills to process and develop food products
CLO 3	demonstrate in-depth understanding of selected methods and problems in food processing and preservation

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3201 Food chemistry		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong evidence of analytical and critical abilities of the changes that take place in variety of food during preparation, processing and storage. Identifies and uses advanced techniques and equipment for a variety of food-specific purposes. Demonstrates advance skills in designing, producing and evaluating solutions of excellent quality for specific food purposes. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities of the changes that take place in variety of food during preparation, processing and storage. Identifies and uses techniques and equipment for a variety of food-specific purposes. Demonstrates high-level skills in designing, producing and evaluating solutions of high quality for specific food purposes. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show adequate evidence of analytical and critical abilities and logical thinking of the changes that take place in variety of food during preparation, processing

		and storage. Identifies and uses appropriate techniques and equipment for a variety of food-specific purposes. Demonstrates adequate skills in designing, producing and evaluating solutions of sound quality for specific food purposes. Use lab skills and techniques and analysis of data and results to draw moderately appropriate conclusions.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking of the changes that take place in variety of food during preparation, processing and storage. Identifies and uses basic techniques and equipment for a variety of food-specific purposes. Demonstrates basic skills in designing, producing and evaluating solutions for specific food purposes. Use lab skills and techniques and analysis of data and results to draw appropriate conclusions occasionally.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking of he changes that take place in variety of food during preparation, processing and storage. Identifies with guidance factors and uses some appropriate techniques and equipment for a limited range of food-specific purposes. With guidance, demonstrates limited skills in designing, producing and evaluating solutions for specific food purposes. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	laboratory/field trip/seminar	24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports		30	CLO 1,2,3

Required/recommended reading and online materials	Food Processing Technology-Principles & Practice 3rd Ed P.J. Fellows Unit Operations in Food Processing - 2nd ed. R.L. Earle
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4207 Meat and dairy sciences (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Prof N P Shah, Biological Sciences *(npshah@hku.hk)*		
Teachers Involved	Prof N P Shah, Biological Science Dr J C Y Lee, Biological Sciences		
Course Objectives	To give students a broad understanding of modern practice and technologies used in meat and dairy production, processing and marketing.		
Course Contents & Topics	Principles of animal nutrition and feed formulation; genetic selection and breeding of farm animals; slaughter and carcass inspection; meat preservation and safety; sensory quality of meat. Dairy processing emphasizing fermented products such as cheese and yogurt; probiotics and health effects. Meat and dairy product marketing.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand modern practices in meat and dairy production
CLO 2	demonstrate a knowledge and understanding of meat and dairy sensory quality, and the technologies used in processing, preservation or improvement of meat and dairy products
CLO 3	demonstrate knowledge of selected issues related to meat and dairy safety

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3201 Food chemistry		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous

		conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		80	CLO 1,2,3
Laboratory reports		20	CLO 1,2

Required/recommended reading and online materials	Lawrie's Meat Science. RA Lawrie (CRC Press, 2006) Dairy Processing and Quality Assurance. RC Chandan, A Kilara, N Shah (Eds) (Blackwell, 2008)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4209 Functional foods (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr M F Wang, Biological Sciences *(mfwang@hku.hk)*		
Teachers Involved	Dr M F Wang, Biological Sciences		
Course Objectives	To provide a fundamental understanding of the rapidly emerging functional food/nutraceutical industry with an emphasis on the history, regulation, chemical basis and quality control of healthy ingredients/products and their effects on human health.		
Course Contents & Topics	Concept, history and global regulation of functional foods and nutraceuticals; classification of functional foods and nutraceuticals based on their chemical structures; unsaturated fatty acids, proteins, food pigments and dietary fibers as healthy food ingredients; health benefits of dietary phenolics, terpenes, phytosterols and sulphur-containing compounds; probiotics and prebiotics; small berries, spices, teas and herbs for health; quality control and assurance of functional foods and nutraceuticals.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the definition and global regulation of functional foods and nutraceuticals
CLO 2	have substantial chemical knowledge of functional food and nutraceutical products
CLO 3	be able to describe examples of functional foods and interpret critically their claimed health benefits
CLO 4	demonstrate understanding of the current functional food and nutraceutical industry
CLO 5	understand major techniques and technologies for quality control and manufacturing of healthy products

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3201 Food chemistry or BIOL3202 Nutritional biochemistry		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use knowledge to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use knowledge to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use knowledge to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use knowledge to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use knowledge

	ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**: Lectures / / 36; Tutorials / tutorials/seminars / 12; Reading / Self study / / 100

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/seminars	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4,5
Examination		70	CLO 1,2,3,4,5

Required/recommended reading and online materials	R. E. C. Wildman: Handbook of Nutraceuticals and Functional Foods (CRC Press, 2007) C. M. Hasler: Regulation of Functional Foods and Nutraceuticals: a Global Perspective (IFT Press, 2005)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4210 Food product development (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr M F Wang, Biological Sciences *(mfwang@hku.hk)*		
Teachers Involved	Dr M F Wang, Biological Sciences		
Course Objectives	To introduce the key concepts and techniques used in food product development. To provide small group experience in the design, development and production of a new food product.		
Course Contents & Topics	History and future of the food industry; industrial product development process; idea generation and prototype development for new food products; quality management and legal protection; marketing strategies; food labeling; food package design; new product development for different food industries.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the food product development cycle
CLO 2	know the key steps in new product development
CLO 3	demonstrate enhanced insight and understanding of current and future trends in the food industry
CLO 4	have professional level practical experience in new product development
CLO 5	know the main characteristics of different sectors of the food industry

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3203 Food microbiology or BIOL4205 Food processing and engineering		
Offer in 2015 - 2016	Y 1st sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.

Course Type	Laboratory and workshop course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Laboratory		48
Group work	80-100 hours group project work	100
Tutorials	10 lectures + 12 tutorials	22

Reading / Self study			100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assessment of group product development project including in-class presentation	80	CLO 1,2,3,4,5
Test		20	CLO 1,2,3,4,5

Required/recommended reading and online materials	A. L. Brody and J. B. Lord: Developing New Food Products for a Changing Marketplace (CRC Press, 2007) E. Graf and I. S. Saguy: Food Product Development (Avi Books, 1991) G. W. Fuller: New Food Product Development (CRC Press, 2005)
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4301 Fish and fisheries (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Prof Y J Sadovy, Biological Sciences *(yjsadovy@hku.hk)*		
Teachers Involved	Prof Y J Sadovy, Biological Sciences		
Course Objectives	- to acquaint students with the principles governing interrelationships among fishes as well as with biotic and abiotic aspects of their environment for an understanding of population dynamics and multispecies interactions. - to provide an understanding of how species diversity and selected aspects of their life history are relevant to fishery management challenges, sustainable supply of seafood, and the conservation of threatened species. - to cover the theoretical and practical aspects of marine fisheries management, fish farming and fish conservation using local, regional and global examples		
Course Contents & Topics	Introduction to course: phylogenetic, biological and ecological concepts and adaptation. Multispecies interactions in marine and freshwater fish assemblages. Fishery theory; how do fisheries work? Status of the world's capture fisheries; fish stock assessment and fishery management practices using local, regional and global examples. The roles of mariculture and capture fisheries for seafood supply and relationship to capture fisheries. Fishery management and fish conservation. Conclusion: fish biodiversity and fishery production; ethics of fish research and exploitation; climate change and the future of fish and fisheries.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the basis of fish species diversity in relation to phylogenetic, ecological and biological factors
CLO 2	appreciate the direct and indirect impacts and consequences of human activities on fish species and species assemblages and implications for seafood security
CLO 3	understand of the functioning of fisheries and standards of fisheries assessment, development and management
CLO 4	appreciate the mutual dependency of humans with fished populations in relation to their long-term sustainability
CLO 5	enhance the ability for critical and synthetic thinking

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3301 Marine biology or BIOL3303 Conservation ecology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>24</td></tr><tr><td>Field work</td><td>Field, laboratory, practical and tutorials</td><td>36</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td></td><td>30</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Examination</td><td></td><td>60</td><td>CLO 1,2,3,4,5</td></tr><tr><td>Test</td><td></td><td>10</td><td>CLO 3</td></tr></table>
Required/recommended reading and online materials	Hart P. J. B. & Reynolds J. D. (eds): Handbook of Fish Biology and Fisheries (Volumes 1 & 2, Blackwell Science Ltd, 2002) G. Helfman, B. Collette and D. Facey: The Diversity of Fishes (Blackwell Science, 1997)
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4302 Environmental impact assessment (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr D M Baker, Biological Sciences *(dmbaker@hku.hk)*		
Teachers Involved	Dr D M Baker, Biological Sciences Prof K M Y Leung, Biological Sciences Dr C H Hau, Biological Sceinces		
Course Objectives	To introduce the general principles, processes, techniques, current practices and problems of environmental impact assessment (EIA).		
Course Contents & Topics	Background and history of EIA development. Concept of carrying capacity and precautionary principle. EIA legislation. Processes in conducting EIA. Risk assessment and management. Mitigatory measures and remediation. Cost benefit analysis. Socio-economic perspectives and analysis. Project monitoring and audit. Common techniques employed in EIA (e.g. matrix, sequence diagram, causal chain analysis, modeling). Modern EIA instruments (environmental liability, environmental insurance and environmental share). Application of EIA in environmental management. Case studies. Role play exercise.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>understand the operation of EIA systems in Hong Kong and overseas</td></tr><tr><td>CLO 2</td><td>apply a variety of techniques in assessing environmental impact</td></tr><tr><td>CLO 3</td><td>evaluate different options and determine acceptability in environmental impact assessment</td></tr><tr><td>CLO 4</td><td>prepare EIA reports for small scale projects</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2306 Ecology and evolution; and Any BIOL3XXX course or ENVS3004 Environment, society and economics		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking.</td></tr><tr><td>B</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of material sand ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking.</td></tr><tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking.</td></tr><tr><td>D</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking.</td></tr><tr><td>Fail</td><td>Fail Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr></table>		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>24</td></tr><tr><td>Field work</td><td>field trip / tutorials</td><td>24</td></tr></table>		

	Reading / Self study	student center learning		70
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		50	CLO 1,2,3,4
	Examination		50	CLO 1,2,3,4
Required/recommended reading and online materials	J. Glasson, R. Therivel & A. Chadwick: Introduction to Environmental Impact Assessment, (London: Routledge, 2005) HKSAR Government: Technical Memorandum for Environmental Impact Assessment Ordinance (Hong Kong: HKSAR Government, 1998) References: To be provided in classes			
Course Website	http://www.biosch.hku.hk/ecology/lsc			
Additional Course Information	The course will be offered subject to a minimum enrollment number and availability of teachers.			

BIOL4303 Animal behaviour (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr L Karczmarski, Biological Sciences *(leszek@hku.hk)*		
Teachers Involved	Dr L Karczmarski, Biological Sciences		
Course Objectives	This course teaches students the ways and means of exploring and understanding animal behaviour; it provides insights into a field of science that investigates everything animals do, including the underlying mechanisms and functions of specific behaviours; the ways in which animals interact with each other, with their physical environment and other organisms; how animals find and defend resources, avoid predators, choose mates, reproduce, and care for their young; how complex animal societies are formed and how behaviour of an individual affects the structure of a population.		
Course Contents & Topics	This course will introduce students to scientific reasoning and conceptual basis of an understanding of animal behaviour and behavioural ecology. What causes specific behaviour and what are the underlying mechanisms? How does behaviour develop within the individual's lifetime and what functions does it serve? For example; why are some species monogamous while others are polygamous? What makes one organism the hunter and another the hunted? Several animal species, including humans, tend to live in groups; social life is among the most complex and effective survival strategy. However, how could, for instance, the birth of sterile castes, like in bees, be explained through an evolving mechanism which emphasizes the reproductive success of as many individuals as possible? Why, among animals living in small groups like squirrels, would an individual risk its own life to save the rest of the group? In this course, based upon ecological and evolutionary principles, students will learn to think within the paradigm of behavioural ecology and understand the causes, functions, development, and evolution of behaviour. We will discuss several classical studies that form the foundation of this field, as well as more recent research that represents the current concepts which have led to modern understanding of animal behaviour. We will also illustrate the links between the recent extraordinary advances in behavioural ecology and socio-ecology with their application in animal conservation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 learn to appreciate the causes, functions, development, and evolution of animal behaviour CLO 2 appreciate the complexity of interactions between environmental selective pressures and animal behaviour CLO 3 appreciate current theories that form basis for modern understanding of animal behaviour CLO 4 learn the scientific reasoning and methodology in the field of Animal Behaviour CLO 5 think analytically in terms of behavioural ecology, animal socio-behavioural complexity, and how the understanding of species' behaviour contributes to its conservation		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution; and pass in one of the following courses: BIOL3301 Marine biology or BIOL3313 Freshwater ecology or BIOL3319 Terrestrial ecology or BIOL3320 The biology of marine mammals		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Evidence of a thorough grasp of the subject in a broader comparative perspective as demonstrated by background reading and excellent use of named examples and case studies. Evidence of independent critical thought with excellent use of a broad range of fundamental concepts to draw insightful and logical conclusions. Show eagerness to learn, great abilities of independent work, effective presentation skills with excellent analytical argumentation. Excellent or outstanding work relative to what is required at degree level. **B** Evidence of a good grasp of the subject as demonstrated by some background reading and appropriate use of named examples and some case studies. Evidence of good critical thought, although not necessarily original. Good and very good (but not outstanding) abilities of independent work, effective presentation skills with good analytical and logical argumentation. Good general command of acquired knowledge to draw meaningful and logical conclusions. Work more than sufficient for what is required at degree level. **C** Demonstrate an adequate, but not coherent and incomplete grasp of the subject, with limited background reading and limited use of named examples and case studies. Some abilities of logical critical thinking, but not insightful and/or independent; only partial abilities to use acquired knowledge and work independently to draw meaningful conclusions. Fair presentation skills, with mostly correct argumentation, but limited (or no) abilities to integrate broader concepts. Work sufficient for what is required for degree level. **D** Demonstrate some grasp of the subject, but partial and limited to the most basic concepts, examples, and limited (or none) case studies. Insufficient evidence of background reading, limited abilities of critical independent thinking, and		

		not particularly effective presentation skills with generally weak logical argumentation and restricted ability of drawing appropriate conclusions. Work barely meets what is required at degree level.
	Fail	No evidence of basic minimum knowledge and understanding of the subject. No evidence of background reading and no familiarity with any relevant examples and case studies. Inadequate evidence of coherent logical thought; ineffective presentation skills with poor argumentation and no abilities to draw meaningful conclusions. Work fails to reach degree level.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	including field trips, site visits, interactive practical/visual sessions, classroom debates	32
Project work	project work review	8
Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	active participation/continuous assessment/presentation	55	CLO 1,2,3,4,5
Examination		45	CLO 1,2,3,4,5

Required/recommended reading and online materials	Bolhuis J.J. & Giraldeau L.A. The Behavior of Animals: Mechanisms, Function, and Evolution (Blackwell Publishing 2005) Danchin E., Giraldeau L-A. & Cezilly F. Behavioural Ecology (Oxford University Press 2008) Dugatkin L.A. Principles of Animal Behavior (2nd edition) (W.W. Norton & Company 2009) Breed M.D. & Moore J. (eds). Encyclopedia of Animal Behavior (Academic Press 2010)
Course Website	http://www.biosch.hku.hk/ecology/lsc
Additional Course Information	This course is offered in alternate year. This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4401 Medical microbiology and applied immunology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr W Y Lui, Biological Sciences *(wylui@hku.hk)*		
Teachers Involved	Dr W Y Lui, Biological Sciences Prof W W M Lee, Biological Sciences Dr A Yan, Biological Sciences		
Course Objectives	The objective is to provide students the knowledge on the practical applications of immunology and microbiology in biological research, clinical analysis and disease diagnosis.		
Course Contents & Topics	Basic parameters affecting antigen-antibody interactions Application of antigen-antibody interaction in advanced research: CHIP assay, co-immunoprecipitation, immunohistochemistry and dual Immunofluorescence Principles and application of flow cytometry Techniques in cellular immunology and tumor immunology Microbial pathogens and associated diseases, host immune response, antimicrobial agents and multidrug resistance, epidemiology and prevention of microbial infections Clinical laboratory analyses in serology, haematology, blood banking, microbiology and chemical pathology		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	apply the principles of antigen-antibody interaction in various advanced research techniques
CLO 2	demonstrate knowledge on microbial pathogens, mechanisms for their disease-causing, and principles of antibiotic development
CLO 3	understand the scientific principles of various clinical laboratory analyses
CLO 4	promote public attention on control of microbial infection and the spread of antibiotic resistance

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3401 Molecular biology or BIOL3403 Immunology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.

	C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports		30	CLO 1,2,3

Required/recommended reading and online materials	To be announced in class
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4402 Microbial biotechnology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr J S H Tsang, Biological Sciences *(jshtsang@hku.hk)*		
Teachers Involved	Dr J S H Tsang, Biological Sciences		
Course Objectives	This course is intended for students who would like to understand the application of modern microbiology in biotechnology. The microbial systems being used include different types of viruses, bacteria, fungi and algae. At the end of the course the students are expected to know the parameters and conditions that affect the yield of production and the systems available for the expression of vaious types of biotechnology products.		
Course Contents & Topics	Upstream and downstream processing will be briefly described to equip the students with the background for microbial biotechnology. The latest advances in microbial expression systems using viruses, bacteria, yeasts and algae will be reviewed. Specific examples on the use of these systems will be provided. These include but not limited to production of recombinant vaccines, secondary metabolites, food and food additives, industrial enzymes and biopesticides as well as bioremediation and medical diagnostics.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	explain the fundamental biochemical concepts underlying the industrial production of selected microbial biotechnology products
CLO 2	understand the importance of the current recombinant technology for large-scale manufacturing of various protein products
CLO 3	describe the major expression systems, understand their purposes, advantages, and disadvantages
CLO 4	deliver a professional group presentation on a self-decided topic related to microbial biotechnology

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3401 Molecular biology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Demonstrate deep understanding of the subject. Demonstrate integration of the full range of appropriate theories, principles, evidence and techniques. Illustrate insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining most of the course learning outcomes. Demonstrate substantial grasp of the subject. Demonstrate general integration of theories, principles, evidence and techniques. Illustrate critical use of relevant information from sources, showing ability to

		make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete knowledge and skills required for attaining most of the course learning outcomes. Demonstrate general but incomplete grasp of the subject. Demonstrate some partial integration of theories, principles, evidence and techniques. Illustrate use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Apply moderately effective organizational and presentational skills.
	D	Demonstrate limited knowledge and skills required for attaining some of the course learning outcomes. Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Show limited integration of theories, principles, evidence and techniques. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no knowledge and skills required for attaining the course learning outcomes. Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Show little or no or inapt integration of theories, principles, evidence and techniques. Show limited use of secondary sources and no critical comparison of them. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		30
Tutorials	including group presentations	18
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4
Examination		70	CLO 1,2,3

Required/recommended reading and online materials	A. N. Glazer and H. Nikaido: Microbial Biotechnology: Fundamentals of Applied Microbiology (W. H. Freeman & Co., 1995) A. L. Demain, J. E. Davies, R. M. Atlas, G. Cohen, C. L. Hershberger, W-S. Hu, D.
Course Website	http://moodle.hku.hk/

BIOL4409 General virology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr W B L Lim, Biological Sciences *(bllim@hku.hk)*		
Teachers Involved	Dr W B L Lim, Biological Sciences Prof F C C Leung, Biological Sciences		
Course Objectives	This Course provides the fundamental principles of virology so that students can understand the pathogenesis of major viral diseases that affect animal health. The course will prepare students for profession or graduate work in virology, medicine and biotechnology.		
Course Contents & Topics	Fundamental Virology 1. Classification and Nomenclature of Viruses 2. Virus structure: Capsid symmetry, Icosahedral symmetry 3. Virus structure: Genetic Materials, Nucleocapsid, Envelope 4. Virus entry: Receptors, uncoating and fusion 5. Virus-Cell interaction 6. RNA viruses: Genome replication and mRNA production 7. Baltimore Class IV (+) s.s. RNA viruses: Picornaviruses 8. Baltimore Class V (-) s.s. RNA viruses: Myxoviruses 9. Ambisense RNA viruses: Bunyaviruses and Arenaviruses 10, 11. Baltimore Class VI (+) s.s. RNA viruses: Retroviruses 12. Baltimore Class III d.s. RNA viruses: Reoviruses 13, 14. Baltimore Class I d.s. DNA viruses: Adenoviruses, Herpesviruses 15. Baltimore Class II s.s. (+) DNA viruses: Parvoviruses 16. Mechanisms of Viral Oncogenesis 17. Anti-viral treatments 18. Viruses as Tools in Medicine and Biotechnology Practical Virology 19. Specimen Collection, Transportation and Processing, Quality Assurance & Laboratory Safety 20. Virus isolation, propagation and titration 21, 22. Virus Identification: Immunocytochemical assays, ELISA, Complement Fixation Assay, Hemagglutination and HI assays 23, 24. Neutralization assay and Antiviral assay		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	be familiar with virus classification and the modes of replication and transmission of various viral families
CLO 2	gain hand-on experiences on common virological techniques
CLO 3	carry out researches on virology after taking this course

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3401 Molecular biology or BIOL3403 Immunology

Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of knowledge required for attaining all the course learning outcomes. Show strong analytical skills and competent ability to acquire knowledge on new development of the subject. Apply highly effective lab skills and techniques. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical skills and adequate ability to acquire knowledge on new development of the subject. Apply effective lab skills and techniques. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical skills and certain ability to acquire knowledge on new development of the subject. Apply moderately effective lab skills and techniques. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of limited analytical skills and ability to acquire knowledge on new development of the subject. Apply partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical skills and ability to acquire knowledge on new development of the subject. Apply minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		80	CLO 1,2,3
Laboratory reports		20	CLO 1,2,3

Required/recommended reading and online materials	Virology: Molecular Biology and pathogenesis (2010) L. C. Norkin, ASM Press. Principles of Virology (2009) S.J. Flint, ASM Press. Basic Virology (2008) E.K. Wagner. Blackwell.
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4411 Plant and food biotechnology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Prof M L Chye, Biological Sciences *(mlchye@hku.hk)*		
Teachers Involved	Prof M L Chye, Biological Sciences		
Course Objectives	This course covers the principles and key concepts of plant and food biotechnology and its applications in increasing global food supply. The significances of biotechnology in agriculture and food production, and the emerging importance of plant biotechnology in molecular farming for the production of biopharmaceuticals and other high-value proteins will be discussed. The course will also provide an insight on the real-life applications of plant and food biotechnology.		
Course Contents & Topics	- Genetic improvements in agriculture. Transgenic crops in global food production. - Tools in plant genetic engineering: promoters and marker genes. - Techniques in plant gene transfer: Agrobacterium-mediated transformation, biolistics and microinjection. - Nuclear and plastid transformation. - Gene silencing in plants. Genetic manipulation of commercially useful biosynthetic pathways in crops. Extending shelf-life of fruits. Prevention of enzymatic browning of potato tubers. Genetically-engineered biofortified foods: provitamin A-enriched rice, omega-3-enriched soy and high-anthocyanin tomatoes. - Biotechnology in plant pest and disease management: Producing crops resistant to phytopathogens and pests. Short-interfering RNAs in gene silencing to defend against plant viruses. Protecting crops in the field using the Bt toxin. Pest-resistant genetically-transformed seeds using the alpha-amylase inhibitor - Herbicide-resistant crops. - Plants as bioreactors for molecular farming: transgenic and transplastomic plants for producing recombinant biopharmaceutical proteins. Biodegradable plastics. Biofuels. - Genetically-modified crops and food products: regulation, testing and labelling. - Status of GM food in North America, Europe and Hong Kong. - Regulations on the production of plant-derived pharmaceuticals.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	acquire key concepts in plant and food biotechnology and basic laboratory techniques in plant biotechnology
	CLO 2	gain insight into real-life applications in plant and food biotechnology
	CLO 3	develop scientific inquiry and critical thinking skills

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3401 Molecular biology or BIOL3211 Nutrigenomics		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough and complete mastery of extensive knowledge and skills required for attaining the learning outcomes in Plant and Food Biotechnology. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations in plant biotechnology. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes in plant biotechnology. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Some evidence of coherent and logical thinking, accompanied with limited analytical and critical skills. Show limited ability to apply knowledge in plant biotechnology. Show limited or barely effective organizational and presentational skills.
Fail	Fail to demonstrate command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. No evidence in ability to apply knowledge in plant biotechnology. Ineffective organizational and presentational skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	practical/laboratory/project	30
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports		10	CLO 1,2,3
Presentation		20	CLO 1,2,3

Required/recommended reading and online materials	Chrispeels, M.J. and D.E. Sadava. Plants, genes, and agriculture. Jones and Bartlett. E-reserves (HKU Library) Lecture notes on Moodle
Course Website	http://moodle.hku.hk/
Additional Course Information	Core in Molecular Biology & Biotechnology Major An advanced elective course in FNS Major An advanced elective course in Plant Science Minor

BIOL4415 Healthcare biotechnology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	70
Course Co-ordinator	Prof A S T Wong, Biological Sciences *(awong1@hku.hk)*		
Teachers Involved	Prof A S T Wong, Biological Sciences Dr K W Y Yuen, Biological Sciences		
Course Objectives	This course discusses the key concepts and principles involved in healthcare biotechnology, and their applications in molecular medicine.		
Course Contents & Topics	Genetic biotechnology in animals (transgenics, knockouts and other related technologies): Transgenic animals as models in the study of human diseases, as bioreactors for the production of hormones, antibiotics and vaccines and organs for xenotransplantation. Advanced molecular biology techniques related to human and animal science basic research, disease diagnosis and development of new therapies. These include but not limited to: applications of DNA technologies in diagnostic medicine and forensic science; tissue engineering. An overview of the drug development process, with a focus on the early-stage, preclinical drug discovery, drug target identification, high-throughput assay development, and screening of chemical libraries (synthetic and natural products). The concept of individualized medicine will also be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe key concepts in genetic biotechnology and human health
CLO 2	acquire and apply advanced laboratory techniques essential to biotechnology

	CLO 3: develop scientific inquiry and critical thinking skills to understand, analyze, and evaluate problems in order to develop solutions CLO 4: gain insight into real-world applications in healthcare biotechnology
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3401 Molecular biology
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts. **B**: Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts. **C**: Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding. **D**: Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level. **Fail**: Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials	tutorials/assignments/computer sessions	6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Assignment/Discussion	10	CLO 1,3,4
Examination		60	CLO 1,3,4
Laboratory reports		20	CLO 1,2,3,4
Test		10	CLO 1,3

Required/recommended reading and online materials	- Textbook of Drug Design and Discovery (Krogsgaard-Larsen, Liljefors, and Madsen, Taylor & Francis, 2002) - Human Molecular Genetics (Strachan and Read, Garland Science, 2010) - Suggested readings for each topic will be provided.
Course Website	http://moodle.hku.hk/
Additional Course Information	Moodle

BIOL4416 Stem cells and regenerative biology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr K W Y Yuen, Biological Sciences *(kwyyuen@hku.hk)*		
Teachers Involved	Dr K W Y Yuen, Biological Sciences Dr J Zhang, Biological Sciences		
Course Objectives	To introduce the current understanding in regenerative biology, aging and longevity at the cellular and molecular level, and to present the interconnection between these biological events.		
Course Contents & Topics	The course will discuss cutting-edge research in (i) regenerative and stem cell biology: - the basic characteristics of stem cells - the molecular and genetic control of cell fate specification and differentiation - embryonic and adult stem cells - experimental inducible pluripotent stem cells and tissue engineering - therapeutics potentials for stem cell technology - ethical issues in stem cell research (ii) aging and longevity: - model systems used for aging and life-span studies - cellular and molecular biology of aging - telomeres and cellular senescence		

	- genomic stability, DNA mutations and repair - mitochondrial defects and oxidative stress - genetic aging diseases - genetic ,biochemical and metabolic pathways involved in longevity
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: appreciate the complex regulations of cell potency, cell age and organism longevity CLO 2: describe the characteristics of stem cells and the different types of stem cells CLO 3: describe applications of stem cell research, and understand ethical concerns involved CLO 4: describe the cellular mechanisms of aging, and the pathways involved in longevity
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3211 Nutrigenomics or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3403 Immunology or BIOL3404 Protein structure and function or BIOL3408 Genetics or BIOC3601 Metabolism or BIOC3604 Essential techniques in biochemistry and molecular biology.
Offer in 2015 - 2016	Y 2nd sem; **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough and complete mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assignment/discussion	10	CLO 1,2,3,4
Examination		60	CLO 1,2,3,4
Laboratory reports		20	CLO 1,2,3,4
Test		10	CLO 1,2,3,4

Required/recommended reading and online materials	References: Essentials of stem cell biology edited by Robert Paul Lanza 2009 Science in medicine: the JCI textbook of molecular medicine By Andrew R. Marks, American Society for Clinical Investigation, Ushma S. Neill Molecular biology of aging, Issue 51 By Leonard Guarente, Linda Partridge, Douglas C. Wallace - 2008
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4417 'Omics' and systems biology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr J W Zhang, Biological Sciences *(jzhang1@hku.hk)*		
Teachers Involved	Dr J W Zhang, Biological Sciences		
Course Objectives	Recent progress in high-throughput omics technology has revolutionized the biological research. Genome-wide profiling of various biomolecules simultaneously by omics technology generates huge amounts of data, providing the potential to obtain a global and holistic view of the system. This course aims to introduce the technologies of Omics and Systems Biology, and overview of various applications of omics technology in agricultural, biomedical, environmental, and nutritional sciences. This course will make the		

	state-of-the-art knowledge of Systems Biology and know-how available to those working on an omics projects as well as those preparing their research proposal.
Course Contents & Topics	The course covers various OMICS techniques with special focus on sequence alignment, next generation sequencing, computational modeling, and statistic programming. This course will also provide students hands-on experience in large scale data analysis, and high-throughput methodologies involved in: Genomics - the study of all genes or DNA sequences in a genome Transcriptomics - the study of all mRNA transcripts Proteomics - the study of all proteins Interactomes - the study of all genetic or physical interactions among genes or proteins Systems biology and functional genomics - the study of the interactome/network between components of a biological system, and modeling to discover the integrated function and emergent properties of that system Metagenomics - all genetic materials found in an environment Metabolomics - metabolites & intermediates involved in a biological reaction.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: explain the conceptual differences between 'Omics'/Systems Biology studies and traditional one-gene approach, and discuss the pros and cons of both approaches CLO 2: describe common methodologies used in major 'Omics' studies CLO 3: describe basic analytical methods, and access database resources generated in major 'Omics' studies CLO 4: describe how 'Omics' data are used in Systems Biology to understand the integrated functions of the system CLO 5: identify questions that can be addressed by 'Omics' and System Biology studies, appreciate and describe applications in 'Omics' studies
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3211 Nutrigenomics or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3403 Immunology or BIOL3404 Protein structure and function or BIOL3408 Genetics or BIOC3601 Metabolism or BIOC3604 Essential techniques in biochemistry and molecular biology.
Offer in 2015 - 2016	Y 2nd sem; **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough and complete mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		40	CLO 2,3,4,5
Examination		60	CLO 1,2,3,4,5

Required/recommended reading and online materials	TBA
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4501 Molecular phylogenetics and evolution (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	25
Course Co-ordinator	TBC, Biological Sciences *()*		
Teachers Involved	TBC, Biological Sciences		
Course Objectives			

The purpose of this course is to provide a comprehensive overview of state-of-the-art molecular systematics and phylogenetic research, focusing on in depth coverage of the latest techniques. The treatment of theoretical issues in formal lectures is coupled with practical workshops.

- acquisition of the sequences from the databases
- DNA and protein sequence assembly and alignment
- phylogeny reconstruction using parsimony, distance based, and maximum likelihood approaches
- introduction to relevant software for phylogenetics
- methods for the evaluation of phylogene trees

Course Contents & Topics

Introduction to molecular systematics and phylogenetics. Tree of life. Obtaining, storing and archiving specimens and tissue samples for use in molecular studies. Sources of molecular data, experimental design for molecular studies, taxon sampling and marker choice. Overview of basic laboratory methods for data collection (DNA isolation, PCR, DNA sequencing). Sequence editing and aligning; utilizing public sequence databases. Estimation of nucleotide polymorphism and diversity. Methods for phylogeny reconstruction: parsimony, distance methods, maximum likelihood, Bayesian methods. Statistical methods for the evaluation of phylogenetic trees. Software for phylogeny reconstruction. Molecular markers in conservation and ecological genetics. Phylogenies for different organisms. Biogeography vs. phylogeography using molecular data.

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the fundamental principles of molecular phylogenetics
CLO 2	understand the purposes each method is used for and be able to choose the most appropriate method(s) for the analysis of given data
CLO 3	understand the advantages and disadvantages of the methods
CLO 4	acquire practical skills for the analysis of molecular data

Pre-requisites (and Co-requisites and Impermissible combinations)

Pass in BIOL3401 Molecular biology or BIOL3408 Genetics

Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate comprehensive knowledge and an advanced level of skills sufficient for achieving all the goals and expected learning outcomes of the course. Show deep understanding of the course subject. Excellent ability to efficiently combine and apply the relevant theories, principles, and methods taught in the course. Advanced skills in possession and application of the methods and software for evolutionary analysis of real data. Excellent ability to collect, systematize, analyze and critically evaluate data from various sources and to quote them appropriately. Excellent presentational skills.
B	Demonstrate good knowledge and good level of skills sufficient for accomplishing most of the goals and expected learning outcomes of the course. Demonstrate good understanding of the course subject. Show good ability to combine and to apply theories, principles, and methods taught in the course. Substantial skills in possession and application of the methods and software for molecular evolutionary analysis of real data. Show good ability to collect, systematize, analyze and critically evaluate data from various sources and to quote them appropriately. Good presentational skills.
C	Demonstrate basic knowledge and basic level of skills sufficient for accomplishing most of the goals and expected learning outcomes of the course. Demonstrate general understanding of the subject. Show some ability to combine and to apply theories, principles and methods taught in the course. Basic skills in possession and application of the methods and software for molecular evolutionary analysis of real data. Show general ability to collect, systematize, analyze and evaluate data from various sources and to quote them appropriately. Basic presentational skills.
D	Demonstrate incomplete knowledge and weak skills sufficient for accomplishing only some of the goals and expected learning outcomes of the course. Demonstrate poor understanding of the subject, Show poor ability to combine and to apply theories, principles, and methods taught in the course. Limited skills in possession and application of the methods and software for molecular evolutionary analysis of real data. Show poor ability to collect data from various sources, to systematize, analyze and evaluate them appropriately. Poor presentational skills.
Fail	Demonstrate poor or no knowledge and skills required for accomplishing the goals and expected learning outcomes of the course. Demonstrate very poor or no understanding of the subject. Show no ability to combine and/or to apply theories, principles, and methods taught in the course. Poor or no skills in possession and application of the methods and software for molecular evolutionary analysis of real data. Show very poor or no ability to collect data from other sources and to systematize, analyze and evaluate them appropriately. Very poor or no presentational skills.

Course Type

Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	computer laboratory/tutorial/projects	36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		40	CLO 2,3,4
Examination		60	CLO 1,2,3

Required/recommended reading and online materials

Nei M., Kumar S.: Molecular Evolution and Phylogenetics (Oxford University Press, 2000) Hall B.G.: Phylogenetic Trees Made Easy (Sinauer, 2004, 2nd ed.)
TBC

Course Website

http://moodle.hku.hk/

Additional Course Information

This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4861 Ecology & biodiversity internship (6 credits)		Academic Year	2015
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr T Vengatesen, Biological Sciences *(rajan@hku.hk)*		
Teachers Involved	All academic staff in Ecology & Biodiversity Major, Biological Sciences		
Course Objectives	To provide a stimulating experience for all Ecology & Biodiversity Major undergraduates to integrate and apply their knowledge and skills obtained from the Ecology & Biodiversity Major through gaining work experience in the field of Ecology & Biodiversity that are related to the major of study.		
Course Contents & Topics	Students taking this course will work as an intern for at least 160 hours within the University or outside the University in a company, government department or NGO. The internship may be arranged by the School or obtained by students themselves. In the latter case, the internship must be in a relevant field to the Ecology & Biodiversity Major that the students are taking and prior approval by the course coordinator is required.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain first hand work experience in a job placement related to their Ecology & Biodiversity Major CLO 2 apply the knowledge in their Ecology & Biodiversity Major in solving practical problems in the work place CLO 3 acquire an understanding and appreciation of the real work environment CLO 4 extend their network in their field of study		
Pre-requisites (and Co-requisites and Impermissible combinations)	This course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc		
Course Type	Internship		
Course Teaching & Learning Activities	**Activities**: Internship work; **Details**: at least 160 hours; **No. of Hours**: 160		
Assessment Methods and Weighting	**Methods**: Written report; **Details**: written report, supervisor's feedback and oral presentation; **Weighting in final course grade (%)**: 100; **Assessment Methods to CLO Mapping**: CLO 1,2,3,4		
Course Website	http://www.biosch.hku.hk/ecology/lsc/		
Additional Course Information	Students taking this course have to submit a written report of not less than 1,000 words and an oral presentation about their internships, which will be assessed by internal supervisors. Student's supervisor at work i.e. the institution offering the internship will also submit an assessment report to the University. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator. BIOL4861 E&B internship is not a Capstone Course.		

BIOL4911 Conservation science in practice (6 credits)		Academic Year	2015
Offering Department	Biological Sciences	**Quota**	15
Course Co-ordinator	Prof Y J Sadovy, Biological Sciences *(yjsadovy@hku.hk)*		
Teachers Involved	Prof Y J Sadovy, Biological Sciences		
Course Objectives	To build on the foundation acquired by students in the Biological Sciences in the fields of ecology, biodiversity and environmental science by using case studies that stimulate them to integrate the principles and concepts learned to produce and successfully debate a topic in conservation science. Case studies will specifically address the use of science in achieving meaningful conservation outcomes taking into account the need for considering social, economic, and political contexts. Students will be expected to present their cases orally using sound practical and scientific reasoning. This course is a capstone course for Ecology & Biodiversity major students.		
Course Contents & Topics	This course will use directed case studies to give students the opportunity to consider and synthesize solutions to specific problems in conservation and the application of conservation science in the modern world, and within the wider context of economic development, political considerations and scientific uncertainty.Projects will be conducted through collaborations with local organizations, such as WWF-Hong Kong and Ocean Park, and address real-life questions and issues. Possible case studies range from ecosystem services, biological footprints, wildlife trade, to assessment of conservation risk, effectiveness of		

	international conservation and biodiversity instruments, and the relationship between biodiversity and human livelihoods. Tutorials by the course coordinator will introduce practical conservation concepts, develop critical thinking and address specific issues of relevance across case studies.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 have an in-depth understanding of the topic studied, the major issues involved and the needs and prospects for further work in the area CLO 2 have developed investigative skills associated with the case study selected which include synthesis, organization and presentation of information CLO 3 understand the importance and complexities of conserving biodiversity CLO 4 be able to identify practical and scientifically defensible initiatives and measures for successful conservation intervention CLO 5 be able to competently present the case study and convincingly argue their case
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major including BIOL3303 Conservation ecology. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 2nd sem — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with strong evidence of ability to integrate and synthesize information across subject areas, including from practical work undertaken, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations and showing consideration of practical and political dimensions for addressing conservation challenges. Apply highly effective presentational skills. Strong evidence of attention to thoughtful and reflective thinking and consideration of the wider issues of biodiversity conservation for Society. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, with some integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Some evidence of clear attention to thoughtful and reflective thinking and attention to detail. Consideration of practical components in conservation management must be demonstrated including the importance of biodiversity conservation in Society. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, ability to apply knowledge to most familiar situations and of relevance of biodiversity conservation for Society. Apply moderately effective presentational skills and understanding of the practical challenges of effective conservation initiatives. Little evidence of clear attention to thoughtful and reflective thinking. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Have basic understanding of importance of biodiversity for Society. Show limited ability to apply knowledge to solve problems or consider the practical challenges of biodiversity conservation. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking or attention to detail. Show very little or no ability to apply knowledge or practical thinking to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course
Course Teaching & Learning Activities	**Activities**: Reading / Self study — **Details**: supervised practical work of at least 80 hours followed by written & oral reports. Tutorials provided by course coordinator — **No. of Hours**: 120
Assessment Methods and Weighting	Oral presentation — Weighting: 40 — CLO 1,2,4,5 Research report — project report — Weighting: 60 — CLO 1,2,3,4,5
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation		40	CLO 1,2,4,5
Research report	project report	60	CLO 1,2,3,4,5

BIOL4912 Sensory evaluation of food (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	20
Course Co-ordinator	Prof H Corke, Biological Sciences *(harold@hku.hk)*		
Teachers Involved	Prof H Corke, Biological Sciences		
Course Objectives	To provide a broad understanding of the physiological and psychological basis of human sensory perception of food. To develop expertise in the choice and application of sensory techniques, and analysis of sensory data, in food science and consumer research.		
Course Contents & Topics	This course will be offered in June in a 2-week intensive workshop format at a collaborating facility in mainland China, to enable close study of food products in the Chinese marketplace. Preliminary lectures will take place at the University of Hong Kong. Physiology and psychology of sensory		

	perception. Objectives, planning and conduct of sensory testing. Discrimination testing, thresholds, descriptive analysis, affective testing. Instrument-sensory relationships, texture and aroma profiles, food oral processing, shelf-life studies, expert panels. Case studies of sensory applications in product development, quality management, and consumer research.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the psychophysiological basis for human sensory perception of food CLO 2 understand the major techniques used in sensory testing CLO 3 interpret sensory evaluation reports, and to design and conduct sensory evaluation projects using appropriately chosen methods
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutrional Science Major including BIOL3201 Food Chemistry This capstone course is for Food & Nutrional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills. **B** Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness. **Fail** Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.
Course Type	Laboratory and workshop course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Laboratory		48
Project work		48
Tutorials	lectures/tutorials	24
Reading / Self study		30

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Laboratory reports		20	CLO 2,3
Project reports		60	CLO 2,3
Test		20	CLO 1,2,3

Required/recommended reading and online materials	Stone, H. and Sidel, J.L. (2004) Sensory Evaluation Practices 3rd edition - Elsevier Lawless, H.T. (2013) Laboratory Exercises for Sensory Evaluation - Springer
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL4962 Food & nutritional science internship (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr J C Y Lee, Biological Sciences *(jettylee@hku.hk)*		
Teachers Involved	All academic staff in Food & Nutritional Science Major, Biological Sciences		
Course Objectives	To provide a stimulating experience for all Food & Nutritional Science Major undergraduates to integrate and apply their knowledge and skills obtained from the Food & Nutritional Science Major through gaining work experience in the field of Food & Nutritional Science that are related to the major of study.		
Course Contents & Topics	Students taking this course will work as an intern for at least 160 hours in at least 20 working days within the University or outside the University in a company, government department or NGO. The internship may be arranged by the School or obtained by students themselves. In the latter case, the internship must be in a relevant field to the Food & Nutritional Science Major that the students are taking and prior approval by the course coordinator is required		

Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain first hand work experience in a job placement related to their Food & Nutritional Science Major CLO 2 apply the knowledge in their Food & Nutritional Science Major in solving practical problems in the work place CLO 3 acquire an understanding and appreciation of the real work environment CLO 4 extend their network in their field of study
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutritional Science Major. This capstone course is for Food & Nutritional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	Pass/Fail
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc
Course Type	Internship
Course Teaching & Learning Activities	**Activities**: Internship work; **Details**: at least160 hours (lunch hour excluded) in at least 20 working days; **No. of Hours**: 160
Assessment Methods and Weighting	**Methods**: Written report; **Details**: written report, employer's feeback and oral presentation; **Weighting in final course grade (%)**: 100; **Assessment Methods to CLO Mapping**: CLO 1,2,3,4
Course Website	http://moodle.hku.hk
Additional Course Information	Students taking this course have to submit a written report of not less than 1,000 words and an oral presentation about their internships, which will be assessed by internal supervisors. Student's supervisor at work i.e. the institution offering the internship will also submit an assessment report to the University. Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

BIOL4963 Molecular biology & biotechnology internship (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr W K Yip, Biological Sciences *(wkyip@hku.hk)*		
Teachers Involved	All academic staff in Molecular Biology & Biotechnology Major, Biological Sciences		
Course Objectives	To provide a stimulating experience for all Molecular Biology & Biotechnology Major undergraduates to integrate and apply their knowledge and skills obtained from the Molecular Biology & Biotechnology Major through gaining work experience in the field of Molecular Biology & Biotechnology that are related to the major of study.		
Course Contents & Topics	Students taking this course will work as an intern for at least 160 hours in at least 20 working days within the University or outside the University in a company, government department or NGO. The internship may be arranged by the School or obtained by students themselves. In the latter case, the internship must be in a relevant field to the Molecular Biology & Biotechnology Major that the students are taking and prior approval by the course coordinator is required.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain first hand work experience in a job placement related to their Molecular Biology & Biotechnology Major CLO 2 apply the knowledge in their Molecular Biology & Biotechnology Major in solving practical problems in the work place CLO 3 acquire an understanding and appreciation of the real work environment CLO 4 extend their network in their field of study		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Molecular Biology & Biotechnology Major.		

	This capstone course is for Molecular Biology & Biotechnology Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc		
Course Type	Internship		
Course Teaching & Learning Activities	see below		

Activities	Details	No. of Hours
Internship work	at least 160 hours (lunch hour excluded) in at least 20 working days	160

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Written report	written report, supervisor's feedback and oral presentation	100	CLO 1,2,3,4

Course Website	http://moodle.hku.hk
Additional Course Information	Students taking this course have to submit a written report of not less than 1,000 words and an oral presentation about their internships, which will be assessed by internal supervisors. Student's supervisor at work i.e. the institution offering the internship will also submit an assessment report to the University. Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

BIOL4964 Biological sciences internship (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr J S H Tsang, Biological Sciences *(jshtsang@hku.hk)*		
Teachers Involved	All academic staff in Biological Sciences Major, Biological Sciences		
Course Objectives	To provide a stimulating experience for all Biological Sciences major undergraduates to integrate and apply their knowledge and skills obtained from the Biological Sciences Major through gaining work experience in the field of Biological Sciences that are related to the major of study.		
Course Contents & Topics	Students taking this course will work as an intern for at least 160 hours in at least 20 working days within the University or outside the University in a company, government department or NGO. The internship may be arranged by the School or obtained by students themselves. In the latter case, the internship must be in a relevant field to the Biological Sciences major that the students are taking and prior approval by the course coordinator is required		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain first hand work experience in a job placement related to their Biological Sciences Major CLO 2 apply the knowledge in their Biological Sciences Major in solving practical problems in the work place CLO 3 acquire an understanding and appreciation of the real work environment CLO 4 extend their network in their field of study		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Biological Sciences Major. This captsone course is for Biological Sciences Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc		

Course Type	Internship
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Internship work / at least160 hours (lunch hour excluded) in at least 20 working days / 160
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Written report / written report, employer's feeback and oral presentation / 100 / CLO 1,2,3,4
Course Website	http://moodle.hku.hk
Additional Course Information	Students taking this course have to submit a written report of not less than 1,000 words and an oral presentation about their internships, which will be assessed by internal supervisors. Student's supervisor at work i.e. the institution offering the internship will also submit an assessment report to the University. Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

BIOL4991 Ecology & biodiversity project (12 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Prof G A Williams, Biological Sciences *(hrsbwga@hku.hk)*		
Teachers Involved	All academic staff in Ecology & Biodiversity Major, Biological Sciences		
Course Objectives	To provide a stimulating capstone experience for Ecology & Biodiversity Major undergraduates to integrate and apply their knowledge and skills obtained from the Ecology & Biodiversity Major through planning and carrying out a research project under the supervision of a member of staff.		
Course Contents & Topics	Students should seek approval from a prospective supervisor prior to selecting this course. After admission to the course is approved by the course coordinator, students will complete their project work under the guidance of their supervisor.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 critique and review appropriate scientific literature CLO 2 use this information to generate a scientifically relevant research question CLO 3 develop and formulate scientific hypotheses to test this question CLO 4 design and undertake practical research work to formally test the hypotheses proposed CLO 5 analyse and evaluate the data collected to test the hypotheses, present data in a professional manner to illustrate the outcomes CLO 6 draw an objective series of conclusions based on the experimental work CLO 7 highlight and discuss their research findings and place them into a holistic scientific context CLO 8 submit their work following a specified journal format, present their work as a scientific conference talk		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Ecology & Biodiversity Major; and Cumulative GPA of 3.0 or above. Students are not permitted to take both BIOL3991 and BIOL4991. This capstone course is for Ecology & Biodiversity Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Evidence of complete or near-complete understanding and a thorough grasp of the subject matter as demonstrated by attainment of all learning outcomes. Excellent critique and knowledge of relevant literature and identification of research hypothesis. Well designed experimental approach to test research hypothesis. Show excellent organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate comprehensive, critical, assessment of results and professional presentation of research work. **B** Evidence of near-complete understanding and a good grasp of the subject matter as demonstrated by attainment of the majority of learning outcomes. Good critique and knowledge of relevant literature and identification of research hypothesis. Appropriately designed experimental approach to test research hypothesis. Show good organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate effective, critical, assessment of results and good presentation of research work. **C** Evidence of adequate understanding and grasp of the subject matter as demonstrated by general but incomplete attainment of most of the learning outcomes. Acceptable critique and knowledge of relevant literature and identification of research hypothesis. Adequately designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate adequate but not necessarily critical, assessment of results and presentation of research work. **D** Evidence of limited understanding and grasp of the subject matter as demonstrated by incomplete attainment of many of the learning outcomes. Limited critique and knowledge of relevant literature and identification of research hypothesis. Poorly designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills		

		and laboratory/fieldwork techniques. Demonstrate confused and poorly organized assessment of results and limited presentation of research work.
	Fail	Evidence of poor or inadequate understanding and grasp of the subject matter such that most of the learning outcomes are not attained. Poor critique and knowledge of relevant literature and identification of research hypothesis. Badly designed experimental approach to test research hypothesis. Show little evidence of appropriate organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate incorrect interpretation and assessment of results and poor presentation of research work.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	formal lectures, seminars & practical work	144

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation		80	CLO 1,2,3,4,5,6,7,8
Oral presentation	research seminar	20	CLO 1,2,3,4,5,6,7

Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	A dissertation of about 9,000 - 12,000 words (80% weighting) and a research seminar (20% weighting).

BIOL4992 Food & nutritional science project (12 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Prof N P Shah, Biological Sciences *(npshah@hku.hk)*		
Teachers Involved	All academic staff in Food & Nutritional Science Major, Biological Sciences		
Course Objectives	To provide a stimulating capstone experience for Food & Nutritional Science Major undergraduates to integrate and apply their knowledge and skills obtained from the Food & Nutritional Science Major through planning and carrying out a research project under the supervision of a member of staff.		
Course Contents & Topics	Students should seek approval from a prospective supervisor prior to selecting this course. After admission to the course is approved by the course coordinator, students will complete their project work under the guidance of their supervisor.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	critique and review appropriate scientific literature
CLO 2	use this information to generate a scientifically relevant research question
CLO 3	develop and formulate scientific hypotheses to test this question
CLO 4	design and undertake practical research work to formally test the hypotheses proposed
CLO 5	analyse and evaluate the data collected to test the hypotheses, present data in a professional manner to illustrate the outcomes
CLO 6	draw an objective series of conclusions based on the experimental work
CLO 7	highlight and discuss their research findings and place them into a holistic scientific context
CLO 8	submit their work following a specified journal format, present their work as a scientific conference talk

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Food & Nutritional Science Major; and Cumulative GPA of 3.0 or above. This capstone course is for Food & Nutritional Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of complete or near-complete understanding and a thorough grasp of the subject matter as demonstrated by attainment of all learning outcomes. Excellent critique and knowledge of relevant literature and identification of research hypothesis. Well designed experimental approach to test research hypothesis. Show excellent organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate comprehensive, critical, assessment of results and professional presentation of research work.
B	Evidence of near-complete understanding and a good grasp of the subject matter as demonstrated by attainment of the majority of learning outcomes. Good critique and knowledge of relevant literature and identification of research hypothesis. Appropriately designed experimental approach to test research hypothesis. Show good organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate effective, critical, assessment of results and good presentation of research work.
C	Evidence of adequate understanding and grasp of the subject matter as demonstrated by general but incomplete attainment of most of the learning outcomes. Acceptable critique and knowledge of relevant literature and identification of research hypothesis. Adequately designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate adequate but not necessarily critical, assessment of results and presentation of research work.
D	Evidence of limited understanding and grasp of the subject matter as demonstrated by incomplete attainment of many of the learning outcomes. Limited critique and knowledge of relevant literature and identification of research hypothesis. Poorly designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate confused and poorly organized assessment of results and limited presentation of research work.

	Fail — Evidence of poor or inadequate understanding and grasp of the subject matter such that most of the learning outcomes are not attained. Poor critique and knowledge of relevant literature and identification of research hypothesis. Badly designed experimental approach to test research hypothesis. Show little evidence of appropriate organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate incorrect interpretation and assessment of results and poor presentation of research work.
Course Type	Project-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Reading / Self study	formal lectures, seminars & practical work	144

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation		80	CLO 1,2,3,4,5,6,7,8
Oral presentation	research seminar	20	CLO 5,7

Course Website	http://moodle.hku.hk/
Additional Course Information	A dissertation of about 9,000 - 12,000 words (80% weighting) and a research seminar (20% weighting).

BIOL4993 Molecular biology & biotechnology project (12 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr W K Yip, Biological Sciences *(wkyip@hku.hk)*		
Teachers Involved	All academic staff in Molecular Biology & Biotechnology Major, Biological Sciences		
Course Objectives	To provide a stimulating capstone experience for all Molecular Biology & Biotechnology Major undergraduates to integrate and apply their knowledge and skills obtained from the Molecular Biology & Biotechnology Major through planning and carrying out a research project under the supervision of a member of staff.		
Course Contents & Topics	Students should seek approval from a prospective supervisor prior to selecting this course. After admission to the course is approved by the course coordinator, students will complete their project work under the guidance of their supervisor.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	critique and review appropriate scientific literature
CLO 2	use this information to generate a scientifically relevant research question
CLO 3	develop and formulate scientific hypotheses to test this question
CLO 4	design and undertake practical research work to formally test the hypotheses proposed
CLO 5	analyse and evaluate the data collected to test the hypotheses
CLO 6	present data in a professional manner to illustrate the outcomes
CLO 7	draw an objective series of conclusions based on the experimental work
CLO 8	highlight and discuss their research findings and place them into a holistic scientific context

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Molecular Biology & Biotechnology Major; and Cumulative GPA of 3.0 or above. This capstone course is for Molecular Biology & Biotechnology Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Evidence of complete or near-complete understanding and a thorough grasp of the subject matter as demonstrated by attainment of all learning outcomes. Excellent critique and knowledge of relevant literature and identification of research hypothesis. Well designed experimental approach to test research hypothesis. Show excellent organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate comprehensive, critical, assessment of results and professional presentation of research work.
B	Evidence of near-complete understanding and a good grasp of the subject matter as demonstrated by attainment of the majority of learning outcomes. Good critique and knowledge of relevant literature and identification of research hypothesis. Appropriately designed experimental approach to test research hypothesis. Show good organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate effective, critical, assessment of results and good presentation of research work.
C	Evidence of adequate understanding and grasp of the subject matter as demonstrated by general but incomplete attainment of most of the learning outcomes. Acceptable critique and knowledge of relevant literature and identification of research hypothesis. Adequately designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate adequate but not necessarily critical, assessment of results and presentation of research work.
D	Evidence of limited understanding and grasp of the subject matter as demonstrated by incomplete attainment of many of the learning outcomes. Limited critique and knowledge of relevant literature and identification of research hypothesis. Poorly designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate confused and poorly organized assessment of results and limited presentation of research work.
Fail	Evidence of poor or inadequate understanding and grasp of the subject matter such that most of the learning outcomes are not attained. Poor critique and knowledge of relevant literature and identification of research hypothesis. Badly designed experimental approach to test research hypothesis. Show little evidence of appropriate organizational and/or

		analytical skills and laboratory/fieldwork techniques. Demonstrate incorrect interpretation and assessment of results and poor presentation of research work.

Course Type	Project-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**: Reading / Self study — formal lectures, seminars & practical work — 144

Activities	Details	No. of Hours
Reading / Self study	formal lectures, seminars & practical work	144

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation		80	CLO 1,2,3,4,5,6,7,8
Oral presentation	research seminar	20	CLO 1,6,7,8

Course Website	http://moodle.hku.hk/
Additional Course Information	A dissertation of about 9,000 - 12,000 words (80% weighting) and a research seminar (20% weighting).

BIOL4994 Biological sciences project (12 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr J S H Tsang, Biological Sciences *(jshtsang@hku.hk)*		
Teachers Involved	All academic staff in Biological Sciences Major, Biological Sciences		
Course Objectives	To provide a stimulating capstone experience for all Biological Sciences Major undergraduates to integrate and apply their knowledge and skills obtained from the Biological Science Major through planning and carrying out a research project under the supervision of a member of staff.		
Course Contents & Topics	Students should seek approval from a prospective supervisor prior to selecting this course. After admission to the course is approved by the course coordinator, students will complete their project work under the guidance of their supervisor.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	critique and review appropriate scientific literature
CLO 2	use this information to generate a scientifically relevant research question
CLO 3	develop and formulate scientific hypotheses to test this question
CLO 4	design and undertake practical research work to formally test the hypotheses proposed
CLO 5	analyse and evaluate the data collected to test the hypotheses
CLO 6	present data in a professional manner to illustrate the outcomes
CLO 7	draw an objective series of conclusions based on the experimental work
CLO 8	highlight and discuss their research findings and place them into a holistic scientific context

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective biological sciences courses (BIOL3XXX or BIOL4XXX) in the Biological Sciences Major; and Cumulative GPA of 3.0 or above. This capstone course is for Biological Sciences Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of complete or near-complete understanding and a thorough grasp of the subject matter as demonstrated by attainment of all learning outcomes. Excellent critique and knowledge of relevant literature and identification of research hypothesis. Well designed experimental approach to test research hypothesis. Show excellent organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate comprehensive, critical, assessment of results and professional presentation of research work.
B	Evidence of near-complete understanding and a good grasp of the subject matter as demonstrated by attainment of the majority of learning outcomes. Good critique and knowledge of relevant literature and identification of research hypothesis. Appropriately designed experimental approach to test research hypothesis. Show good organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate effective, critical, assessment of results and good presentation of research work.
C	Evidence of adequate understanding and grasp of the subject matter as demonstrated by general but incomplete attainment of most of the learning outcomes. Acceptable critique and knowledge of relevant literature and identification of research hypothesis. Adequately designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate adequate but not necessarily critical, assessment of results and presentation of research work.
D	Evidence of limited understanding and grasp of the subject matter as demonstrated by incomplete attainment of many of the learning outcomes. Limited critique and knowledge of relevant literature and identification of research hypothesis. Poorly designed experimental approach to test research hypothesis. Show fair organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate confused and poorly organized assessment of results and limited presentation of research work.
Fail	Evidence of poor or inadequate understanding and grasp of the subject matter such that most of the learning outcomes are not attained. Poor critique and knowledge of relevant literature and identification of research hypothesis. Badly designed experimental approach to test research hypothesis. Show little evidence of appropriate organizational and/or analytical skills and laboratory/fieldwork techniques. Demonstrate incorrect interpretation and assessment of results and poor presentation of research work

Course Type	Project-based course

Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Reading / Self study</td><td>formal lectures, seminars & practical work</td><td>144</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Dissertation</td><td></td><td>80</td><td>CLO 1,2,3,4,5,6,7,8</td></tr><tr><td>Oral presentation</td><td>research seminar</td><td>20</td><td>CLO 1,2,3,4,5,6,7,8</td></tr></table>
Course Website	http://moodle.hku.hk/
Additional Course Information	A dissertation of about 9,000 - 12,000 words (80% weighting) and a research seminar (20% weighting).

ENVS1301 Environmental life science (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr T Vengatesen, Biological Sciences *(rajan@hku.hk)*		
Teachers Involved	Dr T Vengatesen, Biological Sciences		
Course Objectives	This course intended for students who wish to understand the fundamentals of environmental biology/life science and importantly the relationship (connection) between environment and life. Here you will learn about the various biological/ecological principles and concepts of environmental science which are needed for critical discussion and evaluation of current global environmental issues including human ecology, urbanization, ecological economics, and climate change.		
Course Contents & Topics	This course is a combination of lectures, group discussion/debate and field trips cum tutorials. We first explore the fundamental interactions between organisms and their environment. We then explore environmental constraints on life at various ecosystems (like marine, freshwater, and terrestrial). Students will also learn how factors such as urbanization, climate change, and anthropogenic impacts affect life at population and ecosystem levels. Similarly, students will be exposed to the incredible interrelationships that are basic to ecological principles and the impact that human development has upon these interrelationships. After learning basics of environmental life science, students will be stimulated to think about current life science issues such as biodiversity loss, organisms adaptation to climate change, tragedy of commons (human ecology) and applied life science topics such as biomaterial science.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>understand life, environment and their interactions</td></tr><tr><td>CLO 2</td><td>appreciate species and ecosystem responses to human-induced environmental change</td></tr><tr><td>CLO 3</td><td>attain ability to critically think and discuss about current environ-life science issues</td></tr><tr><td>CLO 4</td><td>be motivated and equipped: to tackle biological environmental science questions and to choose advanced environmental science courses</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Evidence of original thought during the analysis of environmental life science issues. Show evidence of analytical, critical and multidimensional thinking about the study subject. Extensive knowledge and skills required for attaining all the course learning outcomes. Demonstrate excellent ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show highly effective organizational, presentational and field trip skills.</td></tr><tr><td>**B**</td><td>Show substantial knowledge and thought during the analysis of environmental life science issues. Show some evidence of some analytical, critical and multidimensional thinking about the study subject. Good knowledge and skills required for attaining all the course learning outcomes. Demonstrate good ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show effective organizational, presentational and field trip skills.</td></tr><tr><td>**C**</td><td>Show general but incomplete knowledge and original thought during the analysis of environmental life science issues. Fair knowledge and skills required for attaining all the course learning outcomes. Demonstrate fair ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show considerable organizational, presentational and field trip skills.</td></tr><tr><td>**D**</td><td>Evidence to show a minimum knowledge (i.e. knowledge is very incomplete) and thought during the analysis of environmental life science issues. Show insufficient knowledge and skills required for attaining all the course learning outcomes. Demonstrate poor ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show very little organizational, presentational and field trip skills.</td></tr><tr><td>**Fail**</td><td>Evidence of meager or inadequate knowledge and understanding of environmental life science issues. Show no evidence of knowledge and skills required for attaining all the course learning outcomes. Demonstrate no ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show no evidence of familiarity with relevant reading material and field trip demonstrations, or any knowledge of organizational and presentational skills.</td></tr></table>		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>24</td></tr><tr><td>Field work</td><td>3-12 hours field work</td><td>12</td></tr></table>		

	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		10	CLO 2,3
	Examination		70	CLO 1,3
	Presentation	group presentation	10	CLO 3,4
	Test		10	CLO 1

Required/recommended reading and online materials	Appropriate reading materials/handouts will be provided during the course.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

ENVS2001 Environmental field and lab course (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr D M Baker, Biological Sciences *(dmbaker@hku.hk)*		
Teachers Involved	Dr D M Baker, School of Biological Science		
Course Objectives	To introduce students to a broad spectrum of field and laboratory methods for data collection in environmental science. Through exposure to environmental data collection, experimental design, data analysis, interpretation and reporting, students will gain a deeper appreciation of the process that underlies environmental science research and it's relevancy to critical thinking and future careers in the sciences.		
Course Contents & Topics	This course will involve environmental data collection in both field and laboratory settings. In-class lectures will cover basic principles of specific methodologies and relevant applications in preparation for laboratory and field-based experiential learning. Having an interdisciplinary focus, the course will cover topics relevant to the study of the biosphere, encompassing terrestrial, aquatic, and atmospheric systems. Students will gain hands-on experience with the operation of standard and advanced sampling and analytical equipment, quality control, basic data analysis and reporting.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	understand how scientific data is used to address environmental problems
	CLO 2	have a basic understanding of the techniques and methodologies necessary for collecting environmental data
	CLO 3	understand some of the problems inherent in data collection, and how this impacts data interpretation
	CLO 4	understand how data collected in the lab and field can be used to critically evaluate ideas

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity		
Offer in 2015 - 2016	Y 1st sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab / fieldwork skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Apply effective lab / fieldwork skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab / fieldwork skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab / fieldwork skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Laboratory and workshop course	

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Laboratory		30
	Field work		10
	Project work		20

	Tutorials		12
	Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3
Laboratory reports		20	CLO 1,2,3,4
Presentation		20	CLO 2,3
Project reports		50	CLO 1,2,3,4

Course Website: http://www.biosch.hku.hk/ecology/lsc/

ENVS2002 Environmental data analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr T C Bonebrake, Biological Sciences *(tbone@hku.hk)*		
Teachers Involved	Dr T C Bonebrake, School of Biological Science		
Course Objectives	To provide students with the ability to analyze data; especially data which are relevant to issues and questions in environmental science. This course will enable students to accurately interpret, organize, display, test and analyze environmental data. The course will also introduce students to principles of a variety of important advanced approaches in analyzing environmental data including spatial analysis, geographic information systems, remote sensing, risk assessment, and time series analysis.		
Course Contents & Topics	The course will feature lectures on aspects of sampling, distributions, uncertainty, probability, and hypothesis testing in addition to lectures on advanced analysis topics. Special emphasis will be placed on qualities inherent to most environmental datasets such as large size, multivariate, and spatial. All material will be applied and practiced in environmental science contexts (e.g. chemistry, ecology, geology and oceanography) using a variety of datasets in a computer laboratory setting using the 'R Project for Statistical Computing' software (a graphical user interface will be implemented such that prior knowledge of coding or computer science is not required).		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	accurately interpret methods and approaches in the scientific literature
CLO 2	evaluate critically data analyses in the environmental sciences
CLO 3	perform standard and appropriate statistical analyses on a variety of data sources
CLO 4	work comfortably with large datasets using applied software (e.g. R)
CLO 5	present results of data analyses in a clear and transparent manner

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply a highly effective computational skills and techniques for basic statistical analyses. Be able to critically use data and statistical results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject and skills required for attaining at least most of the course learning outcomes. Present evidence of analytical and critical abilities and logical thinking. Apply effective computational skills and techniques for basic statistical analyses. Be able to correctly use data and statistical results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some analytical and critical abilities and logical thinking. Apply moderately effective computational skills and techniques for basic statistical analyses. Demonstrate mostly correct but some erroneous use of data and statistical results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial and limited grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some analytical and critical abilities and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective computational skills and techniques for basic statistical analyses. Demonstrate limited ability to use data and statistical results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate limited or no grasp of the subject and skills required for attaining any of the course learning outcomes. Present evidence of little or lack of analytical and critical abilities, logical or coherent thinking. Apply minimally effective or ineffective computational skills and techniques for basic statistical analyses. Demonstrate misuse of data and statistical results and/or unable to draw appropriate conclusions. Apply minimally effective or ineffective organizational and presentational skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	problem-based learning/computer laboratory	24
Tutorials		6

	Reading / Self study			100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Examination		25	CLO 1,2,3
	Project report		25	CLO 1,2,3,4,5
	Test	problem-based exercises	50	CLO 1,2,3,4,5
Required/recommended reading and online materials	Textbooks: Shahbaba, B. 2012. Biostatistics with R: An Introduction to Statistics through Biological Data. Springer, New York. Reimann, C. et al. 2007. Statistical Data Analysis Explained: Applied Environmental Statistics with R. John Wiley & Sons, Chichester. References: Zhang C. 2007. Fundamentals of Environmental Sampling and Analysis. John Wiley & Sons, New Jersey.			
Course Website	http://www.biosch.hku.hk/ecology/lsc/			

ENVS3019 Urban ecology (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr T C Bonebrake, Biological Sciences *(tbone@hku.hk)*		
Teachers Involved	Dr T C Bonebrake, School of Biological Science		
Course Objectives	This course will provide students with an understanding and knowledge of the ecology of urban ecosystems. The course will highlight the role of cities in a world under environmental change and rapid development.		
Course Contents & Topics	Ecological systems within cities and cities as ecological systems will both be covered in this course. Ecological concepts unique to or specialized within cities will be covered including sustainability, conservation, health, development, globalization, and restoration. Specific topics will include climate change (e.g. urban heat island effects), invasive species, infectious diseases and pollution. Examples will be taken globally but special emphasis will be placed on Hong Kong.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: describe and evaluate the processes and patterns that characterize urban ecological systems CLO 2: understand biodiversity and ecosystem responses to urbanization CLO 3: recognize energy flows within urban ecosystems and how energy use and waste improve or deteriorate environmental quality CLO 4: critically evaluate management and policy solutions to urban ecological problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
	Methods	**Details**	

Assessment Methods and Weighting			**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Examination	Mid-term exam (20%), Final exam (30%)	50	CLO 1,2,3,4
	Presentation		20	CLO 1,2,3,4
	Project reports		30	CLO 1,2,3,4

Required/recommended reading and online materials	Textbooks: Niemela J, Breuste JH, Elmqvist T, Guntenspergen PJ, McIntyre NE (2011) Urban Ecology: Patterns, Processes, and Applications. Oxford University Press, Oxford. References: Gaston KJ (2010) Urban ecology. Cambridge University Press, Cambridge.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers. This course will be offered in alternative year.

ENVS4110 Environmental remediation (6 credits)		**Academic Year**	2015
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr J D Gu, Biological Sciences *(jdgu@hku.hk)*		
Teachers Involved	Dr J D Gu, Biological Sciences		
Course Objectives	To introduce students with the environmental fate information of different pollutants/contaminants in the environment To understand the technologies available for environmental remediation of pollutants in soils and water, and the characteristics of each techniques relevant to the pollutants of concern To learn the fundamental physical, chemical and biochemical reactions involved in the remediation process To obtain skills for critical analysis of the recent technological development and the proposed applications		
Course Contents & Topics	Understanding the types of different pollutants and their fate in the environments including both terrestrial and aquatic; and relevant strategy of pollution control and treatment; advanced oxidation, microbiological treatment and phytoremediation; mechanisms of biochemical transformation of polyaromatic hydrocarbon, polychlorinated biphenols, agrichemicals and phthalate esters as well as both metals and metalloids; biochemical pathways and the specific genes involved in detoxification; chemotaxis and engineering the degradation pathways in bacteria; transport of microorganisms and monitoring in subsurface environment; survival of introduced organisms; evolution of the degradative genes in bacteria; in situ and ex situ remediation techniques; green technologies.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	explain the remediation technologies available to the type of pollutants of concern in remediation practice
	CLO 2	propose remediation strategies for polluted sites with the best technologies available considering the type of pollutants and the cost involved
	CLO 3	differentiate the technologies available for the specific pollutants and the fundamental process involved in terms of the catalysts and the effectiveness
	CLO 4	describe several key chemical and biochemical processes used in environmental remediation with adequate background information on their history and development

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL3109 Environmental microbiology or BIOL3110 Environmental toxicology or BIOL3401 Molecular biology or ENVS3042 Pollution		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors	**A**	Thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject matter. Show very strong analytical and critical abilities and high logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
	B	Substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	General but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 24 Laboratory: 8 Field work: 6 Project work: 6 Tutorials: 4 Reading / Self study: 100

Activities	Details	No. of Hours
Lectures		24
Laboratory		8
Field work		6
Project work		6
Tutorials		4
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination		50	CLO 1,2,3,4
Laboratory reports		25	CLO 1,2,3,4
Presentation		10	CLO 1,2,3,4
Test		5	CLO 1,2,3,4

Required/recommended reading and online materials	C.J. Hurst: Manual of Environmental Microbiology (ASM Press, 2nd edition) S.C. McCutcheon & J.L. Schnoor: Phytoremediation: Transformation and Control of Contaminants (Wiley) R. Mitchell & J-D Gu: Environmental Microbiology (Wiley-Blackwell, 2nd edition)
Course Website	http://moodle.hku.hk/
Additional Course Information	The course will be offered subject to a minimum enrollment number and availability of teachers. This course will be offered in alternative year.

ENVS4955 Environmental science in practice (6 credits)		**Academic Year**	**2015**
Offering Department	Biological Sciences	**Quota**	18
Course Co-ordinator	Dr M Yasuhara, Biological Sciences *(yasuhara@hku.hk)*		
Teachers Involved	Dr M Yasuhara, Biological Science		
Course Objectives	To provide students experiential learning experience in the field of environmental science. The course is primarily based on an array of field studies covering essential areas of environmental science as well as thesis style report on environmental science topic. Invited guest lectures delivered by environmental practitioners may be held.		
Course Contents & Topics	Students to attend a series of field studies in, and/or outside, Hong Kong throughout the final academic year. The field studies may include: (1) Residential field trip, for example, to Japan (that may include marine environmental survey, sediment core sampling, practical learning of ecological, paleoecology and environmental problems, environmental geology/paleontology field trip, and other tours and activities); (2) Natural resource management and conservation: visiting Agriculture, Fisheries and Conservation Department, Fish Marketing Organization, local fisheries organizations, agriculture/aquaculture/mariculture farms, Mai Po RAMSAR Site, Hong Kong Wetland Park, Hong Kong Organic Resource Centre, Country Park Visitor Centre, and Marine Parks and Reserves; (3) Environmental science and technologies: visiting water treatment plant, waste water treatment plant, strategic landfill sites, power plants, Environmental Management Division of Productivity Council (for research and development of green technology), Centre for Marine Environmental Research and Innovative Technology; (4) Environmental Lab: visiting Environmental Science and other PI's laboratory, looking into research activities, interviewing PI, postdocs, post-graduate students, and writing a short article on the Lab. In addition, the course includes thesis style report on an environmental science topic. The list of potential topics will be provided. Alternatively, students may propose their own topic.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — recognize ways of environmental science in practice CLO 2 — gain knowledge of current environmental problems and solutions CLO 3 — present and communicate their field observations and findings		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab / fieldwork skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.		

	B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Apply effective lab / fieldwork skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab / fieldwork skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab / fieldwork skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Laboratory and workshop course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Field work	Field work and other learning students will take part in at least 66 hours of field trips and other learning 66 hours	66
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Laboratory reports	field reports	30	CLO 1,2,3
Presentation	group presentations	30	CLO 1,2,3
Project reports	individual report	40	CLO 1,2,3

Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	Some trips will be organized in reading weeks, and others in weekends. Students will need to pay for their own travel cost for the residential field trip. (please contact us for details and financial difficulty). This course will be offered subject to a minimum enrollment number and availability of teachers.

CAES1000 Core University English (6 credits)		Academic Year	2016
Offering Department	English	**Quota**	---
Course Co-ordinator	Dr N Fong, English *(fongsn@hku.hk)*		
Teachers Involved	Dr N Fong, Centre for Applied English Studies		
Course Objectives			
Course Contents & Topics	The Core University English (CUE) course aims to enhance first-year students' academic English language proficiency in the university context. CUE focuses on developing students' academic English language skills for the Common Core Curriculum. These include the language skills needed to understand and produce spoken and written academic texts, express academic ideas and concepts clearly and in a well-structured manner and search for and use academic sources of information in their writing and speaking. Students will also complete four online-learning modules through the Moodle platform on academic grammar, academic vocabulary, citation and referencing skills and understanding and avoiding plagiarism. This course will help students to participate more effectively in their first-year university studies in English, thereby enriching their first-year experience.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	identify and distinguish between main ideas and supporting details in lectures and written texts and demonstrate an understanding of the arguments / facts expressed
CLO 2	form and express personal opinions through critical reading and listening
CLO 3	argue for and defend a position in a clear and structured way using academic sources, through writing and speaking
CLO 4	demonstrate control of grammatical accuracy and lexical appropriacy in academic communication

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2016 - 2017	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2017 - 2018	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Excellent to outstanding result. Students are able to produce spoken and written academic texts which are at all times appropriately structured. Students can clearly and concisely explain academic concepts and critically argue for a detailed position. Students always use appropriate academic sources to support their ideas in writing and speaking. They cite and reference correctly at all times. Students demonstrate an ability to fully comprehend and critically interpret spoken and written texts. Written language contains very few, if any, systematic errors in grammar and vocabulary. Spoken language is always comprehensible and fluent.
B	Good to very good result. Students are able to produce spoken and written academic texts which are appropriately structured with only minor errors. Students can almost always clearly and concisely explain academic concepts and almost always critically argue for a detailed position. Students almost always use appropriate academic sources to support their ideas in writing and speaking. They cite and reference correctly with only a few non-systematic errors. Students can comprehend and interpret texts with ease, although they may miss some implied meanings and opinions. Written language is mostly accurate but contains a few systematic errors in complex grammar and vocabulary. Spoken language is mostly comprehensible and fluent.
C	Satisfactory to reasonably good result. Spoken and written academic texts produced by students are sometimes not-well structured but there is some evidence of this ability. Students are sometimes unable to clearly and concisely explain academic concepts. While they can argue for a position, it is not very detailed and tend to be simplistic rather than critical. Students sometimes use sources which are nonacademic and/or not appropriate to support their ideas in writing and speaking. There are some systematic errors in citation and referencing but also evidence of correct systematic use. Students have some difficulty comprehending and critically interpreting texts. They can always understand the main ideas but may miss some of the writer's views and attitudes. Written language is sometimes inaccurate, although errors, when they occur, are more often in complex grammar and vocabulary and there is some evidence of control of simple grammatical structures. Spoken language is generally comprehensible and fluent but at times places strain on the listener.
D	Barely satisfactory result. Spoken and written academic texts produced by students are often inappropriately structured but there may be some evidence of this ability. Students are often unable to clearly and concisely explain academic concepts and argue for a position. There is some evidence of an ability to explain academic concepts but not to critically argue for a position. Students often use sources which are nonacademic and/or not appropriate to support their ideas in writing and speaking. There are many systematic errors in citation and referencing however there is evidence of an understanding of some of the conventions of citation and referencing. Students often have difficulty comprehending and interpreting texts, sometimes failing to understand the main ideas and writer's views and attitudes. Written language is often inaccurate containing errors in a range of simple and complex grammar and vocabulary. Spoken language is only sometimes comprehensible and fluent, and strain is frequently placed on the listener.
Fail	Unsatisfactory result. Productive skills are too limited to be able to successfully carry out spoken and written assessments. Texts are unstructured and unclear. Students are unable to follow and interpret texts. There are language errors in almost every sentence. Spoken language is often incomprehensible. Assessments may not have been attempted or contain plagiarism.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		30
Tutorials		6
Reading / Self study		84

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		65	
Examination		35	

CAES9820 Academic English for science students (6 credits)		Academic Year	2016
Offering Department	English	**Quota**	---
Course Co-ordinator	Ms E Law, English *(ellielaw@hku.hk)*		
Teachers Involved	Ms E Law, Centre for Applied English Studies		
Course Objectives	This six credit English-in-the-Discipline course will be offered to second year students studying in the Science Faculty. This course will help students develop the necessary skills to use both written and spoken English within their studies. Students will learn to better communicate and spontaneously discuss general and scientific concepts within their division, with other scientists as well as to a larger audience. Particular emphasis will be placed on enabling students to identify their own language needs and develop appropriate self-learning strategies to improve their proficiency.		
Course Contents & Topics	Topics covered in the course will be: - Finding, evaluating and using appropriate academic source materials; - Compiling an academic bibliography; - Contrasting academic and popular genres of Science; - Writing for a specific audience, including stance, shared knowledge, levels of formality; and - Organizing and articulating ideas in an academically suitable format including appropriate vocabulary and grammar; and - Critically examine their own language proficiency and analyze how that relates to their ability to perform successfully within their discipline. Developing self-directed learning strategies.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2016 - 2017	Y 1st sem 2nd sem	**Examination**	No Exam
Offer in 2017 - 2018	Y		
Course Grade	A+ to F		

Course Learning Outcomes

CLO 1	identify and summarize disciplinary sources related to a specified topic
CLO 2	produce texts (written and spoken) appropriate for a cross-disciplinary audience based on their disciplinary knowledge
CLO 3	identify their own language learning needs and implement a plan to meet those needs

Grade Descriptors

A	Excellent result. Consistently demonstrates ability to summarize salient points accurately from appropriate and reliable sources using original language. Text uses sources appropriately and demonstrates accurate and appropriate grammatical, lexical and organizational characteristics. Language learning needs are clearly identified and aligned with evidence of planning, self-study and reflection.
B	Good to very good result. Usually demonstrates ability to summarize salient points accurately using mostly original language. Text mostly uses sources appropriately and demonstrates mostly accurate and appropriate grammatical, lexical and organizational characteristics. Language learning needs are stated with some reference to evidence of planning and reflection although there is some misalignment between goals and self-study completed.
C	Satisfactory to reasonably good result. Demonstrates some ability to summarize salient points using mostly original language although some inaccuracies are present. Text uses some sources appropriately and demonstrates appropriate but simple grammatical and lexical characteristics with some organizational flaws. Language learning needs are stated with some limited evidence of planning and reflection but goals and self-study are misaligned.
D	Barely satisfactory result. Demonstrates a limited ability to summarize salient points from sources with inaccuracies and little original language. Text uses sources inappropriately and demonstrates grammatical inaccuracy, inappropriate lexical choices and organizational flaws. There is a minimal statement of language learning needs, planning and reflection with little or no apparent alignment between goals and self-study.
Fail	Unsatisfactory result. Does not demonstrate ability to summarize salient points identify, interpret or appropriately paraphrase reliable sources. Text uses no sources and demonstrates serious grammatical, lexical and/or organizational errors. Does not demonstrate any meaningful attempt to identify language learning needs or implement a plan.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Tutorials	seminars	36
Reading / Self study		120
Assessment	independent learning work	84

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	independent learning work	20	
Essay	other genres of writing	55	
Test		25	

Required/recommended reading and online materials	Course materials to be provided electronically through course website.
Course Website	http://caes.hku.hk/caes9820/
Additional Course Information	This a compulsory course for all students studying undergraduate degrees in the Faculty of Science.

CHEM1041 Foundations of chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	156
Course Co-ordinator	Dr A P L Tong, Chemistry *(apltong@hku.hk)*		
Teachers Involved	Dr A P L Tong, Chemistry		
Course Objectives	The course aims to provide students who do not have HKDSE Chemistry or an equivalent background but are interested in exploring Chemistry further, with an understanding of the essential fundamental principles and concepts of chemistry.		
Course Contents & Topics	Topic 1: Chemistry: Matter and Measurement (2 hours) Elements, compounds, and mixtures; physical properties of matter; chemical changes and chemical properties; measuring mass, length, volume and temperature; atomic structure and subatomic particles; the mole concept and stoichiometry; solutions and concentrations; uncertainty in measurement and significant figures. Topic 2: Gases: Their Properties and Behaviour (6 hours) Gas pressure; the gas laws; the ideal gas law and reaction stiochiometry; the kinetic-molecular theory of gases. Topic 3: Chemical Bonding and Structures (7 hours) Covalent, ionic and metallic bonds; bond energy and chemical change; electronegativity and bond polarity; Lewis structures of molecules and ions; VSEPR Theory and molecular shape. Topic 4: Intermolecular Forces: Liquids, Solids, and Phase Changes (8 hours) Physical states and phase changes; types of intermolecular forces; properties of liquid state; the solid state: structure, properties, and bonding; advanced materials e.g. electronic materials, liquid crystals, ceramic materials and polymeric materials. Topic 5: Chemical Equilibrium (4 hours) The equilibrium state and the equilibrium constant; the equilibrium law: calculation of equilibrium constants and reaction quotient; Le Chelier? Principle Topic 6: Introductory Organic Chemistry (9 hours) Homologous series and nomenclature; isomerism; typical reactions of selected functional groups.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate knowledge and understanding in relation to some chemical vocabulary, terminology and conventions CLO 2: demonstrate knowledge and understanding of chemical stoichiometry, the properties of liquids and solids, the nature of gases, phase changes, chemical bonding and structures, and the nature of chemical equilibria CLO 3: demonstrate a basic knowledge of nomenclature, isomerism, and typical reactions of various functional groups of organic compounds CLO 4: apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends CLO 5: organize and present chemical ideas in a clear, logical and coherent way CLO 6: demonstrate awareness and appreciation of the relevant applications of chemistry in society and in everyday life		
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in HKDSE Combined Science with Chemistry component or Integrated Science, or equivalent. Students without such background but keen on taking this foundation chemistry course may approach the course coordinator for consideration. Not for students with Level 3 or above in HKDSE Chemistry.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5
Examination		65	CLO 1,2,3,4,5,6
Test		15	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	1) Petrucci; Herring; Madura; Bissonnette: General Chemistry: Principles and Modern Applications, latest edition, Pearson 2) Moore; Stanitski; Jurs: Chemistry: The Molecular Science, latest edition, Brookes/Cole 3) Zumdahl; Zumdahl: Chemistry, latest edition, Brookes/Cole
Additional Course Information	Suggested follow-up course: CHEM1042 General Chemistry I

CHEM1042 General chemistry I (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	318
Course Co-ordinator	Dr A P L Tong, Chemistry *(apltong@hku.hk)*		
Teachers Involved	Dr A P L Tong, Chemistry		
Course Objectives	The course aims to provide students with a solid foundation of the basic principles and concepts of chemistry. It also provides students with hands-on training of basic laboratory skills and techniques including volumetric analysis, preparation, purification and characterization of chemical substances and some basic instrumental methods. Students will be equipped with a good foundation of theoretical and practical knowledge and skills for further studies in Chemistry.		
Course Contents & Topics	1. Chemistry: its nature and method Physical properties; chemical changes and chemical properties; elements and compounds; measuring mass, length, volume and temperature; atomic structure and subatomic particles; the mole concept and stoichiometry; solutions and concentrations; uncertainty in measurement and significant figures. 2. Atoms: the quantum world Electromagnetic radiation and matter; Planck's quantum theory; the Bohr model of the hydrogen atom; the quantum mechanical model of the atom; quantum numbers, energy levels, and atomic orbitals; shapes of atomic orbitals; electron configurations; periodic trends: atomic radii, ionic radii, ionization energies, and electron affinities. 3. Chemical bonding and structures Review on covalent, ionic and metallic bond. Covalent bonds and molecular structures (VSEPR, VB theory). 4. Energetics and kinetics of reactions Heat and work; the first law of thermodynamics; heat of reactions; spontaneity of changes. Reaction rate; factors that influence reaction rate; rate laws: differential and integrated rate laws; temperature and reaction rate; reaction mechanisms. 5. Acid-Base equilibria Acid-base concepts; equilibria in solutions of weak acids and in weak bases; ionization constants; molecular properties and acid strength; acid-base properties of salt solutions; buffer solutions; acid-base titrations.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	demonstrate a basic knowledge and understanding of the microscopic nature of atomic structure and concepts of chemical bonding and their relationships with the bulk properties of matter
CLO 2	demonstrate knowledge and understanding in relation to thermodynamics and kinetics of reactions as well as aqueous equilibria including acid-base equilibria
CLO 3	apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends
CLO 4	carry out chemical experiments with proper procedures, record experimental oberservations accurately, and interpret and evaluate the experimental data
CLO 5	organize and present chemical ideas in a clear, logical and coherent way
CLO 6	demonstrate awareness and appreciation of the relevant applications of chemistry in society and in everyday life

Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in HKDSE Chemistry or equivalent; students without Level 3 or above in HKDSE Chemistry but having a pass in CHEM1041 Foundations of chemistry may be allowed to take this course.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Show highly effective lab skills and techniques. Apply highly effective organizational and presentational skills.

	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Show effective lab skills and techniques. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective lab skills and techniques. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		60	CLO 1,2,3,5,6
Laboratory reports		25	CLO 1,2,3,4,5,6
Test		15	CLO 1,2,3,5,6

Required/recommended reading and online materials

1) Petrucci; Herring; Madura; Bissonnette: General Chemistry: Principles and Modern Applications, latest edition, Pearson
2) Moore; Stanitski; Jurs: Chemistry: The Molecular Science, latest edition, Brookes/Cole
3) Zumdahl; Zumdahl: Chemistry, latest edition, Brookes/Cole

Additional Course Information: Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM1043 General chemistry II (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	180
Course Co-ordinator	Dr A P L Tong, Chemistry *(apltong@hku.hk)*		
Teachers Involved	Dr A P L Tong, Chemistry Prof D L Phillips, Chemistry		
Course Objectives	This course is a continuation of CHEM1042 General Chemistry I. It aims to further consolidate some of the important fundamentals of chemistry that underlie many topics and principles across the physical sciences. The course prepares students to pursue a major in chemistry or in other aspects that require a good foundation in chemistry.		

Course Contents & Topics

1. Gases
Simple gas laws; ideal gas equation; gases in chemical reactions; mixture of gases; kinetic-molecular theory of gases; diffusion and effusion; non-ideal gases.
2. Structure and Bonding: The Delocalized Approach: Molecular Orbital Theory
Bonding in homonuclear and heteronuclear diatomic molecules of first and second period of elements; bonding in some simple polyatomic molecules; bonding in metals (band theory).
3. Solutions and their Properties
Types of solutions; intermolecular forces and the solution process; solution formation and equilibrium; solubilities of gases; vapor pressures of solutions; osmotic pressure; freezing-point depression and boiling-point elevation of nonelectrolyte solutions; solutions of electrolytes; colloidal mixtures.
4. Solubility and Complex-Ion Equilibria
Solubility product constant; relationship between solubility and Ksp; common-ion effect in solubility equilibria; limitations of the Ksp concept; precipitation; solubility and pH; equilibria involving complex ions; qualitative cation analysis.
5. Entropy & Gibbs Energy
A quick review on entropy and the second & third laws of thermodynamics. Standard Gibbs energy change; Gibbs energy change and equilibrium; coupled reactions.
6. Electrochemistry
Electrode potentials and their measurement; standard electrode potentials; Ecell, delta G, and K; Ecell as a functions of concentrations; batteries; corrosion; electrolysis; industrial electrolysis processes.

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	demonstrate a knowledge and understanding of the properties and behavior of gases and apply gas laws and kinetic-molecular theory to processes involving gases
CLO 2	demonstrate a knowledge and understanding in relation to solutions and their properties, solubility and complex-ion equilibria, and also electrochemistry
CLO 3	

		apply molecular orbital theory to explain the formation and properties of diatomic molecules of first and second period of elements and of some simple polyatomic molecules
	CLO 4	demonstrate a knowledge and understanding of the relationship between free energy and spontaneity of reaction
	CLO 5	apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends
	CLO 6	organize and present chemical ideas in a clear, logical and coherent way
	CLO 7	demonstrate awareness of the relevant applications of chemistry in society and in everyday life

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3,4,5,6,7
Test	Test and assignment	30	CLO 1,2,3,4,5,6,7

Required/recommended reading and online materials

1) Petrucci; Herring; Madura; Bissonnette: General Chemistry: Principles and Modern Applications, latest edition, Pearson
2) Moore; Stanitski; Jurs: Chemistry: The Molecular Science, latest edition, Brookes/Cole
3) Zumdahl; Zumdahl: Chemistry, latest edition, Brookes/Cole

CHEM2041 Principles of chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	140
Course Co-ordinator	Dr I K Chu, Chemistry *(ivankchu@hku.hk)*		
Teachers Involved	Dr A M Y Yuen, Chemistry Dr I K Chu, Chemistry		
Course Objectives	This course is designed for non-chemistry major students covering basic principles of chemistry.		
Course Contents & Topics	Gas Laws and the Kinetic Theory of Gases Thermodynamics: work, heat, the zeroth and first law of thermodynamics, internal energy, enthalpy, heat capacities, thermochemistry, Hess's Law, Kirchhoff's Law, the second and third laws of thermodynamics, entropy, Gibbs free energy, spontaneity, equilibrium, coupled reaction; Transport Phenomena: diffusion, viscosity of gases, diffusion in liquids and viscosity of liquids, ionic conduction; Chemical Kinetics: rate of reactions, orders of reactions, rate laws, reaction mechanism, experimental measurement of reaction rates, enzyme kinetics, enzyme inhibition, temperature effect on rates; Chemical Equilibrium; Equilibria in single-, and two component systems: phase transitions, phase diagrams and the phase rule, chemical potential; liquid/liquid systems; Introduction to acids and bases: calculation on concentration of different chemical species in a solution, diprotic and polyprotic acids, activity; Introduction to Spectroscopy: UV/Visible absorption spectroscopy, Beer-Lambert Law; IR Spectroscopy, identification of functional groups; NMR Spectroscopy, Larmor frequency & chemical shift, peak integral,		

	spin-spin coupling multiplicities; Mass Spectrometry, isotopic distribution, determination of molecular formulae.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 explain the principles of the thermochemistry, chemical kinetics, chemical equilibrium, physical properties of solutions and gases CLO 2 explain the principles of the spectroscopy, and spectrometry
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I; and Not for students who have passed in CHEM2341 Inorganic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2441 Organic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2541 Introductory physical chemistry/Physical chemistry I, or have already enrolled in this course; and Not for Chemistry major students.
Offer in 2015 - 2016	N — **Examination** ---
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	see below

Grade	Descriptor
A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show strong ability to apply and integrate knowledge and theory, and strong ability to analyze problems related to general chemistry and spectroscopy.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show evidence to apply and integrate knowledge and theory, and ability to analyze problems related to general chemistry and spectroscopy.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show evidence of some abilities to apply and integrate knowledge and theory, and to analyze problems to most familiar situations to general chemistry and spectroscopy.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show evidence of limited abilities to apply and integrate knowledge and theory, and limited ability to analyze problems to most familiar situations related to general chemistry and spectroscopy.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show little or no evidence of abilities to apply and integrate knowledge and theory, and little or no ability to analyze problems to most familiar situations related to general chemistry and spectroscopy.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 1,2
Examination		75	CLO 1,2

Required/recommended reading and online materials	Spectroscopy for the biological science, by Gordon G. Hammes, Wiley-Interscience (2005)

CHEM2241 Analytical chemistry I (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	115
Course Co-ordinator	Dr W T Chan, Chemistry *(wtchan@hku.hk; kwanmng@hku.hk)*		
Teachers Involved	Dr W T Chan (1st sem), Chemistry Dr I K Chu (2nd sem), Chemistry		
Course Objectives	The course aims to introduce the basic principles of chemical analysis. The principles of chemical measurement, including error analysis, quality assurance and calibration, data acquisition and processing, will be discussed with reference to methods of chemical analysis that are based on chemical equilibrium and stoichiometric reactions. The laboratory classes will include experiments demonstrating modern approaches of data acquisition and processing as well as chemical analysis based on chemical equilibrium.		
Course Contents & Topics	Measurement: analog and digital measurement, accuracy and precision, comparing means and deviations, calibration curves and least square method for linear plots Quality assurance: validation of analytical procedures Chemical equilibrium and chemical analysis: aqueous solution and chemical equilibrium; analysis by acid-base reactivity, complexation reactivity, precipitation reactivity		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 explain the basic principles of chemical measurements CLO 2 explain the principles of classical methods of chemical analysis such as acid-base neutralization CLO 3 use laboratory apparatus for chemical analysis
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I (for students admitted in 2014-15 or before); Pass in CHEM1042 General chemistry I; and Pass in CHEM1043 General chemistry II or already enrolled in this course (for students admitted in 2015-16 or thereafter)
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. Demonstrate highly effective organization and presentation skills.
B	Demonstrate substantial grasp of the subject. Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. Demonstrate effective organization and presentation skills.
C	Demonstrate general but incomplete grasp of the subject. Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. Demonstrate moderately effective organization and presentation skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. Demonstrate limited or barely effective organization and presentation skills.
Fail	Demonstrate little or no grasp of the knowledge and understanding of the subject. Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. Demonstrate incoherent organization and poor presentation skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		5	CLO 1,2
Examination		65	CLO 1,2
Laboratory reports		20	CLO 3
Test		10	CLO 1,2

Required/recommended reading and online materials	Skoog, West, Holler and Crouch, "Fundamentals of Analytical Chemistry", latest edition, Cengage Learning.
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM2341 Inorganic chemistry I (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	115
Course Co-ordinator	Prof V W W Yam (1st sem); Dr H Y Au Yeung (2nd sem), Chemistry *(wwyam@hku.hk; hoyuay@hku.hk)*		
Teachers Involved	Prof V W W Yam / Dr H Y Au Yeung, Chemistry Dr A M Y Yuen, Chemistry		
Course Objectives	To provide students with the basic principles and knowledge of inorganic chemistry and to introduce their relevance to biological processes and materials science. This course provides the foundation for further studies in inorganic chemistry.		
Course Contents & Topics	Acid-base concept; structure and bonding of transition metal complexes and main group compounds; electronic absorption and magnetic properties of metal complexes; chemical reactions of metal complexes: redox and substitution; chemistry of selected main group elements and transition metal complexes and their relevance to biology and materials.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the basic principles and concepts of inorganic chemistry and appreciate their relevance to selected examples of biological processes and materials science CLO 2 demonstrate knowledge and understanding of the acid-base concept and definition		

CLO 3	demonstrate knowledge and understanding of the structure and bonding of main group compounds and transition metal complexes and their relevance to the electronic absorption and magnetic properties of transition metal complexes
CLO 4	demonstrate knowledge and understanding of the thermodynamic stability of metal complex formation and the thermodynamic and kinetic aspects of substitution and redox reactions
CLO 5	demonstrate knowledge and understanding of the role of main group elements and transition metal complexes in bioinorganic chemistry

Pre-requisites (and Co-requisites and Impermissible combinations)

Pass in CHEM1042 General chemistry I; and NOT for students who have passed in CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2014-15 or before);
Pass in CHEM1042 General chemistry I; and Pass in CHEM1043 General chemistry II or already enrolled in this course; and NOT for students who have passed in CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2015-16 or thereafter)

Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show strong ability to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate highly effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show evidence to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show evidence of some abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate moderately effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate partially effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate minimally effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.

Course Type

Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		5	CLO 1,2,3,4,5
Examination		65	CLO 1,2,3,4,5
Laboratory reports		10	CLO 1,2,3,4,5
Test		20	CLO 1,2,3,4,5

Required/recommended reading and online materials

F. A. Cotton ; G. Wilkinson ; P. L. Gaus : Basic Inorganic Chemistry (John Wiley & Sons, 1995, 3rd ed.)
P. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong: Shriver & Atkins Inorganic Chemistry (Oxford University Press, 2006, 4th ed.)

Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM2441 Organic chemistry I (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	200
Course Co-ordinator	Prof P Chiu, Chemistry *(pchiu@hku.hk)*		
Teachers Involved	Prof P Chiu, Chemistry		
Course Objectives	To provide students with the basic principles to understand the structure and reactivity of organic molecules, with examples illustrating the role of organic chemistry in daily life and industry. This course serves as the first part of the complete program on fundamental organic chemistry, to be followed up by CHEM3441 Organic Chemistry II.		
Course Contents & Topics	Structure and bonding of organic compounds, three dimensional structures of organic molecules, conformational stereochemistry, chirality. Chemistry of alkanes, cycloalkanes, alkenes, alkynes, haloalkanes, dienes, aromatic compounds, alcohols, thiols, and ethers. Organometallic chemistry for organic synthesis. Principles of organic synthesis. Detailed considerations of reaction mechanisms.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand basic concepts and employ the vocabulary of organic chemistry
CLO 2	visualize and draw three-dimensional, stereochemically correct representations of organic molecules
CLO 3	recognize, discriminate and name chiral stereoisomers and diastereomers
CLO 4	understand the reactivity of the functional groups
CLO 5	understand reaction mechanisms and apply mechanistic knowledge to solve chemistry problems
CLO 6	apply reactions to the synthesis of target molecules
CLO 7	appreciate the relevance of organic chemistry in biological processes and daily life

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I; and NOT for students who have passed in CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2014-15 or before); Pass in CHEM1042 General chemistry I; and Pass in CHEM1043 General chemistry II or already enrolled in this course; and NOT for students who have passed CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2015-16 or thereafter)		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate a thorough mastery at an advanced level of knowledge and understanding of facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show a strong ability to integrate knowledge and theory, and a strong ability to analyze and solve novel organic chemistry problems. Demonstrate highly effective organization, understanding, and execution of lab skills and techniques in organic chemistry experiments.
B	Demonstrate substantial command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show evidence of ability to integrate knowledge and theory, and evidence of ability to analyze and solve novel organic chemistry problems. Demonstrate effective organization, understanding, and execution of lab skills and techniques in organic chemistry experiments.
C	Demonstrate a general but incomplete command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show evidence of some ability to integrate knowledge and theory, and evidence of some ability to analyze novel problems. Show a mostly correct use of knowledge to solve most familiar problems. Demonstrate adequately effective organization, understanding, and execution of lab skills and techniques in organic chemistry experiments.
D	Demonstrate a partial but limited command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show evidence of limited ability to integrate knowledge and theory, and a limited ability to analyze novel problems. Show some correct but also erroneous use of knowledge to solve most familiar problems. Demonstrate a partially effective organization, understanding and application of lab skills and techniques in organic chemistry experiments.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show little or no evidence of ability to apply and integrate knowledge and theory, and little or no ability to analyze novel problems. Show little or no evidence of ability to solve most familiar problems. Demonstrate minimal or no organization, understanding and application of lab skills and techniques in organic chemistry experiments.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4,5,6,7
Examination	2 hrs written examination	75	CLO 1,2,3,4,5,6
Test		15	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Reference Book: "Organic Chemistry", by Paula Y. Bruice, 2014, 7th Edition, Pearson, with e-text and Mastering Chemistry. Chapters 3-13.
Additional Course Information	Nil

CHEM2442 Fundamentals of organic chemistry (6 credits)		**Academic Year**	2015
Offering Department	Chemistry	**Quota**	130
Course Co-ordinator	Dr P H Toy, Chemistry *(phtoy@hku.hk)*		
Teachers Involved	Dr P H Toy, Chemistry		
Course Objectives	The major objective of this course is to give the students a basic understanding of organic chemistry, especially in the context of daily life. This will be achieved through the introduction of the chemistry of organic functional groups that form the basis of organic molecules. The concepts presented in the lectures will be reinforced by a series of laboratory experiments.		
Course Contents & Topics	The chemistry of organic functional groups such as alkenes, alkynes, alkyl halides, alcohols, aldehydes, ketones, carboxylic acids and their derivatives, and amines will be discussed, as will the general concepts of molecular structure, conformation and stereochemistry.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate basic understanding of the structure of organic molecules CLO 2: demonstrate basic understanding of the reactivity of organic molecules CLO 3: appreciate how organic chemistry plays an important role in everyday life		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I; and Not for students who have passed CHEM2441 Organic chemistry I or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive organic chemistry knowledge, and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar problems. **B**: Demonstrate substantial command of organic chemistry with a broad range of knowledge, and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar problems. **C**: Demonstrate general but incomplete command of organic chemistry knowledge, and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar problems. **D**: Demonstrate partial but limited command of organic chemistry knowledge, and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. **Fail**: Demonstrate little or no evidence of command of organic chemistry knowledge, and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.		
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Tutorials		5
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		60	CLO 1,2,3
Laboratory reports	Experiment & Lab report	15	CLO 1,2,3
Test	Test/Quiz	25	CLO 1,2,3

Required/recommended reading and online materials	Bruice, P.Y. Essential Organic Chemistry (Pearson, 2010, 2nd edition)
Additional Course Information	Students who are planning to CHEM3441 should take CHEM2441. Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM2443 Fundamentals of organic chemistry for pharmacy students (6 credits)		**Academic Year**	2015
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Dr P H Toy, Chemistry *(phtoy@hku.hk)*		

Teachers Involved	Dr P H Toy, Chemistry
Course Objectives	The major objective of this course is to give pharmacy students a basic understanding of organic chemistry, especially in the context of daily life. This will be achieved through the introduction of the chemistry of organic functional groups that form the basis of organic molecules. The concepts presented in the lectures will be reinforced by a series of laboratory experiments.
Course Contents & Topics	The chemistry of organic functional groups such as alkenes, alkynes, alkyl halides, alcohols, aldehydes, ketones, carboxylic acids and their derivatives, and amines will discussed, as will the general concepts of molecular structure, conformation and stereochemistry.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	demonstrate basic understanding of structure of organic molecules
CLO 2	demonstrate basic understanding of the reactivity of organic molecules
CLO 3	appreciate how organic chemistry plays an important role in everyday life

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I; and Not for students who have passed CHEM2442 Fundamentals of organic chemistry, or already enrolled in this course. (This course is for BPharm students only)		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive organic chemistry knowledge, and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar problems.
B	Demonstrate substantial command of organic chemistry with a broad range of knowledge, and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar problems.
C	Demonstrate general but incomplete command of organic chemistry knowledge, and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar problems.
D	Demonstrate partial but limited command of organic chemistry knowledge, and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.
Fail	Demonstrate little or no evidence of command of organic chemistry knowledge, and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Tutorials		5
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		60	CLO 1,2,3
Laboratory reports	Experiment & Lab report	15	CLO 1,2,3
Test	Test/Quiz	25	CLO 1,2,3

Required/recommended reading and online materials	Bruice, P.Y.: Essential Organic Chemistry (Pearson, 2010, 2nd edition)
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM2541 Introductory physical chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	200
Course Co-ordinator	Dr J Y Tang, Chemistry *(jinyao@hku.hk)*		
Teachers Involved	Dr J Y Tang, Chemistry		
Course Objectives	The course aims to provide a rigorous understanding of equilibrium thermodynamics and chemical kinetics. Students are required to apply mathematical skills (derivations and integrations) and basic physics to understand chemical reactions and related processes. Topics include the three laws of thermodynamics, thermodynamic properties of mixtures, solutions, chemical equilibrium, electrochemistry, rates of chemical reactions and reaction dynamics. Students will gain a good foundation of knowledge and skills for further study in Physical Chemistry.		
Course Contents & Topics	Properties of Gases States of gases and the gas laws with applications.		

	The First Law of Thermodynamics Basic concepts of work, heat, energy, expansion work, heat transactions, enthalpy and adiabatic changes and examples in relation to biochemistry and materials science. The Second and Third Laws of Thermodynamics Direction of spontaneous change, entropy and the Third Law of Thermodynamics. Simple Mixtures Thermodynamic description of mixtures, partial molar quantities, and chemical potentials of liquids. Activities of solvent, solute, regular solutions and ions in solution. Chemical Equilibrium Spontaneous chemical reactions, the Gibbs energy minimum and equilibrium. Response of equilibria to pressure, temperature. Electrochemistry Electrochemical cell, relationship of electrochemical potential to thermodynamic functions. Applications of electrochemistry in energy, material science, sensing. Molecules in Motion Molecular motion in gases and liquids, kinetic model, collisions with surfaces, the rate of effusion and transport properties, conductivities of electrolyte solutions. Rates of Chemical Reactions Empirical chemical kinetics including experimental methods, rates of reactions, integrated rate laws and temperature dependence of reactions and Reaction mechanism
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	demonstrate knowledge and understanding of the properties of gases, molecules in motion and the rates of chemical reactions
CLO 2	understand and demonstrate knowledge of the three laws of thermodynamics
CLO 3	understand and apply the concepts of chemical equilibrium and the response of chemical equilibria to temperature and pressure
CLO 4	understand and demonstrate knowledge of electrochemistry and its relationship to thermodynamics, can build electrochemical cell and calculate thermodynamic functions from electrochemical reactions
CLO 5	demonstrate knowledge and understanding of basic reaction dynamics including reaction mechanism and how mechanism determines reaction rate law

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I; and NOT for students who have passed CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2014-15 or before) Pass in CHEM1042 General chemistry I and CHEM1043 General chemistry II; and NOT for students who have passed CHEM2041 Principles of chemistry or already enrolled in this course (for students admitted in 2015-16 or thereafter)
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	including tests	30	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4

	"Physical Chemistry" by P. W. Atkins, latest edition

Required/recommended reading and online materials	

CHEM3141 Environmental chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	100
Course Co-ordinator	Dr W T Chan, Chemistry *(wtchan@hku.hk)*		
Teachers Involved	Dr W T Chan, Chemistry Prof A S C Cheung, Chemistry		
Course Objectives	This course introduces students to Environmental Chemistry and enables them to understand the chemical principles involved in various environmental phenomena and processes.		
Course Contents & Topics	Atmosphere chemistry: atmospheric composition and behavior, ozone in the stratosphere, chemistry of the troposphere, air pollution Water Chemistry: property of water, water resources and cycle, chemical quality of natural water, acid-base chemistry, oxidation-reduction chemistry, water purification Organic pollutants: persistent organic pollutants, pesticides, toxicology Energy: energy resources, fossil fuels, solar energy, nuclear energy, energy conversion (heat engine, fuel cells) Waste treatment: domestic and hazardous waste treatment (landfill, incineration, air stripping, adsorption, oxidation)		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge on chemical principles of the various environmental phenomena and processes CLO 2 describe the practical processes of chemistry in atmosphere, water purification, waste treatment, and energy production CLO 3 critically discuss local and global environmental issues based on scientific principles and data CLO 4 apply knowledge to analyze chemical processes involved in various environmental problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Introductory physical chemistry/Physical chemistry I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	- Demonstrate thorough grasp of the subject. - Demonstrate integration of the full range of appropriate theories, principles, and evidence. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly effective organization and presentation skills.
B	- Demonstrate substantial grasp of the subject. - Demonstrate general integration of theories, principles, and evidence. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate effective organization and presentation skills.
C	- Demonstrate general but incomplete grasp of the subject. - Demonstrate some partial integration of theories, principles, and evidence. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate moderately effective organization and presentation skills.
D	- Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Demonstrate limited integration of theories, principles, and evidence. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate limited or barely effective organization and presentation skills.
Fail	- Demonstrate little or no grasp of the knowledge and understanding of the subject. - Demonstrate little or inapt integration of theories, principles, and evidence. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate incoherent organization and poor presentation skills.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	25	CLO 1,2,3,4
Examination		75	CLO 1,2,3,4

Required/recommended reading and online materials

C. Baird and M. Cann: Environmental Chemistry, Freeman, latest edition.
S.E. Manahan: Environmental Chemistry, Lewis Publishers, latest edition.

	Academic Year	**2015**

CHEM3142 Chemical process industries and analysis (6 credits)			
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Prof G K Y Chan, Chemistry *(hrsccky@hku.hk)*		
Teachers Involved	Prof G K Y Chan, Chemistry Guest lecturer, Chemistry		
Course Objectives	To familiarize with typical chemical industries important in local and global economy. To understand the technology of chemicals manufacturing and chemical processes in general industry.		
Course Contents & Topics	Process flow charts, units and conversions, materials and energy balances, unit operations. Selection of chemical processes to include variation in products, scale, and types of operation, e.g. for petrochemical industries, industrial gases, beverage processes, chloroalkaline manufacturing.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 solve basic problems of energy and mass balances in chemical and environmental processes CLO 2 be familiarized with a few common chemical industries and chemical processes CLO 3 understand some general principles of industrial practice through plant visits		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Introductory physical chemistry/Physical chemistry I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough knowledge of industrial chemical processes and mastery of mass and energy balance skills required for attaining all of the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to solve problems in a wide range of complex, familiar and unfamiliar situations. Critical use of data and sourcing of references. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to solve problems in familiar and some unfamiliar situations. Correct use of data and sourcing of references. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge solve problems to most familiar situations. Mostly correct but some erroneous use of data and references. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited ability to use data and source references. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Misuse of data and references. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	computational laboratory	12
Field work	1 - 2 plant visits	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	continuous assessment	5	CLO 1,2
Examination		70	CLO 1,2,3
Test	test/quiz	25	CLO 1,2

Required/recommended reading and online materials	Felder and Rousseau: Elementary Principles of Chemical Processes
Additional Course Information	Laboratory courses are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3143 Introduction to materials chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	100
Course Co-ordinator	Prof W K Chan, Chemistry *(waichan@hku.hk)*		
Teachers Involved	Prof W K Chan, Chemistry		
Course Objectives			

	This course provides an introduction to materials chemistry. Some basic material characterization techniques will also be introduced. This course is essential for students who wish to take advanced materials course.
Course Contents & Topics	Classification of materials; introduction to organic polymers: molecular weight, polymerization reaction, polymer synthesis and characterization; ceramics; semiconducting materials; applications of different materials; materials characterizations.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: describe different materials classification and to explain the concept of structure/property relationship CLO 2: understand the concept of molecular weight distribution in polymers, and explain how it is affected by the kinetics of polymerization reactions CLO 3: identify examples of some important polymers, and explain how the molecular structure of these polymers affect their physical properties CLO 4: demonstrate knowledge in materials characterizations
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Introductory physical chemistry/Physical chemistry I
Offer in 2015 - 2016	Y 1st sem — **Examination**: Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the classification of materials, materials properties, synthesis and characterization of polymers, properties and applications of common polymers. Show strong ability to apply and integrate knowledge and theory relating to the synthesis and applications of materials. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to materials synthesis and characterization. **B**: Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the classification of materials, materials properties, synthesis and characterization of polymers, properties and applications of common polymers. Show evidence to apply and integrate knowledge and theory relating to the synthesis and applications of materials. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to materials synthesis and characterization. **C**: Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the classification of materials, materials properties, synthesis and characterization of polymers, properties and applications of common polymers. Show evidence of some abilities to apply and integrate knowledge and theory relating to the synthesis and applications of materials. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to materials synthesis and characterization. **D**: Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the classification of materials, materials properties, synthesis and characterization of polymers, properties and applications of common polymers. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the synthesis and applications of materials. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to materials synthesis and characterization. **Fail**: Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the classification of materials, materials properties, synthesis and characterization of polymers, properties and applications of common polymers. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the synthesis and applications of materials. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to materials synthesis and characterization.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3,4
Test	(continuous assessment)	30	CLO 1,2,3,4

Required/recommended reading and online materials	F. W. Billmeyer: Textbook of Polymer Science (John Wiley and Sons, 1984) G. Odian: Principles of Polymerizations (John Wiley and Sons, 2004) M. P. Stevens: Polymer Chemistry: An Introduction (Oxford University Press, 1999)

CHEM3146 Principles and applications of spectroscopic and analytical techniques (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	200
Course Co-ordinator	Dr X Li, Chemistry *(xiangli@hku.hk)*		
Teachers Involved	Dr X Li, Chemistry		
Course Objectives	To cover the principles and applications of modern practical spectroscopic and analytical techniques. This course is a pre-requisite for the advanced chemistry courses.		

Course Contents & Topics	UV-Visible Absorption Spectroscopy, Nuclear Magnetic Resonance Spectroscopy, Mass Spectrometry, Infra-red Spectroscopy, Elemental Analysis, Molecular Formulas and analysis of data.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the basic principles and applications of IR, UV/Vis, MS and NMR spectroscopic techniques CLO 2 describe and explain the terminology of IR, UV/Vis, MS and NMR spectroscopies CLO 3 perform chemical structure elucidation and analysis based on UV/Vis, MS and NMR spectroscopic data
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in any CHEM2XXX level course
Offer in 2015 - 2016	Y 2nd sem; **Examination** May
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,2,3
Examination		70	CLO 1,2,3
Test	(2 quizzes)	15	CLO 1,2,3

Required/recommended reading and online materials	Donald L. Pavia, Gary M. Lampman, George S. Kriz: Introduction to Spectroscopy (Thomson Learning, 2001, 3rd & 4th edition) W. Kemp: Organic Spectroscopy (Macmillan, 1991, 3rd ed.)
Additional Course Information	Suggested follow-up course: CHEM3241

CHEM3241 Analytical chemistry II: chemical instrumentation (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	80
Course Co-ordinator	Dr W T Chan, Chemistry *(wtchan@hku.hk)*		
Teachers Involved	Dr W T Chan, Chemistry Dr I K Chu, Chemistry		
Course Objectives	To cover the basic principles and applications of chemical instrumentation. This course aims to provide working knowledge, in addition to the principles, of instruments that are commonly used in chemical laboratories.		
Course Contents & Topics	Optical methods: Beer's Law; UV-visible, infrared, and atomic spectrometry; fluorescence; atomic mass spectrometry; grating spectrometer; photon detectors and thermal detectors. Separation methods: partition; chromatography theories; high performance liquid chromatography (HPLC) and gas chromatography (GC); instrumental set up of HPLC and GC. Mass spectrometry: fundamental concept of mass spectrometry; electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI); time-of-flight (TOF) and quadrupole (Q) mass analyzers.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 explain the principles of the optical methods, separation methods, and mass spectrometry CLO 2 describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes CLO 3 apply experimental skills in chemical analysis including sample preparation, standard solution preparation, instrument calibration, and matrix effects correction (standard additions)		

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2241 Anlytical chemistry I		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	- Demonstrate thorough grasp of the subject. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. - Demonstrate highly effective organization and presentation skills
B	- Demonstrate substantial grasp of the subject. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. - Demonstrate effective organization and presentation skills.
C	- Demonstrate general but incomplete grasp of the subject. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. - Demonstrate moderately effective organization and presentation skills.
D	- Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. - Demonstrate limited or barely effective organization and presentation skills.
Fail	- Demonstrate little or no grasp of the knowledge and understanding of the subject. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. - Demonstrate incoherent organization and poor presentation skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		28
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports	including an oral presentation	20	CLO 1,2,3
Test		10	CLO 1,2,3

Required/recommended reading and online materials

D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition).
D.A. Skoog, D.M. West, F.J. Holler, and S.R. Crouch: Fundamentals of Analytical Chemistry (Thomson, latest edition)

Additional Course Information

Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3242 Food and water analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Dr K M Ng, Chemistry *(kwanmng@hku.hk)*		
Teachers Involved	Dr I K Chu, Chemistry Dr K M Ng, Chemistry		
Course Objectives	To cover areas in the application and new methodology development in analytical chemistry with focus on food and water analysis.		

Course Contents & Topics

Chemical Analysis in Practicing Laboratories: Use of standard methods, guidelines and standards for food and water analysis; good laboratory practice; reliability and quality issues in chemical analysis.

Food Analysis: Requirement of nutritional labeling; determination of food nutritional value (e.g. total protein content, sodium content); detection of food adulteration and contamination (e.g. presence of banned additives, toxins, undeclared components); recent issues and case studies in food analysis.

Water Analysis: Water quality standards; sampling, pretreatment, storage of water samples; theory and technologies for field, laboratory and automated analysis of selected types of water (e.g. drinking water, recreational water, waste water).

Analytical Method Development: Selection, application and combination of analytical (e.g. sample digestion, solid phase extraction) and instrumental (e.g. GC, LC, MS) techniques for food and water analysis; method validation (e.g. recovery analysis, analysis of certified reference materials)

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	identify and determine errors and uncertainty of analytical results
CLO 2	apply measures taken to control quality and ensure reliability of analytical results

	CLO 3 — demonstrate a general knowledge in food and water analysis CLO 4 — understand issues in public health protection related to chemical analysis CLO 5 — carry out analytical techniques used in practicing food and water laboratories
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2041 Principles of chemistry or CHEM2241 Analytical chemistry I or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Introductory physical chemistry/Physical chemistry I; and Pass in CHEM3241 Analytical chemistry II: chemical instrumentation, or already enrolled in this course.
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	see below

Grade	Descriptor
A	Demonstrate through a thorough grasp of the knowledge and skills required in theory and laboratory work in food and water analysis to acquire accurate results with full interpretation for analytical application as described in all the course learning outcomes. Show strong analytical and critical abilities, logical thinking and capability to apply knowledge learnt to solve a wide range of complex issues and problems related to the analysis of food and water. Apply highly effective organization and presentation skills as shown in class work.
B	Demonstrate a substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities, logical thinking, and capability to apply knowledge learnt to solve a wide range of complex issues and problems related to the analysis of food and water. Apply effective organization and presentation skills as shown in class work.
C	Demonstrate a general command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, logical thinking, and ability to apply knowledge learnt to solve a wide range of complex issues and problems related to the analysis of food and water. Apply effective organization and presentation skills as shown in class work.
D	Demonstrate a partial but limited command of knowledge and skills required for attaining some of the course learning outcomes in Food and Water Analysis. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems related to the analysis of food and water. Apply limited or barely effective organization and presentation skill as shown in class work.
Fail	Demonstrate little or no evidence for the command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems related to the analysis of food and water. Organization and presentation skills are minimally effective or ineffective as shown in class work.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		8
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		5	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4
Laboratory reports	coursework assessment including laboratory work	15	CLO 2,5
Test		10	CLO 1,2,3,4

Required/recommended reading and online materials	D. A. Skoog, D. M. West, F. J. Holler, S.R. Crouch: Fundamentals of Analytical Chemistry (Cengage Learning, latest edition)
Additional Course Information	References to specialist texts and other published material will be made throughout the course. Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3243 Introductory instrumental chemical analysis (6 credits)		**Academic Year**	2015
Offering Department	Chemistry	**Quota**	65
Course Co-ordinator	Dr X Li, Chemistry *(xiangli@hku.hk)*		
Teachers Involved	Dr X Li, Chemistry Dr K C J Wong, Pharmacology and Pharmacy		
Course Objectives	This course is designed for non-chemistry major students covering basic principles of separation and spectroscopy for chemical analysis. This course provides a general foundation for further studies in pharmacology, life and environmental sciences.		
Course Contents & Topics	Optical methods: Beer's Law; UV-visible, infrared, and atomic spectrometry; fluorescence; atomic mass spectrometry; grating spectrometer; photon detectors and thermal detectors. Separation methods: partition; chromatography theories; high performance liquid chromatography (HPLC) and gas chromatography (GC); instrumental set up of HPLC and GC. Mass spectrometry: fundamental concept of mass spectrometry; electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI); time-of-flight (TOF) and quadrupole (Q) mass analyzers. NMR: basic principle of nuclear magnetic resonance. Analysis and quality assurance: statistical analysis of small sets of data, control chart.		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 explain the principles of the optical methods, separation methods, mass spectrometry, and NMR CLO 2 describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2041 Principles of chemistry or CHEM2241 Analytical chemistry I; and Not for students who have passed CHEM3241 Analytical chemistry II: chemical instrumentation or have already enrolled in this course.
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	- Demonstrate thorough grasp of the subject. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. - Demonstrate highly effective organization and presentation skills.
B	- Demonstrate substantial grasp of the subject. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. - Demonstrate effective organization and presentation skills.
C	- Demonstrate general but incomplete grasp of the subject. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. - Demonstrate moderately effective organization and presentation skills.
D	- Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. - Demonstrate limited or barely effective organization and presentation skills.
Fail	- Demonstrate little or no grasp of the knowledge and understanding of the subject. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. - Demonstrate incoherent organization and poor presentation skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		28
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2
Laboratory reports		15	CLO 1,2
Test		15	CLO 1,2

Required/recommended reading and online materials	D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition). D.A. Skoog, D.M. West, F.J. Holler, and S.R. Chttp://webapp.science.hku.hk/sr4/servlet/sr004rouch: Fundamentals of Analytical Chemistry (Thomson, latest edition)
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3244 Analytical techniques for pharmacy students (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	35
Course Co-ordinator	Dr X Li, Chemistry *(xiangli@hku.hk)*		
Teachers Involved	Dr X Li, Chemistry Dr K C J Wong, Pharmacology and Pharmacy		
Course Objectives	This course is designed for Bachelor of Pharmacy students to provide an overview of different analytical and measurement techniques that are important to pharmacology and pharmaceutical sciences.		
Course Contents & Topics	Principles and Applications of different analytical and measurement techniques in pharmaceutical sciences such as drug analysis and pharmacokinetics studies Analysis and quality assurance: statistical analysis of data, control chart. Analysis by Optical methods: Beer's Law; instrumentation, grating spectrometer, detectors; absorption spectrometry: UV-visible, infrared, and atomic; emission spectrometry; Sample Separation and Purification: partition; chromatography theories; high performance liquid chromatography (HPLC) and gas chromatography (GC); instrumentation of HPLC and GC. Molecular Mass Measurements: mass spectrometry-fundamental concepts; various ionization techniques including electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI); time-of-flight (TOF) and quadrupole (Q) mass analyzers; use of mass spectrometry in drug analysis		

	Nuclear magnetic resonance: basic principles; instrumentations; applications in structure determination of molecules of biological and pharmaceutical importance
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge and understanding of the principles of different optical methods, separation methods, mass spectrometry, NMR spectroscopy and their applications in pharmaceutical sciences CLO 2 describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes CLO 3 apply experimental skills in chemical analysis including sample preparation, standard solution preparation, instrument calibration, matrix effects correction (standard additions)
Pre-requisites (and Co-requisites and Impermissible combinations)	For BPharm students only; and Pass in BPHM2136 Physical chemistry: principles and applications in pharmaceutical science
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** - Demonstrate thorough grasp of the subject. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. - Demonstrate highly effective organization and presentation skills. **B** - Demonstrate substantial grasp of the subject. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. - Demonstrate effective organization and presentation skills. **C** - Demonstrate general but incomplete grasp of the subject. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. - Demonstrate moderately effective organization and presentation skills. **D** - Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. - Demonstrate limited or barely effective organization and presentation skills. **Fail** - Demonstrate little or no grasp of the knowledge and understanding of the subject. -.Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. - Demonstrate incoherent organization and poor presentation skills.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	(see below)

Activities	Details	No. of Hours
Lectures		24
Laboratory		28
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports		15	CLO 1,2,3
Test		15	CLO 1,2,3

Required/recommended reading and online materials	D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition). D.A. Skoog, D.M. West, F.J. Holler, and S.R. Crouch: Fundamentals of Analytical Chemistry (Thomson, latest edition).
Additional Course Information	This course is for Pharmacy students ONLY. Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3341 Inorganic chemistry II (6 credits)		**Academic Year**	2015
Offering Department	Chemistry	**Quota**	90
Course Co-ordinator	Prof V W W Yam, Chemistry *(wwyam@hku.hk)*		
Teachers Involved	Prof V W W Yam, Chemistry Dr A M Y Yuen, Chemistry		
Course Objectives	This course is a continuation from CHEM2341 Inorganic Chemistry I, with a more detailed treatment of general inorganic chemistry, with examples relevance to biological processes and material science, suited to the needs of those intending to extend their studies in chemistry.		
Course Contents & Topics	Chemistry of selected classes of inorganic, coordination and organometallic compounds including mechanisms of their reaction where appropriate. Structure, bonding, magnetism and spectral properties of inorganic systems including examples in bioinorganic systems.		
Course Learning Outcomes			

On successful completion of this course, students should be able to:

CLO 1	demonstrate knowledge of chemistry of selected classes of inorganic, coordination and organometallic compounds
CLO 2	understand structure, bonding, magnetism and spectral properties of inorganic systems
CLO 3	understand mechanisms of selected chemical reactions that are essential to coordination and organometallic compounds
CLO 4	gain appropriate knowledge of coordination compounds in biological systems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2341 Inorganic chemistry I		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show strong ability to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate highly effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show evidence to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show evidence of some abilities to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate moderately effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate partially effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate minimally effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	including lab report & test	30	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4

Required/recommended reading and online materials

Shriver & Atkins, Inorganic Chemistry (4th Ed.), Oxford University Press, 2005
Catherine, Housecroft & Sharpe, Inorganic Chemistry (3nd Ed.), Prentice Hall, 2008

Additional Course Information

Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3342 Bioinorganic chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Prof H Z Sun, Chemistry *(hsun@hku.hk)*		
Teachers Involved	Dr H Y Au Yeung, Chemistry Prof H Z Sun, Chemistry		
Course Objectives	This course is a continuation from Basic Inorganic Chemistry and Basic Organic Chemistry, giving further and more details of inorganic chemistry in biological system, with examples relevance to biological processes and medical science, suited to the needs of those intending to extend their studies in (bio) chemistry and biomedical science.		
Course Contents & Topics	Bioinorganic Chemistry of selected topics of interest. Examples include the inorganic chemistry (and biochemistry) behind the requirement of biological cells for metals such as zinc, iron and copper; and metals in medicine such as mechanisms by which organisms obtain required metal ions from their environment, and use of metal-containing compounds in treating diseases such as cancer.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the principles and concepts of inorganic/organic chemistry in biological system
CLO 2	understand structure, bonding, and spectral properties of selected metals in proteins and nucleic acids
CLO 3	understand chemical mechanisms of selected metal homeostasis (i.e. uptake, transport and storage)
CLO 4	understand the role of metal complexes medicine

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2341 Inorganic chemistry I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show strong ability to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate highly effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show evidence to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show evidence of some abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate moderately effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate partially effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate minimally effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials	including literature survey & presentation	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**

	Assignments	(continuous assessment of assignments and presentation)	25	CLO 1,2,3,4
	Examination		75	CLO 1,2,3,4
Required/recommended reading and online materials	Lippard, S. J. and Berg, J. M. Principles of Bioinorganic Chemistry (University Science Books; Mill Valley, CA, 1994 Bertini, I.; Gray, H. B.; Stiefel, E. I.; Valentine, J. S., editors. Biological Inorganic Chemistry: Structure and Reactivity, University Science Books, 2007			
Additional Course Information	Metals and Life, Moore C., RSC Publishing, 2010. Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, Kaim W. & Schwederski B., John Wiley & Sons, 2013.			

CHEM3441 Organic chemistry II (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	80
Course Co-ordinator	Prof D Yang, Chemistry *(yangdan@hku.hk)*		
Teachers Involved	Prof D Yang, Chemistry		
Course Objectives	As a continuation from CHEM2441 Organic Chemistry I, this course aims to provide a solid foundation of organic chemistry together with CHEM2441. It focuses primarily on the basic principles to understand the structure and reactivity of organic molecules, with examples illustrating the role of organic chemistry in daily life and industry.		
Course Contents & Topics	Chemistry of common organic functional groups: ketones and aldehydes; carboxylic acids and their derivatives; amines; aromatic compounds. Principles of organic synthesis. Detailed considerations of reaction mechanisms. Spectroscopic tools (UV-Vis, IR, NMR, and MS) for characterization and identification of organic compounds.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	draw correct structural representations of organic molecules
CLO 2	understand the basic principles of structure and reactivity of organic molecules
CLO 3	determine structures of organic compounds based on spectroscopic data
CLO 4	write reasonable mechanisms for transformations of common functional groups (alcohols, ethers, carbonyl compounds, aldehydes, ketones, carboxylic acids, acyl halides, anhydrides, esters, amides, nitriles, and amines)
CLO 5	appreciate the importance of organic chemistry in daily life
CLO 6	devise synthetic pathways to organic compounds using functional group chemistry

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2441 Organic chemistry I [Remarks: CHEM3441 Organic chemistry II will be changed to lecture-based course from semester 2, 2015-16. For Chemistry students who admitted in 2014-15 or before, they must enroll also CHEM3443 for enrolling CHEM3441 (new version without lab component) to meet the Chemistry Major requirements.]		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination	1 x 3 hr written examination	70	CLO 1,2,3,4,5,6
Test	Test and assignments	30	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	"Organic Chemistry", by Paula Y. Bruice, 2014, 7th Edition, Pearson, with e-text and Mastering Chemistry. Chapters 14-20.

CHEM3442 Organic chemistry of biomolecules (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Dr P H Toy, Chemistry *(phtoy@hku.hk)*		
Teachers Involved	Dr P H Toy, Chemistry		
Course Objectives	The major objective of this course is to give the students an understanding and appreciation of the role of organic chemistry in biology and biochemistry.		
Course Contents & Topics	The chemistry of organic molecule groups such as carbohydrates, amino acids, peptides, coenzymes, nucleotides and lipids will discussed. Enzyme catalysis, cofactors and inhibitors will also be presented.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2442 Fundamentals of organic chemistry or CHEM2443 Fundamentals of organic chemistry for pharmacy students or CHEM3441 Organic chemistry II		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			
Course Type	Lecture-based course		
Course Teaching & Learning Activities			
Assessment Methods and Weighting			
Required/recommended reading and online materials	Paula Y. Bruice, "Organic Chemistry", 2011, 6th Edition, Pearson, Chapters 21-27.		

Course Learning Outcomes:

CLO 1	have a basic understanding of biologically important organic molecules
CLO 2	have a basic understanding of enzyme catalysis
CLO 3	appreciate how organic chemistry plays an important role in biology and biochemistry

Grade Descriptors:

A	Demonstrate thorough mastery at an advanced level of extensive biomolecule organic chemistry knowledge, and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar problems. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of biomolecule organic chemistry with a broad range of knowledge, and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar problems. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of biomolecule organic chemistry knowledge, and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar problems. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of biomolecule organic chemistry knowledge, and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of biomolecule organic chemistry knowledge, and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities:

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		60	CLO 1,2,3
Presentation		10	CLO 1,2,3
Test	2-mid term tests	30	CLO 1,2,3

CHEM3443 Organic chemistry laboratory (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	80
Course Co-ordinator	Dr A M Y Yuen, Chemistry *(maiyan@hku.hk)*		
Teachers Involved	Dr A M Y Yuen, Chemistry		
Course Objectives	To provide students with intensive hands-on training of experimental chemistry techniques on organic reactions; and the opportunity to develop analytical and critical thinking skills through scientific investigations in organic chemistry experiments. The course focuses on the practical aspects of a variety of		

	organic reactions, including and multistep syntheses. Chromatographic, instrumental, and spectroscopic techniques are also discussed to give a holistic training of experimental organic chemistry.
Course Contents & Topics	The course will include the following laboratory skills and practices: laboratory safety practice; preparation, purification, and characterization of organic compounds; gas and liquid chromatography; ultraviolet-visible spectrophotometry; infrared spectroscopy; NMR spectroscopy and melting point determination
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate a good practice of laboratory safety and exercise proper procedures for safe handling and usage of chemicals CLO 2: carry out, record and analyze the results of chemical experiments CLO 3: apply modern instrumentation techniques to characterize organic compounds and draw conclusions from the results CLO 4: communicate the results of their work to others CLO 5: demonstrate problem-solving skills, critical thinking and analytical reasoning
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2441 Organic chemistry I; and pass in CHEM3441 Organic chemistry II or already enrolled in this course; NOT for students who have passed CHEM3441A in semester 1, 2015-16, or CHEM3441 in or before 2014-2015 (for students admitted in 2014-15 or before) Pass in CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2443 Fundamentals of organic chemistry for pharmacy students; and Pass in CHEM3441 Organic chemistry II or CHEM3442 Organic chemistry of biomolecules or already enrolled in any of these two courses (for students admitted in 2015-16 or thereafter)
Offer in 2015 - 2016	Y 2nd sem; **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate extensive knowledge and thorough command of concepts and principles which are required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Competently conduct experiment with efficient lab skills and techniques. Critically appraise data to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp and mastery of the subject knowledge. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Show effective lab skills and techniques and critical analysis of experimental data. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject knowledge. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective lab skills and techniques. Demonstrated some ability to analyze experimental data critically. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining course learning outcomes. Ability to recall some of factual information of the subject. Show a partial comprehension of basic concepts and principles and weak ability to apply them. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Laboratory	12 x 4-hr lab sessions	48
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination	2 hrs written examination (20%); practical and oral examination (20%)	40	CLO 1,2,3,4,5
Laboratory reports	Lab report (20%);lab performance (20%)	40	CLO 1,2,3,4,5
Test		20	CLO 1,2,3,4,5

Required/recommended reading and online materials	John W. Lehman: Operational Organic Chemistry - A Problem-Solving Approach to the Laboratory Course (Pearson, latest edition)
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3541 Physical chemistry: Introduction to quantum chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	80

Course Co-ordinator	Prof A S C Cheung, Chemistry *(hrsccsc@hku.hk)*
Teachers Involved	Prof A S C Cheung, Chemistry
Course Objectives	The course presents fundamental principles and topics on quantum chemistry in order to provide a soiled foundation for students intending to further their studies in chemistry.
Course Contents & Topics	Elementary quantum mechanics: Historical development, Postulates of quantum mechanics, Principles of quantum mechanics, Theory of angular momentum, Heisenberg uncertainty principle. Applications to simple systems: particle in a box, harmonic oscillator, rigid rotator; Atomic structure: Hydrogen and many electron atoms. Molecular structure and chemical bonds. Approximation methods: variational method, Hartree-Fock method, valence bond theory, and perturbation theory.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	understand and use the terminology and nomenclature in quantum chemistry and topics discussed in the course
CLO 2	demonstrate knowledge and understanding of basic concepts in quantum mechanics, atomic and molecular structure
CLO 3	understand elementary numerical procedures and the basic relationships of quantum mechanics and molecular systems
CLO 4	hands-on experience of the application of Hartree-Fock method to molecules

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2541 Introductory physical chemistry/Physical chemistry I		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with thorough grasp of the subject, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and substantial grasp of the subject, ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and general but incomplete grasp of the subject, ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show partial but limited grasp of the subject, retention of some relevant information of the subject, ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show little or no grasp of the knowledge and understanding of the subject, very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports	Experiment & Lab report	20	CLO 1,2,3,4
Test	Test/Quiz	10	CLO 1,2,3

Required/recommended reading and online materials	D. A. McQuarrie: Quantum Chemistry (2nd Edition, 2007) I.. N. Levin: Quantum Chemistry (5th Edition, 2008)
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM3542 Physical chemistry: statistical thermodynamics and kinetics theory (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	40
Course Co-ordinator	Dr H Hu, Chemistry *(haohu@hku.hk)*		

Teachers Involved	Dr H Hu, Chemistry		
Course Objectives	The course presents fundamental principles and topics on statistical thermodynamics and kinetic theory in order to provide a solid foundation for students intending to further their studies in physical chemistry and related fields.		
Course Contents & Topics	Principles of Statistical Thermodynamics - Thermodynamic laws - Ensembles and partition functions: microcanonical, canonical and grand-canonical - Systems of independent molecules: ideal gas - Molecular degrees of freedom: translation, rotation, vibration, and electronic - Ideal gas mixture: chemical equilibrium, binding, and titration - Lattice statistics: Ising model and phase transition - Quantum statistics Chemical equilibrium and kinetics theory - Rate theory: collision theory, transition state theory		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand and use the terminology and nomenclature in statistical thermodynamics and topics discussed in the course CLO 2: demonstrate knowledge and understanding of basic concepts in statistical thermodynamics CLO 3: understand correlation between macroscopic observables and microscopic statistical model systems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM2541 Introductory physical chemistry/Physical chemistry I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Thorough mastery at an advanced level of extensive knowledge of statistical thermodynamics and reaction dynamics. Demonstrate evidence of strong analytical / critical abilities and logical thinking. Can apply the knowledge to practical questions in Physical Chemistry. **B**: Substantial command of knowledge of statistical thermodynamics and reaction dynamics. Demonstrate evidence of analytical / critical abilities and logical thinking. Understand the scope of Physical Chemistry questions that can be applied with the knowledge. **C**: General but incomplete command of knowledge of statistical thermodynamics and reaction dynamics. Demonstrate evidence of analytical thinking. Can apply the knowledge to familiar situations. **D**: Partial but limited command of knowledge of knowledge of statistical thermodynamics and reaction dynamics. Demonstrate limited evidence of analytical thinking. Understand the question to be solved with knowledge. **Fail**: Little or no evidence of command of knowledge of statistical thermodynamics and reaction dynamics.		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	(see table below)		
Assessment Methods and Weighting	(see table below)		
Required/recommended reading and online materials	T. L. Hill, An introduction to Statistical Thermodynamics P. Atkins, Physical Chemistry		
Course Website	Nil		
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	continuous assessment of on class quizzes & assignments	40	CLO 1,2,3
Examination		60	CLO 1,2,3

CHEM3999 Directed studies in chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	---
Course Co-ordinator	Prof D L Phillips, Chemistry *(phillips@hku.hk)*		
Teachers Involved	Various teachers in the Department, Chemistry		
Course Objectives	This course is designed for third year students who would like to take an early experience on research. It offers students an opportunity to carry out small scale chemical projects by themselves.		
Course Contents & Topics	Students interested in taking this course should contact their prospective supervisors in May to determine the contents and the nature of their project in the coming academic year. Prior approval from both the prospective supervisor and the course coordinator is required.		

Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the terminology and nomenclature associated with the small scale chemical project they worked on in the course CLO 2 demonstrate knowledge and understanding of basic concepts involved in their chemical project CLO 3 understand the relationships of the their particular chemical project to the wider area of chemistry
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major including a pass in CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Introductory physical chemistry/Physical chemistry I or CHEM3146 Principles and applications of spectroscopic techniques. This capstone course is for Chemistry Major students only. This course is designed for third year students who would like to take an early experience on research. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 2nd sem — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Show an extensive comprehension of the subject. Demonstrate very able analytical and critical thought with presence of some originality. Illuminating utilization and critical analysis / evaluation of information acquired from a wide range of high quality sources. Critical employment of data and results to synthesize appropriate and illuminating conclusions. Demonstrate integration of a wide range of appropriate theories, principles, data and methods. Employ very effective organizational and presentational skills. [Work of A+ should demonstrate substantial additional work beyond that is required in wider areas relevant to the topic.]
B	Show a substantial comprehension of the subject. Demonstrate able analytical and critical thinking with use of relevant information from sources. Demonstrate ability to compose meaningful comparisons between different secondary interpretations. Correct utilization of data and results to form appropriate conclusions. Compose general integration of theories, principles, data and methods. Perform effective organizational and presentational skills.
C	Show a general but incomplete comprehension of the subject. Presence of some analytical and critical thinking with use of relevant information from sources. Demonstrate ability to compose comparisons between different interpretations. Mainly correct but some incorrect utilization of data and results to form appropriate conclusions. Demonstrate some partial integration of theories, principles, data and methods. Perform moderately effective organizational and presentational skills.
D	Show a partial but limited comprehension, with knowledge of some relevant information, of the subject. Presence of some coherent and logical thinking, but with limited analytical and critical abilities. Show utilization and reference of several sources, but mostly via summary instead of by analysis and comparison. Limited ability to employ data and results to form appropriate conclusions. Demonstrate limited integration of theories, principles, data and methods. Perform limited or marginally effective organizational and presentational skills.
Fail	Show little or no comprehension of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited employment of secondary sources and no critical comparison of them. Incorrectly utilize data and results and/or unable to form appropriate conclusions. Demonstrate little or no integration of theories, principles, data and methods. Organization and presentational skills are of very limited use or ineffective.

Course Type: Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	discussion & meetings to be arranged by the student and the supervisor	96

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation	including a written report and an oral presentation	100	CLO 1,2,3

Required/recommended reading and online materials	Recommended reading material will be assigned depending on the project.
Additional Course Information	Exceptional academic strength of the students is required for taking this course

CHEM4142 Symmetry, group theory and applications (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Prof V W W Yam, Chemistry *(wwyam@hku.hk)*		
Teachers Involved	Prof V W W Yam, Chemistry Prof C M Che, Chemistry		
Course Objectives	To introduce the concepts of symmetry and group theory and to apply them in solving chemical problems. This course also provides an introductory treatment of bonding theories, inorganic electronic and vibrational spectroscopy. This course is essential for students who wish to take advanced courses in inorganic chemistry and all types of spectroscopy.		
Course Contents & Topics	Symmetry elements and symmetry operations; symmetry point groups; reducible and irreducible representations; character tables; direct products; symmetry-adapted linear combinations; projection operators; hybrid orbitals; molecular orbital theory for organic, inorganic and organometallic systems; selected applications in electronic and vibrational spectroscopy.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the basic principles and concepts of symmetry and group theory and to apply them in solving chemical problems		

	CLO 2	demonstrate knowledge and understanding in the use of character tables and projection operator techniques
	CLO 3	demonstrate knowledge and understanding of bonding theories involving hybrid orbitals and molecular orbitals for organic, inorganic and organometallic systems
	CLO 4	demonstrate knowledge and understanding in the application of symmetry and group theory in electronic and vibrational spectroscopy

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3341 Inorganic chemistry II		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to symmetry and group theory and their applications in solving chemical problems, especially those related to symmetry elements and symmetry operations; symmetry point groups; reducible and irreducible representations; character tables; direct products; symmetry-adapted linear combinations; projection operators; treatment of bonding theories including hybrid orbitals and molecular orbitals for organic, inorganic and orgametallic systems; and applications in electronic and vibrational spectroscopy. Show strong ability to apply and integrate knowledge and theory relating to the basic principles and concepts of symmetry and group theory and their applications in bonding, and electronic and vibrational spectroscopy. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the principles and applications of symmetry and group theory.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to symmetry and group theory and their applications in solving chemical problems, especially those related to symmetry elements and symmetry operations; symmetry point groups; reducible and irreducible representations; character tables; direct products; symmetry-adapted linear combinations; projection operators; treatment of bonding theories including hybrid orbitals and molecular orbitals for organic, inorganic and orgametallic systems; and applications in electronic and vibrational spectroscopy. Show evidence to apply and integrate knowledge and theory relating to the basic principles and concepts of symmetry and group theory and their applications in bonding, and electronic and vibrational spectroscopy. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the principles and applications of symmetry and group theory.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to symmetry and group theory and their applications in solving chemical problems, especially those related to symmetry elements and symmetry operations; symmetry point groups; reducible and irreducible representations; character tables; direct products; symmetry-adapted linear combinations; projection operators; treatment of bonding theories including hybrid orbitals and molecular orbitals for organic, inorganic and orgametallic systems; and applications in electronic and vibrational spectroscopy. Show evidence of some abilities to apply and integrate knowledge and theory relating to the basic principles and concepts of symmetry and group theory and their applications in bonding, and electronic and vibrational spectroscopy. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the principles and applications of symmetry and group theory.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to symmetry and group theory and their applications in solving chemical problems, especially those related to symmetry elements and symmetry operations; symmetry point groups; reducible and irreducible representations; character tables; direct products; symmetry-adapted linear combinations; projection operators; treatment of bonding theories including hybrid orbitals and molecular orbitals for organic, inorganic and orgametallic systems; and applications in electronic and vibrational spectroscopy. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the basic principles and concepts of symmetry and group theory and their applications in bonding, and electronic and vibrational spectroscopy. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the principles and applications of symmetry and group theory.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to symmetry and group theory and their applications in solving chemical problems, especially those related to symmetry elements and symmetry operations; symmetry point groups; reducible and irreducible representations; character tables; direct products; symmetry-adapted linear combinations; projection operators; treatment of bonding theories including hybrid orbitals and molecular orbitals for organic, inorganic and orgametallic systems; and applications in electronic and vibrational spectroscopy. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the basic principles and concepts of symmetry and group theory and their applications in bonding, and electronic and vibrational spectroscopy. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the principles and applications of symmetry and group theory.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	or discussion	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	25	CLO 1,2,3,4
Examination		75	CLO 1,2,3,4

Required/recommended reading and online materials: F.A. Cotton: Chemical Applications of Group Theory (Wiley, 3rd ed., 1990)

CHEM4143 Interfacial science and technology (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Prof G K Y Chan, Chemistry *(hrsccky@hku.hk)*		

Teachers Involved	Prof G K Y Chan, Chemistry Guest lecturer, Chemistry
Course Objectives	To understand the science and technology of interfacial phenomena and processes often appeared in high value added products and modern technologies.
Course Contents & Topics	Physics and Chemistry of Interfaces: coatings and surfactants, colloids and interfaces, wetting, microemulsion, thin films, nanomaterials, porous materials.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand interfacial phenomena and their origin from molecular details CLO 2 solve problems in interfacial science and technology by applying knowledge of general chemistry, thermodynamics, and kinetics CLO 3 be familiarized with technologies that require application of interfacial science, including nanomaterials, nanotechnology, detergency, composite polymers, and porosimetry
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough knowledge of interfacial science and technology, and mastery of skills required for attaining all of the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to solve problems in a wide range of complex, familiar and unfamiliar situations. Critical use of data and sourcing of references. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial knowledge of interfacial science and technology and command of skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to solve problems in familiar and some unfamiliar situations. Correct use of data and sourcing of references. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete knowledge of interfacial science and technology and command of skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge solve problems to most familiar situations. Mostly correct but some erroneous use of data and references. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited knowledge of interfacial science and technology and command of skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited ability to use data and source references. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of knowledge of interfacial science and technology, and command of skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Misuse of data and references. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	or discussion	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	5	CLO 1,2,3
Examination		70	CLO 1,2,3
Test	test/quiz	25	CLO 1,2,3

Required/recommended reading and online materials	Barnes and Gentle: Interfacial Science
Additional Course Information	NIL This course is offered every other year.

CHEM4144 Advanced materials (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Prof W K Chan, Chemistry *(waichan@hku.hk)*		
Teachers Involved	Prof W K Chan, Chemistry Dr J Y Tang, Chemistry		
Course Objectives	This course is a continuation from Introdution to Materials Chemistry. It provides a more compreheisive overview on materials chemistry and application of materials in advanced technology. The most recent development in materials chemistry will also be discussed.		
Course Contents & Topics	Advanced polymerization methods: copolymerization and applications of copolymers, coordination polymerization, control of stereochemistry in polymers; ionic and radical living polymerization. Materials for specialty applications: high strength materials; high temperature polymers, polyelectrolytes, conducting		

	polymers, optical information storage, sensors, photonics, electronics, nanotechnology. Advanced materials characterization techniques.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe the mechanisms and kinetics of copolymerizations, coordination polymerizations, and living polymerizations CLO 2 identify examples of some engineering polymers for high temperature/high strength applications, and how are their properties affected by the molecular structures CLO 3 demonstrate knowledge in advanced materials characterization techniques CLO 4 understand the working principles of materials for information storage and opto-electronic applications
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3143 Introduction to materials chemistry
Offer in 2015 - 2016	Y 2nd sem; **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to frontier approach in polymer synthesis, properties, application, and characterization of materials for advanced technology. Show strong ability to apply and integrate knowledge and theory relating to the synthesis and applications of advanced materials. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to advanced materials synthesis and their properties. **B** Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to frontier approach in polymer synthesis, properties, application, and characterization of materials for advanced technology. Show evidence to apply and integrate knowledge and theory relating to the synthesis and applications of advanced materials. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to advanced materials synthesis and their properties. **C** Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to frontier approach in polymer synthesis, properties, application, and characterization of materials for advanced technology. Show evidence of some abilities to apply and integrate knowledge and theory relating to the synthesis and applications of advanced materials. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to advanced materials synthesis and their properties. **D** Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to frontier approach in polymer synthesis, properties, application, and characterization of materials for advanced technology. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the synthesis and applications of advanced materials. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to advanced materials synthesis and their properties. **Fail** Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to frontier approach in polymer synthesis, properties, application, and characterization of materials for advanced technology. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the synthesis and applications of advanced materials. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to advanced materials synthesis and their properties.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	or discussion	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	20	CLO 1,2,3,4
Examination		80	CLO 1,2,3,4

Required/recommended reading and online materials	G. Odian: Principles of Polymerizations (John Wiley and Sons, 2004) Other specialist references will be given throughout the course.

CHEM4145 Medicinal chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	70
Course Co-ordinator	Prof H Z Sun, Chemistry *(hsun@hku.hk)*		
Teachers Involved	Prof H Z Sun, Chemistry Dr X C Li, Chemistry		
Course Objectives	This course covers the chemical principles of drug design and drug action and uses as an introduction to research in areas of bioorganic chemistry, bioinorganic chemistry, medicinal chemistry, pharmaceutical chemistry, and biotechnology.		
Course Contents & Topics	- Drug discovery, design, and development: lead discovery, pharmacophore, structure-activity relationships (SAR), computer-aided drug design, combinatorial chemistry and high-throughput drug screening - Drug-receptor interactions - Proteins (and enzymes) and nucleic acids as drug targets		

	- Metals in medicine - DNA-Drug interactions - Drug metabolism and prodrugs and drug delivery
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge of drug discovery, design and development CLO 2 understand drug-biomolecule interactions where appropriate CLO 3 gain appropriate knowledge of drug metabolism and drug delivery
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3441 Organic chemistry II or CHEM3442 Organic chemistry of biomolecules
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of medicinal chemistry, especially those related to drug discovery, design and development; drug targets; drug lead optimization; structure activity relationship; pharmacokinetics; drug delivery and its relevance to toxicity. Show strong ability to apply and integrate knowledge and theory relating to the basic foundation knowledge of medicinal chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the basic principles and knowledge of medicinal chemistry. Demonstrate highly effective basic techniques for medicinal chemistry, especially in drug discovery and metabolism. **B** Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of medicinal chemistry; especially those related to drug discovery; design and development; drug targets; drug lead optimization; structure activity relationship; pharmacokinetics; drug delivery and its relevance to toxicity. Show evidence to apply and integrate knowledge and theory relating to the basic foundation knowledge of medicinal chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of medicinal chemistry. Demonstrate effective basic techniques for medicinal chemistry, especially in drug discovery and metabolism. **C** Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of medicinal chemistry; especially those related to drug discovery; design and development; drug targets; drug lead optimization; structure activity relationship; pharmacokinetics; drug delivery and its relevance to toxicity. Show evidence of some abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of medicinal chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of medicinal chemistry. Demonstrate moderately effective basic techniques, basic techniques for medicinal chemistry, especially in drug discovery and metabolism. **D** Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of medicinal chemistry; especially those related to drug discovery; design and development; drug targets; drug lead optimization; structure activity relationship; pharmacokinetics; drug delivery and its relevance to toxicity. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of medicinal chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of medicinal chemistry. Demonstrate partially effective basic techniques for medicinal chemistry, especially in drug discovery and metabolism. **Fail** Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of medicinal chemistry; especially those related to drug discovery; design and development; drug targets; drug lead optimization; structure activity relationship; pharmacokinetics; drug delivery and its relevance to toxicity. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of medicinal chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of medicinal chemistry. Demonstrate minimally effective basic techniques for medicinal chemistry, especially in drug discovery and metabolism.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	or discussion	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	25	CLO 1,2,3
Examination		75	CLO 1,2,3

Required/recommended reading and online materials	An Introduction to Medicinal Chemistry (3/e), G.L. Patrick, Oxford University Press, 2005 Medicinal Chemistry- An Introduction, G. Thomas, John Wiley, 2000 D. Wang, S.J. Lippard (2004) Nat. Rev. Drug Dis., Cellular processing of platinum anticancer drugs, 4, 307-320
Additional Course Information	This course is also offered to RPg students, and the course code for RPg students is CHEM6113.

CHEM4241 Modern chemical instrumentation and applications (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Dr I K Chu, Chemistry *(ivankchu@hku.hk)*		
Teachers Involved	Dr I K Chu, Chemistry Dr W T Chan, Chemistry		

Course Objectives	The aim of the course is to provide an understanding of modern instrumentation, covering both fundamental principles and practical aspects of instrument design. The course will be of particular benefit to those pursuing a higher research degree or a career in technical sales/service.
Course Contents & Topics	Biological Mass spectrometry: Liquid Chromatography-Tandem Mass Spectrometry for Proteomics & Metabolomics. Laser Spectroscopy: Principle of laser; three-level and four-level lasers; laser instrumentation (Q-switching and frequency conversion); laser-induced fluorescence; laser atomic spectrometry; laser remote sensing; signal-to-noise enhancement by boxcar integration and photon counting. Atomic Plasma Spectrometry: Inductively couple plasma-atomic emission spectrometry (ICP-AES) and mass spectrometry (ICP-MS); signal-production processes in ICP spectrometry; Echelle grating spectrometer; array detectors; interferences in ICP-AES and ICP-MS. Atomic X-ray Spectrometry: x-ray fluorescence; wavelength-dispersive (WDXRF) and energy-dispersive (EDXRF) X-ray fluorescence spectrometers

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	explain the principles of the modern mass spectrometric methods for proteins and metabolites identification and quantification
CLO 2	explain how proteins are identified and sequenced experimentally and how data is generated in proteomics experiments
CLO 3	use the database searching techniques and software tools to analyze high-throughput proteomics data
CLO 4	apply LC/MS/MS method for target quantitative analysis of small molecules
CLO 5	explain the principles of the laser spectroscopy, atomic plasma spectrometry, and atomic x-ray spectrometry
CLO 6	describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3241 Analytical chemistry II: chemical instrumentation		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show strong ability to apply and integrate knowledge and theory, and strong ability to analyze problems related to fundamental principles and practical aspects of instrument design.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show evidence to apply and integrate knowledge and theory, and ability to analyze problems related to fundamental principles and practical aspects of instrument design.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show evidence of some abilities to apply and integrate knowledge and theory, and to analyze problems to most familiar situations to fundamental principles and practical aspects of instrument design.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show evidence of limited abilities to apply and integrate knowledge and theory, and limited ability to analyze problems to most familiar situations related to fundamental principles and practical aspects of instrument design.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show little or no evidence of abilities to apply and integrate knowledge and theory, and little or no ability to analyze problems to most familiar situations related to fundamental principles and practical aspects of instrument design.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		16
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	30	CLO 1,2,3,4,5,6
Examination		70	CLO 1,2,4,5,6

Required/recommended reading and online materials	Chhabil Dass: Fundamentals of contemporary mass spectrometry (Wiley-Interscience) D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition)
Additional Course Information	Reference to published material will be made throughout the course. Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM4242 Analytical chemistry (6 credits)		Academic Year	2015
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Dr K M Ng, Chemistry *(kwanmng@hku.hk)*		
Teachers Involved	Dr K M Ng, Chemistry		
Course Objectives	This course focuses on the basic principle, practice and methodology in chemical and biochemical analysis. The course emphasizes on the integration of analytical concepts and technologies to solve practical analytical and bioanalytical problems. This course will be particularly useful for students who plan to pursue their career related to analytical and bioanalytical chemistry.		
Course Contents & Topics	Analytical measurement concepts: Statistical treatment & evaluation of chemical measurement data; Figures of merits of analytical methods; Validation of analytical methods; Quality assurance in chemical analysis and testing laboratories Theoretical background and practical techniques of sample preparation, separation and detection: Sample preparation and enrichment techniques for biomedical, pharmaceutical and forensic chemical analysis; Advanced separation technologies for complex mixture analysis (e.g. multidimensional LC); Derivatization methods for chromatographic analysis and spectroscopic detection; Analytes characterization and detection techniques based on mass spectrometry Problem-based design of analytical strategy for chemical & biochemical analysis: Expert sharing of practical knowledge and experience related to selected fields of research; Case study and review of analytical chemistry literature/ scenario.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 apply statistical methods to assess analytical measurement data quality and interpret their significance, validate analytical methods and results CLO 2 demonstrate understanding on the working principle of different analytical techniques and recognize their advantages and limitations CLO 3 integrate different analytical techniques to solve analytical and bioanalytical problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3241 Analytical chemistry II: chemical instrumentation or CHEM3242 Food and water analysis		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities, logical thinking and capability to apply knowledge learnt to solve a wide range of complex issues and problems related to chemical analysis. Apply highly effective organization and presentation skills as shown in class work.
B	Demonstrate a substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities, logical thinking, and capability to apply knowledge learnt to solve a wide range of complex issues and problems related to chemical analysis. Apply effective organization and presentation skills as shown in class work.
C	Demonstrate a general command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, logical thinking, and ability to apply knowledge learnt to solve a wide range of complex issues and problems related to chemical analysis. Apply effective organization and presentation skills as shown in class work.
D	Demonstrate a partial but limited command of knowledge and skills required for attaining some of the course learning outcomes in Food and Water Analysis. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems related to chemical analysis. Apply limited or barely effective organization and presentation skill as shown in class work.
Fail	Demonstrate little or no evidence for the command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems related to chemical analysis. Organization and presentation skills are minimally effective or ineffective as shown in class work.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	6 x 4-hour of laboratory practical	24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		70	CLO 1,2,3
Laboratory reports	Experiment & Lab report	15	CLO 1,2
Presentation		5	CLO 1,2,3
Test	Test/Quiz	10	CLO 1,2,3

Required/recommended reading and online materials: D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch: Fundamentals of Analytical Chemistry (Cengage Learning, latest edition)

Additional Course Information	References to specialist texts and other published materials will be made throughout the course. Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM4341 Advanced inorganic chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Prof C M Che, Chemistry *(cmche@hku.hk)*		
Teachers Involved	Prof C M Che, Chemistry Prof V W W Yam, Chemistry Prof H Z Sun, Chemistry		
Course Objectives	This course is a continuation from Intermediate Inorganic Chemistry, giving further and more detailed treatment to topics in Inorganic Chemistry and new areas of interest. Problem based learning on selected advance topics will be introduced in the later part of the course. This course also aims to prepare students for graduate work.		
Course Contents & Topics	Selected advanced topics of current interest. Examples include metal-metal bonds and metal-ligand multiple bonds, inorganic and supramolecular photochemistry, lanthanide chemistry, bio-inorganic and medicinal chemistry, and activation of small molecules by metal complexes.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the principles and concepts of inorganic and supramolecular photochemistry CLO 2: understand the electronic structure and bondings of novel metal-metal and metal-ligand multiple bonded metal complexes CLO 3: understand and realize the activation of small molecules by transition metal complexes and realize the importance of such activation in chemical catalysis of global interest, green chemistry and energy saving reactions CLO 4: understand the role of metal complexes in bio-inorganic and medicinal chemistry		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3341 Inorganic chemistry II		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough knowledge and understanding of essential facts, concepts, principles and theories relating to the frontiers in inorganic chemistry. Show strong ability to apply and integrate knowledge and theory, and strong ability to analyze novel problems in inorganic chemistry. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles and theories relating to the more advanced knowledge in inorganic chemistry. Show evidence to apply and integrate knowledge and theory, and ability to analyze novel problems of inorganic chemistry. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles and theories relating to the more advanced knowledge in inorganic chemistry. Show evidence of some abilities to apply and integrate knowledge and theory, and to analyze problems to most familiar situations in inorganic chemistry. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles and theories relating to the more advanced knowledge in inorganic chemistry. Show evidence of limited abilities to apply and integrate knowledge and theory, and limited ability to analyze problems to most familiar situations in inorganic chemistry. Demonstrate partially effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles and theories relating to the more advanced knowledge in inorganic chemistry. Show little or no evidence of abilities to apply and integrate knowledge and theory, and little or no ability to analyze problems to most familiar situations in inorganic chemistry. Demonstrate minimally effective organizational and presentational skills.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	including literature survey & presentation	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	20	CLO 1,2,3,4
Examination		80	CLO 1,2,3,4

Required/recommended reading and online materials	F.A. Cotton, G. Wilkinson, Hurillo and Bochmann: Advance Inorganic Chemistry (Wiley, 1999, 6th ed.)
Additional Course Information	References to specialist texts and other published materials will be made throughout the course. (Students are strongly recommended to take CHEM4142 Symmetry, group theory and applications if they wish to take this course.)

CHEM4342 Organometallic chemistry (6 credits)		Academic Year	2015
Offering Department	Chemistry	**Quota**	40
Course Co-ordinator	Prof V W W Yam, Chemistry *(wwyam@hku.hk)*		
Teachers Involved	Prof V W W Yam, Chemistry Dr H Y Au-Yeung, Chemistry		
Course Objectives	To give further, more detailed, treatment to organometallic chemistry mentioned in CHEM3341 Inorganic Chemistry II. The course also aims to introduce and familiarize students with advanced laboratory techniques, and to prepare students for graduate work in inorganic and organometallic chemistry.		
Course Contents & Topics	Lectures: Main group and transition metal organometallics. Transition metal cluster chemistry. Bonding, structure and reactivities of organometallics. Application of organometallics in organic synthesis and catalysis. Laboratory: To introduce and familiarize students with advanced laboratory techniques which include the synthesis and manipulation of air- and moisture- sensitive compounds, and their characterization by various spectroscopic methods.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the advanced principles and concepts in organometallic chemistry CLO 2 demonstrate knowledge and understanding in the bonding, structure and reactivities of main group and transition metal organometallics, especially in transition metal clusters, metal alkyls, metal alkylidenes and metal alkylidynes CLO 3 demonstrate knowledge and understanding in the application of organometallics in organic synthesis, polymerization and catalysis CLO 4 demonstrate ability in advanced laboratory techniques including the synthesis and manipulation of air- and moisture- sensitive compounds, and their characterization by various spectroscopic methods		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3341 Inorganic chemistry II		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show strong ability to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate highly effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture-sensitive compounds and their characterization by various spectroscopic methods. **B** Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show evidence to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture-sensitive compounds and their characterization by various spectroscopic methods. **C** Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show evidence of some abilities to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate moderately effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods. **D** Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate partially effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods. **Fail** Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more detailed and advanced treatment of organometallic chemistry, especially those related to structure, bonding and reactivities of main group and transition metal organometallics; transition metal cluster chemistry; and application of organometallics in organic synthesis and catalysis. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the advanced principles and concepts of organometallic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the advanced principles and applications of organometallic chemistry. Demonstrate minimally effective advanced laboratory skills and techniques, especially in the synthesis and manipulation of air- and moisture- sensitive compounds and their characterization by various spectroscopic methods.		

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>24</td></tr><tr><td>Laboratory</td><td></td><td>30</td></tr><tr><td>Tutorials</td><td></td><td>5</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td>(continuous assessment)</td><td>30</td><td>CLO 1,2,3,4</td></tr><tr><td>Examination</td><td></td><td>70</td><td>CLO 1,2,3,4</td></tr></table>
Required/recommended reading and online materials	R. H. Crabtree: The Organometallic Chemistry of the Transition Metals (Wiley, 2005, 4th ed.) C. Elschenbroich and A. Salzer: Organometallics - A Concise Introduction (VCH, 1992, 2nd revised edition)
Additional Course Information	Reference to specialist texts and other published materials will be made throughout the course. Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM4441 Advanced organic chemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	80
Course Co-ordinator	Prof D Yang, Chemistry *(yangdan@hku.hk)*		
Teachers Involved	Prof D Yang, Chemistry Dr X C Li, Chemistry		
Course Objectives	To provide students with knowledge in organic chemistry reaction mechanisms and organic compound structure determination.		
Course Contents & Topics	The course covers chemical bonding, advanced stereochemistry, conformational analysis, techniques for investigating reaction mechanisms, reactive intermediates, rearrangement reactions, and pericyclic reactions.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>describe, analyze and interpret the structure and reactivity relationship of organic molecules</td></tr><tr><td>CLO 2</td><td>identify and predict the selectivities (chemoselectivity, regioselectivity and stereoselectivity) in organic reactions</td></tr><tr><td>CLO 3</td><td>describe the general approaches to study organic mechanisms</td></tr><tr><td>CLO 4</td><td>have a general understanding and working knowledge of pericyclic reactions, reactive intermediates (radicals, carbenes and nitrenes), and polar rearrangements</td></tr><tr><td>CLO 5</td><td>suggest reasonable mechanistic pathways for some types of organic reactions</td></tr><tr><td>CLO 6</td><td>apply the knowledge of reaction mechanisms in design of synthetic routes for organic compounds</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3441 Organic chemistry II		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.</td></tr></table>		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>		

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Examination</td><td></td><td>70</td><td>CLO 1,2,3,4,5,6</td></tr><tr><td>Test</td><td></td><td>30</td><td>CLO 1,2,3,4,5,6</td></tr></table>
Required/recommended reading and online materials	F.A. Carey and R.J. Sunberg, "Advanced Organic Chemistry, Part-A: Structure and Mechanism", 5th Ed.: Springer, 2007. J. McMurry, "Organic Chemistry", 8th Ed., Thomson Brooks/Cole, 2012. I. Fleming, "Pericyclic Reactions", Oxford University Press, 1999.

CHEM4443 Integrated organic synthesis (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Prof P Chiu, Chemistry *(pchiu@hku.hk)*		
Teachers Involved	Prof P Chiu, Chemistry		
Course Objectives	To introduce aspects of modern organic reactions with relevance to and in the context of the synthesis of natural products, drugs and medicinal chemistry to provide an integrated approach to the subject, and to provide training in advanced organic laboratory skills, and further hands-on experience in synthesis and characterization, as preparation for graduate studies or research in organic chemistry.		
Course Contents & Topics	Building on the organic chemistry covered in the foundational courses CHEM1003 and CHEM2402, this course will present modern synthetic methods and synthetic planning. The course is organized into units based on target drug molecules. In each unit, the chemical biology of these compounds are briefly presented and the syntheses of these molecules are introduced, accompanied by in-depth discussions of the reactions involved with emphasis on their mechanisms, selectivity, stereochemistry, scope and limitations. Concept of synthetic design including retrosynthetic analysis, stereoselectivity and enantioselective control elements will be emphasized. A laboratory section provides training in the practical skills of synthesis.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>understand the rationale, selectivities, and mechanisms of various reactions and reagents in organic chemistry</td></tr><tr><td>CLO 2</td><td>able to solve mechanistic and synthetic chemistry problems</td></tr><tr><td>CLO 3</td><td>perform organic synthesis experiments at an increased level of technical difficulty, using additional skills in experimental design and execution, spectroscopic analysis, and reporting of results</td></tr><tr><td>CLO 4</td><td>integrate lecture material and literature search, to learn chemistry independently</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3441 Organic chemistry II (with lab component); or Pass in CHEM3441 Organic chemistry II (without lab component) and CHEM3443 Organic chemistry laboratory		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate a thorough mastery at an advanced level of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show a strong ability to integrate knowledge and theory, and a strong ability to analyze novel synthetic organic chemistry situations and problems. Show a critical use of knowledge and data to apply to the solution of novel and complex synthetic problems. Demonstrate highly effective organization and application of lab skills and techniques in synthetic experiments.</td></tr><tr><td>**B**</td><td>Demonstrate a substantial command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show evidence of ability to integrate knowledge and theory, and evidence of ability to analyze synthetic organic chemistry situations and problems. Show a correct use of knowledge and data to apply to the solution of some novel and most familiar synthetic problems. Demonstrate effective organization and application of lab skills and techniques in synthetic experiments.</td></tr><tr><td>**C**</td><td>Demonstrate a general but incomplete command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show evidence of some ability to integrate knowledge and theory, and evidence of some ability to analyze synthetic organic chemistry situations and problems. Show a correct use of knowledge to apply to the solution of most familiar problems. Demonstrate moderately effective organization and application of lab skills and techniques in synthetic experiments.</td></tr><tr><td>**D**</td><td>Demonstrate a partial but limited command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show evidence of a limited ability to integrate knowledge and theory, and a limited ability to analyze familiar situations and problems. Show some correct but erroneous use of knowledge to apply to the solution of most familiar problems. Demonstrate partially effective organization and application of lab skills and techniques in synthetic experiments.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and understanding of concepts, principles, reactions and mechanisms related to synthetic organic chemistry. Show little or no evidence of ability to integrate knowledge and theory in synthetic organic chemistry, and little or no ability to analyze most familiar situations and problems. Show mostly erroneous use of knowledge to apply to the solution of familiar problems. Demonstrate minimally effective organization and application of lab skills and techniques in synthetic experiments.</td></tr></table>		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>24</td></tr><tr><td>Laboratory</td><td></td><td>25</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>		

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Examination</td><td></td><td>65</td><td>CLO 1,2</td></tr><tr><td>Laboratory reports</td><td></td><td>25</td><td>CLO 1,2</td></tr><tr><td>Test</td><td></td><td>10</td><td>CLO 3,4</td></tr></table>
Required/recommended reading and online materials	Reference Books: Organic synthesis, C. Willis, M. Wills, Oxford Science Publications Top drugs, top synthetic routes, J. Saunders, Oxford Science Publications
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

<table>
<tr><td colspan="2">CHEM4444 Chemical biology (6 credits)</td><td>Academic Year</td><td>2015</td></tr>
<tr><td>Offering Department</td><td>Chemistry</td><td>Quota</td><td>50</td></tr>
<tr><td>Course Co-ordinator</td><td colspan="3">Dr X C Li, Chemistry (xuechenl@hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td colspan="3">Dr X C Li, Chemistry</td></tr>
<tr><td>Course Objectives</td><td colspan="3">To understand how to use chemical approaches to emulate biological systems to study natural molecules and generate new functional molecules. Useful as an introduction to research in areas of chemical biology, medicinal chemistry and biotechnology.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">Chemical biology of nucleic acids, protein chemistry, protein posttranslational modifications, carbohydrate chemistry, chemical glycobiology and tools and techniques in chemical biology.</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:<table><tr><td>CLO 1</td><td>understand chemical biology approaches in studying biology</td></tr><tr><td>CLO 2</td><td>give examples of how to use chemical methods to produce natural biomolecules and new biomolecules wiht altered functions</td></tr><tr><td>CLO 3</td><td>compare chemical biology and traditional biology approaches in drug discovery</td></tr></table></td></tr>
<tr><td>Pre-requisites
(and Co-requisites and Impermissible combinations)</td><td colspan="3">Pass in CHEM3441 Organic chemistry II or BIOC3601 Metabolism</td></tr>
<tr><td>Offer in 2015 - 2016</td><td>Y 2nd sem</td><td>Examination</td><td>May</td></tr>
<tr><td>Offer in 2016 - 2017</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3"><table>
<tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly.</td></tr>
<tr><td>B</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly.</td></tr>
<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly.</td></tr>
<tr><td>D</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Use and reference of several sources, but mainly through summary rather than analysis and comparison.</td></tr>
<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Limited use of secondary sources and no critical comparison of them.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td colspan="3">Lecture-based course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3"><table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td>tutorials/discussion</td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td colspan="3"><table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Examination</td><td></td><td>60</td><td>CLO 1,2,3</td></tr><tr><td>Test</td><td>tests & presenations</td><td>40</td><td>CLO 1,2,3</td></tr></table></td></tr>
<tr><td></td><td colspan="3">Foundations of Chemical Biology by C.M. Dobson, J.A. Gerrard and A.J. Pratt.</td></tr>
</table>

Required/recommended reading and online materials	
Course Website	Nil
Additional Course Information	Nil

CHEM4541 Physical chemistry III: statistical thermodynamics and kinetics theory (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	40
Course Co-ordinator	Dr H Hu, Chemistry *(haohu@hku.hk)*		
Teachers Involved	Dr H Hu, Chemistry		
Course Objectives	The course presents fundamental principles and topics on statistical thermodynamics and kinetic theory in order to provide a solid foundation for students intending to further their studies in physical chemistry and related fields.		
Course Contents & Topics	Principles of Statistical Thermodynamics - Thermodynamic laws - Ensembles and partition functions: microcanonical, canonical and grand-canonical - Systems of independent molecules: ideal gas - Molecular degrees of freedom: translation, rotation, vibration, and electronic - Ideal gas mixture: chemical equilibrium, binding, and titration - Lattice statistics: Ising model and phase transition - Quantum statistics Chemical equilibrium and kinetics theory - Rate theory: collision theory, transition state theory		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand and use the terminology and nomenclature in statistical thermodynamics and topics discussed in the course CLO 2: demonstrate knowledge and understanding of basic concepts in statistical thermodynamics CLO 3: understand correlation between macroscopic observables and microscopic statistical model systems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Thorough mastery at an advanced level of extensive knowledge of statistical thermodynamics and reaction dynamics. Demonstrate evidence of strong analytical / critical abilities and logical thinking. Can apply the knowledge to practical questions in Physical Chemistry. **B**: Substantial command of knowledge of statistical thermodynamics and reaction dynamics. Demonstrate evidence of analytical / critical abilities and logical thinking. Understand the scope of Physical Chemistry questions that can be applied with the knowledge. **C**: General but incomplete command of knowledge of statistical thermodynamics and reaction dynamics. Demonstrate evidence of analytical thinking. Can apply the knowledge to familiar situations. **D**: Partial but limited command of knowledge of knowledge of statistical thermodynamics and reaction dynamics. Demonstrate limited evidence of analytical thinking. Understand the question to be solved with knowledge. **Fail**: Little or no evidence of command of knowledge of statistical thermodynamics and reaction dynamics.		
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	continuous assessment of on class quizzes & assignments	40	CLO 1,2,3
Examination		60	CLO 1,2,3

Required/recommended reading and online materials	T. L. Hill, An introduction to Statistical Thermodynamics P. Atkins, Physical Chemistry
Additional Course Information	Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM4542 Computational chemistry (6 credits)		Academic Year	2015
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Prof G H Chen, Chemistry *(ghc@yangtze.hku.hk)*		
Teachers Involved	Prof G H Chen, Chemistry Dr H Hu, Chemistry		
Course Objectives	This course covers topics in computational chemistry including first-principles methods and molecular dynamics methods. It is offered to undergraduate and postgraduate students interested in computational chemistry, computational physics and computational biology.		
Course Contents & Topics	Hartree-Fock molecular orbital method, density-functional theory, time-dependent methods, Basis sets, Force Fields, QM/MM method, free energy calculation, and computer-aided drug design.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the basic concepts of density-functional theory CLO 2: understand the basic numerical techniques of molecular mechanics method and quantum mechanics/molecular mechanics method CLO 3: employ the existing computational software to calculate the chemical, physical properties of various molecular systems include organic molecules, inorganic materials and biomolecules		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3351 Quantum mechanics or CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Mastery of advanced knowledge on following topics: density-functional theory, Kohn-Sham equation, time-dependent density-functional theory, open system, molecular dynamics, force field, and quantum mechanics/molecular mechanics. Strong analytical and critical abilities and logical thinking, with strong ability to apply knowledge to practical problems in physical chemistry.
B	Substantial command of a broad range of knowledge on following topics: density-functional theory, Kohn-Sham equation, time-dependent density-functional theory, open system, molecular dynamics, force field, and quantum mechanics/molecular mechanics. Evidence of analytical and critical abilities and logical thinking, with ability to apply knowledge to practical problems in physical chemistry.
C	Command of knowledge on following topics: density-functional theory, Kohn-Sham equation, time-dependent density-functional theory, open system, molecular dynamics, force field, and quantum mechanics/molecular mechanics. Evidence of some analytical and critical abilities and logical thinking, with ability to apply knowledge to familiar problems in physical chemistry.
D	Partial but limited command of knowledge on following topics: density-functional theory, Kohn-Sham equation, time-dependent density-functional theory, open system, molecular dynamics, force field, and quantum mechanics/molecular mechanics. Evidence of some coherent analytical and critical abilities and logical thinking, with limited ability to apply knowledge to practical problems in physical chemistry.
Fail	Little or no evidence of command of knowledge on following topics: density-functional theory, Kohn-Sham equation, time-dependent density-functional theory, open system, molecular dynamics, force field, and quantum mechanics/molecular mechanics. Lack of analytical and critical abilities and logical thinking, with very little or no ability to apply knowledge to practical problems in physical chemistry.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	lab sessions 6x4 hours of computational laboratory	24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	40	CLO 1,2,3
Examination		60	CLO 1,2,3

Required/recommended reading and online materials

Attila Szabo & Neil S. Ostlund: Modern Quantum Chemistry (1st ed.)
Robert G. Parr & Weitao Yang: Density-Functional Theory of Atoms and Molecules
J.M. Haile: Molecular Dynamics Simulation
Andrew R. Leach: Molecular Modelling - Principles and Applications

Additional Course Information

This course is equivalent to CHEM6109 Computational Chemistry.
CHEM4542 is offered every other year.
Laboratory classes are mandatory. Students must complete ALL experiments and laboratory reports to pass this course.

CHEM4543 Advanced physical chemistry (6 credits)		Academic Year	2015
Offering Department	Chemistry	**Quota**	40

Course Co-ordinator	Prof G H Chen, Chemistry *(ghc@yangtze.hku.hk)*
Teachers Involved	Prof G H Chen, Chemistry Prof D L Phillips, Chemistry
Course Objectives	This course covers advanced topics in physical chemistry. It is offered for students majoring in physical chemistry and for students who are interested in postgraduate studies.
Course Contents & Topics	Time-resolved spectroscopy methods, excited states and reactive intermediates, photophysics and photochemical processes, chemical reaction mechanisms, advanced quantum mechanical methods, reaction pathways and surface crossings.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	understand the basic concepts of quantum chemistry, statistical thermodynamics and molecular dynamics
CLO 2	understand Hartree-Fock method, statistical ensembles, quantum statistics, H-theorem, and reaction dynamics
CLO 3	understand the elementary numerical procedures in Hartree-Fock and molecular mechanics methods

Pre-requisites **(and Co-requisites and** **Impermissible combinations)**	Pass in CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Mastery of advanced knowledge on following topics: variation method in quantum mechanics, Hartree-Fock method, perturbation theory, advanced statistical thermodynamics, reaction dynamics. Strong analytical and critical abilities and logical thinking, with strong ability to apply knowledge to practical problems in physical chemistry.
B	Substantial command of a broad range of knowledge on following topics: variation method in quantum mechanics, Hartree-Fock method, perturbation theory, advanced statistical thermodynamics, reaction dynamics. Evidence of analytical and critical abilities and logical thinking, with ability to apply knowledge to practical problems in physical chemistry.
C	Command of knowledge on following topics: variation method in quantum mechanics, Hartree-Fock method, perturbation theory, advanced statistical thermodynamics, reaction dynamics. Evidence of some analytical and critical abilities and logical thinking, with ability to apply knowledge to familiar problems in physical chemistry.
D	Partial but limited command of knowledge on following topics: variation method in quantum mechanics, Hartree-Fock method, perturbation theory, advanced statistical thermodynamics, reaction dynamics. Evidence of some coherent analytical and critical abilities and logical thinking, with limited ability to apply knowledge to practical problems in physical chemistry.
Fail	Little or no evidence of command of knowledge on following topics: variation method in quantum mechanics, Hartree-Fock method, perturbation theory, advanced statistical thermodynamics, reaction dynamics. Lack of analytical and critical abilities and logical thinking, with very little or no ability to apply knowledge to practical problems in physical chemistry.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/discussion	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	(continuous assessment)	20	CLO 1,2,3
Examination		80	CLO 1,2,3

Required/recommended reading and online materials	P. W. Atkins: Physical Chemistry Ira N. Levine: Quantum Chemistry (Prentice Hall, 4th ed.) R. C. Tolman: The Principles of Statistical Mechanics R. D. Levine, R. B. Bernstein: Molecular Reaction Dynam
Course Website	Nil
Additional Course Information	Nil

CHEM4910 Chemistry literacy and research (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	---
Course Co-ordinator	Dr X Li, Chemistry *(xiangli@hku.hk)*		
Teachers Involved	Various teachers in the Department, Chemistry		
Course Objectives	This course is designed for final year students who would like to gain experience on research methods and techniques by working on small projects on literature research and chemistry research.		
Course Contents & Topics	The course provides training on chemistry literature research techniques. Students will work on a small project on literature research and a short laboratory-based research project. Thelaboratory-based projects are provided by the students' supervisorswho are assigned by the department.		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge of academic databases and search engines of chemistry literature CLO 2 understand the terminology and nomenclature associated with their own research project CLO 3 demonstrate knowledge and understanding of the chemical techniques they used to do the research in their own research project CLO 4 demonstrate knowledge and understanding of the results of their own research project and its context in the broader research area
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major including CHEM3241 Analytical chemistry II: chemical instrumentation; and CHEM3341 Inorganic chemistry II; and CHEM3441 Organic chemistry II; and CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 2nd sem — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Show an extensive comprehension of the research project. Demonstrate very able analytical and critical thought with presence of some originality. Illuminating utilization and critical analysis / evaluation of information acquired from a wide range of high quality sources. Critical employment of data and results to synthesize appropriate and illuminating conclusions. Demonstrate integration of a wide range of appropriate theories, principles, data and methods. Employ very effective organizational and presentational skills. [Work of A+ should demonstrate substantial additional work beyond that is required in wider areas relevant to the topic.] **B**: Show a substantial comprehension of the research project. Demonstrate able analytical and critical thinking with use of relevant information from sources. Demonstrate ability to compose meaningful comparisons between different secondary interpretations. Correct utilization of data and results to form appropriate conclusions. Compose general integration of theories, principles, data and methods. Perform effective organizational and presentational skills. **C**: Show a general but incomplete comprehension of the research project. Presence of some analytical and critical thinking with use of relevant information from sources. Demonstrate ability to compose comparisons between different interpretations. Mainly correct but some incorrect utilization of data and results to form appropriate conclusions. Demonstrate some partial integration of theories, principles, data and methods. Perform moderately effective organizational and presentational skills. **D**: Show a partial but limited comprehension, with knowledge of some relevant information, of the research project. Presence of some coherent and logical thinking, but with limited analytical and critical abilities. Show utilization and reference of several sources, but mostly via summary instead of by analysis and comparison. Limited ability to employ data and results to form appropriate conclusions. Demonstrate limited integration of theories, principles, data and methods. Perform limited or marginally effective organizational and presentational skills. **Fail**: Show little or no comprehension of the research project. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited employment of secondary sources and no critical comparison of them. Incorrectly utilize data and results and/or unable to form appropriate conclusions. Demonstrate little or no integration of theories, principles, data and methods. Organization and presentational skills are of very limited use or ineffective.
Course Type	Laboratory and workshop course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Laboratory		50
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Presentation	oral presentation	50	CLO 1,2,3,4
Project reports	research report	50	CLO 1,2,3,4

Required/recommended reading and online materials	Reading materials will be assigned depending on the project.
Additional Course Information	Satisfactory completion of this course will be counted towards the Capstone requirement.

CHEM4911 Capstone experience for chemistry undergraduates: HKUtopia (6 credits)	**Academic Year** 2015
Offering Department	Chemistry — **Quota**: ---
Course Co-ordinator	Dr A P L Tong, Chemistry *(apltong@hku.hk)*
Teachers Involved	Various teachers in the Department, Chemistry
Course Objectives	This project-based course with the theme of Chemistry for a Better Living in a Foreseeable Future aims to provide students with a capstone experience. It aims to enable students to think what are the key issues the world is facing with that have to be solved by chemistry and related technology. Students will need to apply what they have learnt in classroom and conduct literature search regarding advanced chemistry research and related technology under development to solve the problems identified in their project using various channels.
Course Contents & Topics	No formal teaching. It is expected that students are actively engaged and should devote 120-140 hours to working on this project. Students will work in groups of two or three, under the supervision of the course coordinator. The duration

	of the project will be two to three months. The time of running this project-based course is in the summer (May - August).
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 observe and evaluate the various issues we are facing with and determine ways in which chemistry can be used to solve the problems CLO 2 integrate theory and practice, and to understand limitations of their current knowledge CLO 3 work in a team and to collaborate with people with different background CLO 4 express scientific ideas effectively in both written and oral forms CLO 5 develop further logical, critical thinking and creativity CLO 6 advocate to others the appreciation for chemistry as to its relevance to our daily life
Pre-requisites (and Co-requisites and Impermissible combinations)	Students are expected to have satisfactorily completed all introductory chemistry disciplinary core courses and at least 24 credits of advanced level disciplinary core/elective chemistry courses in the Chemistry Major. Students who are interested in taking the course should contact the course coordinator for application in April - May. Late application may not be considered. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Show integration of the full range of appropriate theories, principles, evidence and techniques. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.] **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Show general integration of theories, principles, evidence and techniques. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Show some partial integration of theories, principles, evidence and techniques. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Show limited integration of theories, principles, evidence and techniques. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Show little or no or inapt integration of theories, principles, evidence and techniques. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course
Course Teaching & Learning Activities	see below

Activities	Details	No. of Hours
Meeting with supervisor	Tutorials	10
Reading / Self study		60
Assessment	Group work or project	70

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation		50	CLO 1,2,3,4,5,6
Research report		50	CLO 1,2,4,5,6

Required/recommended reading and online materials	No specific list of textbooks and references. Students are encouraged to obtain information via various channels (main library, e-journals, internet, and discussions with classmates and teachers, etc.).
Course Website	http://www.chemistry.hku.hk/hkutopia/
Additional Course Information	Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

CHEM4966 Chemistry internship (6 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	---
Course Co-ordinator	Dr H Y Au-Yeung, Chemistry *(hoyuay@hku.hk)*		
Teachers Involved	Dr H Y Au-Yeung, Chemistry		
Course Objectives			

	This course aims to offer students the opportunities to gain work experience in the industry related to their major of study. The workplace learning experience would be of great benefits to the students to apply their knowledge gained in the study to the real work environments. Students have to take on at least 160 hours of internship work either within the University or outside the University arranged by the School/Departments.
Course Contents & Topics	- Within the University: The student will be supervised by a staff member (Supervisor), working on a project or various tasks as instructed by the Supervisor. - Outside the University: The student will work in an external agency related to the major of study. The student will be supervised under a staff member of the external agency (the External Supervisor) and a staff member of the Department/School of the student (the Internal Supervisor). The work to be performed by the student will normally be instructed by the External Supervisor, with prior agreement of the Internal Supervisor.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: apply knowledge in their major study in solving practical problems in the work place CLO 2: gain first hand work experience in the industry related to their major study
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 2nd sem Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	Pass/Fail
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.
Course Type	Internship

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Internship work	it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time)	160

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Written report	written report, employer's feedback and oral presentation	100	CLO 1,2

Additional Course Information: Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval.
Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

CHEM4999 Chemistry project (12 credits)		**Academic Year**	**2015**
Offering Department	Chemistry	**Quota**	---
Course Co-ordinator	Dr J Y Tang, Chemistry *(jinyao@hku.hk)*		
Teachers Involved	Various teachers in the Department, Chemistry		
Course Objectives	To provide experience of research techniques by working on a short project under the direct supervision of a member of staff. This course would prepare students for graduate school work in chemistry.		
Course Contents & Topics	A short research project provided by a member of staff (e.g. the students supervisor).		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the terminology and nomenclature associated with their own research chemistry project CLO 2: demonstrate knowledge and understanding of the chemical techniques they used to do the research in their own chemical project CLO 3: demonstrate knowledge and understanding of the results of their own chemistry project and its context in the broader research area		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective chemistry courses (CHEM3XXX or CHEM4XXX) in the Chemistry Major including CHEM3241 Analytical chemistry II: chemistry instrumentation, and CHEM3341 Inorganic chemistry II, and CHEM3441 Organic chemistry II, and CHEM3541 Physical chemistry: introduction to quantum chemistry/Physical chemistry II: introduction to quantum chemistry. This capstone course is for Chemistry Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		

Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Show an extensive comprehension of the research project. Demonstrate very able analytical and critical thought with presence of some originality. Illuminating utilization and critical analysis / evaluation of information acquired from a wide range of high quality sources. Critical employment of data and results to synthesize appropriate and illuminating conclusions. Demonstrate integration of a wide range of appropriate theories, principles, data and methods. Employ very effective organizational and presentational skills. [Work of A+ should demonstrate substantial additional work beyond that is required in wider areas relevant to the topic.]
B	Show a substantial comprehension of the research project. Demonstrate able analytical and critical thinking with use of relevant information from sources. Demonstrate ability to compose meaningful comparisons between different secondary interpretations. Correct utilization of data and results to form appropriate conclusions. Compose general integration of theories, principles, data and methods. Perform effective organizational and presentational skills.
C	Show a general but incomplete comprehension of the research project. Presence of some analytical and critical thinking with use of relevant information from sources. Demonstrate ability to compose comparisons between different interpretations. Mainly correct but some incorrect utilization of data and results to form appropriate conclusions. Demonstrate some partial integration of theories, principles, data and methods. Perform moderately effective organizational and presentational skills.
D	Show a partial but limited comprehension, with knowledge of some relevant information, of the research project. Presence of some coherent and logical thinking, but with limited analytical and critical abilities. Show utilization and reference of several sources, but mostly via summary instead of by analysis and comparison. Limited ability to employ data and results to form appropriate conclusions. Demonstrate limited integration of theories, principles, data and methods. Perform limited or marginally effective organizational and presentational skills.
Fail	Show little or no comprehension of the research project. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited employment of secondary sources and no critical comparison of them. Incorrectly utilize data and results and/or unable to form appropriate conclusions. Demonstrate little or no integration of theories, principles, data and methods. Organization and presentational skills are of very limited use or ineffective.

Course Type: Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	8 hours per week for 24 weeks or longer discussions & meetings	192

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation	including a written report and an oral presentation	100	CLO 1,2,3

Required/recommended reading and online materials	Specialist texts dependant on the selected topic.
Additional Course Information	Third year students with exceptional academic achievement may also apply for this course

<table>
<tr><td colspan="2">CSCI9001 Practical Chinese for science students (6 credits)</td><td>Academic Year</td><td>2015</td></tr>
<tr><td>Offering Department</td><td>Chinese</td><td>Quota</td><td>---</td></tr>
<tr><td>Course Co-ordinator</td><td colspan="3">Mr K W Wong, Chinese (kwwongb@hkusua.hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td colspan="3">Dr C M Chan, Chinese
Dr K T Lam, Chinese
Dr S F Lee, Chinese
Mr K W Wong, Chinese</td></tr>
<tr><td>Course Objectives</td><td colspan="3">This course aims to enhance the students' competence using Chinese for professional communication. It helps the students to master the techniques of writing different types of documents such as memos, emails, letters, announcements, notice, brochures, leaflets, and reports. In addition, topics addressing resentation and discussion techniques, the style and rhetoric of reader-based writings are included to heighten the students' linguistic sensitivity.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">- Grammar & vocabulary of modern Chinese - The Chinese writing system - Techniques of writing short messages: good-news and goodwill messages, bad-news messages, and persuasive messages - Techniques of writing electronic documents: emails; presentations - Styles and rhetoric of reader-based reports, proposals and presentations</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:
<table>
<tr><td>CLO 1</td><td>develop a balanced competency in modern Chinese and write well-formed sentences</td></tr>
<tr><td>CLO 2</td><td>employ rhetorical devices and stylistics, as well as practical writing skills specific to their discipline</td></tr>
<tr><td>CLO 3</td><td>explore new tactics of communication, initiate discussions and debates and address new challenges</td></tr>
<tr><td>CLO 4</td><td>apply their disciplinary knowledge and their Chinese writing skills and professional presentation techniques analytically, critically and creatively in different social or professional discourses</td></tr>
</table></td></tr>
<tr><td>Pre-requisites
(and Co-requisites and Impermissible combinations)</td><td colspan="3">NIL</td></tr>
<tr><td>Offer in 2015 - 2016</td><td>Y 1st sem 2nd sem</td><td>Examination</td><td>Dec May</td></tr>
<tr><td>Offer in 2016 - 2017</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3"><table>
<tr><td>A</td><td>The student acquired a superb ability to achieve the intended learning outcomes of the course at all levels of learning: describe, apply, evaluate, and synthesize the language techniques for effective communication in all situations.</td></tr>
<tr><td>B</td><td>The student acquired the ability to achieve the intended learning outcomes of the course at all levels of learning: describe, apply, evaluate, and synthesize the language techniques for effective communication in most situations.</td></tr>
<tr><td>C</td><td>The student acquired adequate ability to achieve the intended learning outcomes of the course at low levels of learning (i.e. describe and apply the language techniques for effective communication) but not at high levels of learning (i.e. evaluate and synthesize the language techniques for effective communication).</td></tr>
<tr><td>D</td><td>The student only has basic familiarity with the subject.</td></tr>
<tr><td>Fail</td><td>The student has very limited familiarity with the subject.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td colspan="3">Lecture-based course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3"><table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>12</td></tr>
<tr><td>Tutorials</td><td>Small group tutorials</td><td>12</td></tr>
<tr><td>Group work</td><td>Workshops</td><td>24</td></tr>
<tr><td>Discussion</td><td></td><td>24</td></tr>
<tr><td>Reading / Self study</td><td>Reading/self study (20 hours) and preparation (12 hours)</td><td>32</td></tr>
<tr><td>Assessment</td><td></td><td>16</td></tr>
</table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td colspan="3"><table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr>
<tr><td>Assignments</td><td>Self-access & online exercises (40%) and Tutorial disscussion (10%)</td><td>50</td><td></td></tr>
<tr><td>Examination</td><td></td><td>50</td><td></td></tr>
</table></td></tr>
<tr><td>Required/recommended reading
and online materials</td><td colspan="3">汪麗炎，1998年。《漢語修辭》。上海：上海大學出版社。　李家樹、謝耀基，1994年。《漢語的特性和運用》。香港：香港大學出版社。　香港城市大學語文學部，2001年。《中文傳意：基礎篇》。香港：香港城市大學出版社。 周錫韋复，1996年。《中文應用寫作教程》。香港：三聯書店。 李錦昌，2000年。《現代商業傳意大全》。香港：商務印書館。 汪麗炎，1998年。《漢語寫作》。上海：上海大學出版社。 香港城市大學語文學部，2001年。《中文傳意：寫作篇》。香港：香港城市大學出版社。　經文略、蘭德主編，2001年。《企業文案撰寫模式大全》。廣州：廣東經濟出版社。　劉美森，2001年。《新編公文寫作學》。成都：四川人民出版社。 黎運漢、李軍，2001年。《商業語言》。台北：台灣商務印書館。</td></tr>
</table>

EASC1020 Introduction to climate science (6 credits)		Academic Year	2015
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Z H Liu, Earth Sciences *(zhliu@hku.hk)*		
Teachers Involved	Dr Z H Liu, Earth Sciences Dr S H Li, Earth Sciences		
Course Objectives	This course provides an introduction to the study of global climate systems and climate change. We study the controls of temporal and spatial variations in earth's climate and its histories of past climates preserved in the geological record. We look at modern research methods that are used in paleoclimatic and paleoenvironmental reconstructions.		
Course Contents & Topics	Global climatic systems, climate classification, natural variability of climate, physical causes for changes through geologic time, external and internal forcing mechanisms, solar orbital variations, major climatic events of the past and their effects on how our planet has developed, glacial and interglacial oscillations, predicting future global change.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 identify major aspects of climatology and approaches to climatological study CLO 2 explain the factors and physical processes controlling climate system CLO 3 understand the driving forces of Earth's climate change CLO 4 recognize the history of Earth's climate change		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate critical use of data and results to draw appropriate and insightful conclusions. Show insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate correct use of data and results to draw appropriate conclusions. Show critical use of relevant information from sources and ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Demonstrate mostly correct but some erroneous use of data and results to draw appropriate conclusions. Show use of relevant information from sources and ability to make comparisons between different interpretations and to quote/reference aptly.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate limited ability to use data and results to draw appropriate conclusions. Show use and reference of several sources, but mainly through summary rather than analysis and comparison.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate misuse of data and results and/or unable to draw appropriate conclusions. Show limited use of secondary sources and no critical comparison of them.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Project work		36
Reading / Self study		50

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 2,3
Examination		50	CLO 1,2,3,4
Project reports		25	CLO 1,4

Required/recommended reading and online materials

Ruddiman, W. F.: Earth's Climate Past and Future (W. F. Freeman, 2008, 2nd edition)
Robert V. Rohli and Anthony J. Vega: Climatology (Jones and Bartlett Publishers, 2008)

EASC1401 Blue Planet (6 credits)		Academic Year	2015
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr P Bach, Earth Sciences *(pabach@hku.hk)*		

Teachers Involved	Dr P Bach, Earth Sciences Dr T P Y Tam, Earth Sciences
Course Objectives	The aim is to provide those students who are taking a first course in Earth Sciences with a fundamental knowledge of how our diverse and living planet Earth works with weaving together an understanding of the dynamic and interactive processes in the Earth's lithosphere, hydrosphere, biosphere and atmosphere. In addition, students should become familiar with the way the study of Earth Sciences blends observation, information, hypothesis, communication and decision making for a better understanding of the future of our planet.
Course Contents & Topics	The course will introduce and discuss the following topics: - Introduction to Earth Systems and Habitable Planet Earth, - Lithosphere (Earth Materials, Plate Tectonics, Volcanism, Earthquakes, Surface Processes and Rock Cycle) - Hydrosphere (Surface- and Groundwater, Oceans and Water Cycle) - Atmosphere (Composition, Weather, Climate, Green House Effect, Oxygen Cycle) - Biosphere (Life, Ecosystems, Evolution and Extinction, Geochemical Cycles, - Concepts and Evolution of Dynamic Earth Systems, Human Interactions with Planet Earth (Earth Resources, Geological Hazards, Climate Change, Human Impact and Environmental Changes)
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	understand the terminology and nomenclature appropriate to the introductory study of Earth Sciences
CLO 2	demonstrate knowledge and understanding of the underlying concepts associated with the study of the Earth Systems and their dynamic interactive processes
CLO 3	understand the extent and nature of global change and environmental concerns around us
CLO 4	demonstrate the ability to make and record observations on Earth Systems processes in natural field environments
CLO 5	develop skills to synthesize observation and knowledge in a report in essay form

Pre-requisites **(and Co-requisites and Impermissible combinations)**	NIL		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery of extensive knowledge / competencies/skills at an Earth Science introductory level required for attaining most or all of the course learning outcomes. Shows clear understanding of introductory terminology and concepts and strong abilities to apply and relate them in a range of complex interactive processes between Earth Systems. Demonstrates highly effective observational skills in field as well as organizational skills to present important observations made and uses them to draw appropriate and insightful conclusions with an impressive level of depth and original thoughts.
B	Demonstrate substantial command of knowledge / competencies/skills at an Earth Science introductory level required for attaining most of the course learning outcomes. Shows evidence for understanding of introductory terminology and concepts and some abilities to apply and relate them in a range of complex interactive processes between Earth Systems. Demonstrates effective observational skills in field as well as organizational skills to present important observations made and uses them to draw appropriate and insightful conclusions with some level of depth.
C	Demonstrate general but incomplete command of knowledge / competencies/skills at an Earth Science introductory level required for attaining most of the course learning outcomes. Shows evidence for some understanding of introductory terminology and concepts and some abilities to apply and relate them in some interactive processes between Earth Systems. Demonstrates moderately effective observational skills in field as well as organizational skills to present observations made mostly correct but with some erroneous use and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge / competencies/skills at an Earth Science introductory level required for attaining some of the course learning outcomes. Shows evidence of limited understanding of introductory terminology and concepts and limited abilities to apply and relate them in some interactive processes between Earth Systems. Demonstrates limited observational skills in field. Applies limited or barely effective organizational and presentational skills to present observed details and facts correctly. Limited ability to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge / competencies/skills at an Earth Science introductory level required for attaining the course learning outcomes. Shows little or no evidence of understanding of introductory terminology and concepts and little or no abilities to apply and relate them in interactive processes between Earth Systems. Demonstrates poor observational skills in field. Applies incoherent organizational and poor presentational skills. Ineffective presentation of observed details and facts and unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		24
Laboratory		24
Field work	2-day field camp	16
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		40	CLO 1,2,3
Laboratory reports		20	CLO 1,2,4
Project report	Field project report	30	CLO 1,2,3,4,5
Test	Quizzes	10	CLO 1,2,3

Required/recommended reading and online materials	Skinner B.J and Murck B.W. : The Blue Planet (2011) Murphy, B and Damian N.: Earth Science Today (1999)

EASC1402 Principles of geology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof M Sun, Earth Sciences *(minsun@hku.hk)*		
Teachers Involved	Prof M Sun, Earth Sciences Dr J A King, Earth Sciences		
Course Objectives	This course is an introduction to fundamental principles and concepts in geology.		
Course Contents & Topics	- Earth's formation, history and geological time scale - Rocks and rock cycle - Plate tectonics: a unifying theory - Earthquakes and Earth's interior - Igneous processes and igneous rocks - Geomorphology and surficial processes - Sedimentary rocks - Folds, Faults and Metamorphism - Metamorphic rocks - Principles of stratigraphy; stratigraphic dating methods - Biostratigraphic methods; fossils and index fossils - Radiometric dating methods		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	recite the rock cycle and the rock material in the earth's crust
CLO 2	describe the overall structure of the earth and the key external and internal processes
CLO 3	explain the major geological phenomena in the context of plate tectonics theory
CLO 4	describe the methods in geological dating
CLO 5	name the major events in earth's history

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures	12 sessions x 2 hours	24
Laboratory	laboratory practical on rocks and minerals, earthquakes, fossil identifcation	16
Field work	1 field trip	8
Group work	1 group project with presentation	4
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination	2-hour written exam	50	CLO 1,2,3,4,5
Laboratory reports	Practical reports	25	CLO 1,2,3,4,5
Presentation		10	CLO 1,2,3,4,5

Project report			15	CLO 1,2,3,4,5

Required/recommended reading and online materials	Tarbuck E.J. and Lutgens F.K.: The Earth: An Introduction to Physical Geology (latest edition)

EASC1403 Geological heritage of Hong Kong (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	35
Course Co-ordinator	Prof M F Zhou, Earth Sciences *(mfzhou@hku.hk)*		
Teachers Involved	Prof M F Zhou, Earth Sciences		
Course Objectives	To give an overview of the geology of Hong Kong, potential geological resources for tourism and the role of geology in the development of Hong Kong's infrastructure.		
Course Contents & Topics	6 Lectures on general geology of Hong Kong, geology of Hong Kong's Country Parks, and aspects of geological knowledge pertaining to large scale construction project plus at least 4 weekend field trips (equivalent to a total of 32 hours) guided by experts to localities of geological interest.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 acquire an appreciation of the processes leading to the formation of various landforms CLO 2 demonstrate understanding of the major morphological features in Hong Kong CLO 3 enhance the observation and analytical skills, and physical ability through participation in the field excursion CLO 4 understanding the different impacts on / importance of geological heritage of Hong Kong		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate thorough understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking. Evidence of original thoughts, excellent field observation and ability to solve problems. Highly effective organization and presentation skills.
B	Demonstrate substantial understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show analytical and critical abilities and logical thinking. Evidence of original thoughts and abilities of field observation. Effective organization and presentation skills.
C	Demonstrate general but incomplete understanding required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking. Moderately effective organization and presentation skills.
D	Demonstrate partial but limited understanding for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	No or little knowledge about the subject. No evidence for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Very little or no ability for field observation and for solving problems. Poor organization and presentational skills.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	6 sessions x 2 hours	12
Field work	4 field trips (3 compulsory guided field trips + 1 self-decided trip)	32
Group work	1 presentation and report	20
Reading / Self study		60
Assessment	1 essay	20

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	attendance of 3 compulsory guided field trips	20	CLO 1,2,3,4
Essay	1 individual essay	20	CLO 1,2,3,4
Examination	2-hour written examination	40	CLO 1,2,4
Presentation	1 group presentation	10	CLO 1,2,3,4
Project report	1 group project	10	CLO 1,2,3,4

EASC1404 Early life on earth (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	50

Course Co-ordinator	Dr K H Lemke, Earth Sciences *(kono@hku.hk)*
Teachers Involved	Dr K H Lemke, Earth Sciences
Course Objectives	This course focuses on the origins of life. It provides an overview of Earth's early environments, how life is thought to have originated on Earth, and how the Earth's dynamic environment impacted the origin of life. This course will also provide a basic overview of habitable environments on Earth and elsewhere in the Solar system.
Course Contents & Topics	This course will cover the following topics: the composition and properties of the early Earth and Earth's first oceans; the central role of water in life; abundance of biological elements on the early Earth and elsewhere in the Solar system; possible conditions for the synthesis of life's first building blocks; the (geo) chemical roots of early life on Earth and the search for life's signatures in the solar system and beyond.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	describe the basic physical and chemical conditions on the early Earth
CLO 2	explain and describe the role of water and extreme geochemical conditions in the synthesis of biological molecules
CLO 3	understand the role that different geological environments played during the origins of life
CLO 4	identify challenges associated with each step in the origins of life
CLO 5	investigate a current origins of life topic

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Student demonstrates thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Shows strong analytical and critical abilities and logical thinking, with evidence of original thought, and the ability to apply his/her knowledge to a wide range of problems that center around “origins of life” topics, and at the same, can combine knowledge from the natural sciences to better understand potential early Life processes on Earth and elsewhere. Student shows the ability to apply highly effective organizational and presentational skills.
B	Student demonstrates substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and apply his/her knowledge to a range of problems in the field of the “origins of life”, and at the same, is capable to combine knowledge from the natural sciences to better understand potential early Life processes on Earth and elsewhere. Student shows the ability to apply effective organizational and presentational skills.
C	Student demonstrates general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply his/her knowledge to a range of problems in the field of the “origins of life”. Student shows the ability to apply moderately effective organizational and presentational skills.
D	Student demonstrates partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability understand key topics in the “origins of life” field. Student shows the ability to apply limited or barely effective organizational and presentational skills.
Fail	Student demonstrates little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Shows very little or no ability to apply knowledge to understand basic topics related to the origins of life. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	1 midterm, group presentations, short-essay	60	
Examination	2-hour written examination	40	

Required/recommended reading and online materials

Sections from: Mason, S.F.: Chemical Evolution (Oxford University Press, 1991)
K.W. Plaxco & M. Gross: Astrobiology: A brief Introduction (J. Hopkins University Press, 2006)
I. Gilmour & M.A. Sephton: An Introduction to Astrobiology (Cambridge University Press, 2004)

EASC1405 Peaceful use of nuclear technologies (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S H Li, Earth Sciences *(shli@hku.hk)*		
Teachers Involved	Dr S H Li, Earth Sciences		
Course Objectives	To provide students with the science backgrounds and knowledge on application of nuclear technologies in daily life and to invoke an awareness of current applications of nuclear sciences by case studies.		
Course Contents & Topics			

	Man and radiation; principles of nuclear technology; case studies of nuclear techniques applied in arts, engineering, biological, physical and social sciences; radiation on earth and beyond; industrial application of nuclear techniques; nuclear techniques in medical study. Future development in nuclear technologies.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 recognize the science fundamentals in nuclear technologies CLO 2 explain and describe the principles of nuclear technologies applied CLO 3 have the awareness of current applications of nuclear sciences CLO 4 demonstrate the knowledge and understanding of the underlying concepts associated with nuclear technologies
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Field work		6
Group work		6
Project work		6
Reading / Self study		92

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Group activities and reports	30	CLO 1,2,3
Examination	2-hour	50	CLO 1,2,4
Project reports	Individual Report	20	CLO 1,3,4

Required/recommended reading and online materials	To be announced

EASC2401 Fluid/solid interactions in earth processes (6 credits)		**Academic Year**	2015
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr K H Lemke, Earth Sciences *(kono@hku.hk)*		
Teachers Involved	Dr K H Lemke, Earth Sciences		
Course Objectives	This course provides an overview of the physical and chemical principles that govern Earth processes		
Course Contents & Topics	List topics with approximate number of weeks - Earth in the laboratory, scaling time and space (1) - Introduction to thermodynamics, and the concept of equilibrium (2) - States of matter, phase diagrams - sublimation, condensation, crystallisation and melting (2) - Mineral-solution interfaces (1) - Energy exchange in Earth environments: convection, conduction and radiation (2) - Kinetics, reaction rates and isotope fractionation on geological time scales(1) - Newtonian mechanics and basic laws of motion (1) - Fluid flow and particle transport (1) - Gravitational, geostrophic and centripetal forces (1)		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 understand basic principles of thermodynamics as applied to the Earth Sciences CLO 2 use phase diagrams to explain processes of fluid/solid interactions CLO 3 describe how energy is exchanged throughout the Earth System CLO 4 demonstrate an understanding of the kinetics of geochemical reactions CLO 5 comprehend the principles of motion and the basic forces affecting movement of gases, liquids and solids on Earth
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	Kinetics of Water-Rock Interaction (2007) - Brantley, Kubicki & White (Editors).

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hour	24
Laboratory	paper exercises	24
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		60	CLO 1,2,3,4,5
Examination		40	CLO 1,2,3,4,5

EASC2402 Field methods (6 credits)	**Academic Year** 2015
Offering Department	Earth Sciences — **Quota** ---
Course Co-ordinator	Dr P Bach, Earth Sciences *(pabach@hku.hk)*
Teachers Involved	Dr P Bach, Earth Sciences
Course Objectives	This course is hands-on field and class-based that introduces basic geological field and mapping techniques and the use of geological equipment and air photographs, an overview of the geology of Hong Kong.
Course Contents & Topics	- Maps and map reading, map reference system (1 week) - Interpretation of geological maps: topographic and geological cross sections, geological structures from outcrop patterns and structural contour lines (horizontal, inclined strata, folded, and faulted strata, unconformities) (3 weeks) - Interpretation and use of air photographs (1 week) - Geological field techniques and equipment, field observation and description of rocks and outcrops (7 field days)
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 read geological maps and comprehend 3-D geological structures from 2-D geological maps CLO 2 construct a geological cross section showing interpreted subsurface rocks and structures CLO 3 demonstrate techniques for basic field observations, measurements and identifications CLO 4 create and interpret an internally consistent geological map from a set of collected field observations and data

	CLO 5 develop skills in integrating geological field data in determining a geological history and writing a structured field report
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough and complete grasp of the subject in order to fulfill most or all learning outcomes. Shows strong ability to record observations on earth processes in the field and to apply knowledge to familiar and unfamiliar situations. Evidence of strong independent analytical, critical and logical thinking. Show strong ability to synthesize all observations made and knowledge in a field report and geological map with highly effective organizational and presentational skills. **B** Demonstrate substantial grasp of the subject required for most of the learning outcome. Shows evidence of ability to record observations on earth processes in the field and to apply knowledge to familiar and some unfamiliar situations. Evidence of independent analytical, critical and logical thinking. Shows ability to synthesize all observations made and knowledge in a field report and geological map with effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject required for most of the learning outcome. Evidence of some ability to record observations on earth processes in the field and apply knowledge to most familiar situations. Evidence of some independent analytical, critical and logical thinking. Show ability to synthesize most observations made and knowledge in a field report and geological map with moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp of the subject required for most of the learning outcome. Evidence of limited ability to record observations on earth processes in the field and limited application of knowledge to solve problems. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to synthesize some observations made and knowledge in a field report and geological map with barely effective organizational and presentational skills. **Fail** Demonstrate little or no grasp of the subject required for most of the learning outcome. Little or no evidence of ability to record observations on earth processes in the field and show very little or no ability to apply knowledge to solve problems. Evidence of little or lack of analytical and critical abilities, coherent and logical thinking. Shows very little or no ability to synthesize observations made and knowledge in a field report and geological map with incoherent organizational and poor presentational skills.
Course Type	Field camps
Course Teaching & Learning Activities	see table below

Activities	Details	No. of Hours
Lectures	12 sessions x 1 hour	12
Field work	5-day field camp & 2 day trips	56
Laboratory work	12 hours paper exercises	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Lab Assignments	10	CLO 1,2
Report	Field Work Assessment	70	CLO 2,3,4,5
Test		20	CLO 1,2

Required/recommended reading and online materials	Comprehensive Course Notes provided. John Barnes: Basic Geological Mapping (Wiley, 1995, 3rd edition)

EASC2404 Introduction to atmosphere and hydrosphere (6 credits)		**Academic Year**	2015
Offering Department	Earth Sciences	**Quota**	50
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences Prof P P C Wu, Earth Sciences		
Course Objectives	This course introduces the atmosphere and hydrosphere systems, and explains at a basic level how they interact with one another.		
Course Contents & Topics	Introduction and course plan, Earth within a broader context (Solar System and other key features); Geological forces shaping the floor of the Oceans and Seas; Water Structure, Ocean Structure and Seawater Composition/Chemistry; Introduction to the Atmosphere; Heating Earth's surface and Atmosphere; Temperature; Moisture and Atmospheric Stability; Forms of condensation and precipitation; Hydrological Cycle - an overview; Air Pressure and Winds; Intro to Atmospheric Circulation and Weather Systems; Ocean Circulation; Waves; Tides; Coasts; Groundwater basics; Groundwater usage, contamination, caves and karst; Glaciers and glacial landscapes; Climate system, proxy data, causes of climate change; Effects of climate change.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the important features which distinguish Earth from the other planets within our Solar System, particularly with regards to its outer fluid envelopes CLO 2 appreciate that on a geological timescale, the ocean basins and the seas are continually changing their location and morphology, and why this is the case CLO 3 understand the key features of water, and the critical role the compound plays in the Atmosphere-Hydrosphere system		

	CLO 4	understand the basic physical phenomena associated with the Atmosphere and the Oceans/Seas and their important lower-order elements
	CLO 5	have an awareness of the scientifically "hot" Atmosphere and Hydrosphere topics

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough grasp of the subject; evidence of strong critical abilities and logical thinking; highly effective organizational and presentational skills; insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly; integration of the full range of appropriate theories, principles, evidence and techniques.
B	Substantial grasp of the subject; evidence of critical abilities and logical thinking; effective organizational and presentational skills; critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly; general integration of theories, principles, evidence and techniques.
C	General but incomplete grasp of the subject; evidence of some critical abilities and logical thinking; moderately effective organizational and presentational skills; use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly; some partial integration of theories, principles, evidence and techniques.
D	Limited grasp of the subject, retention of some relevant information of the subject; evidence of limited critical abilities; limited or barely effective organizational and presentational skills; use and reference of several sources, but mainly through summary rather than analysis and comparison; limited integration of theories, principles, evidence and techniques.
Fail	Little or no grasp of the knowledge and understanding of the subject; little or no evidence of critical abilities and logical / coherent thinking; incoherent organization and poor presentational skills; limited use of secondary sources and no critical comparison of them; little or no or inapt integration of theories, principles, evidence and techniques.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	including tutorials & discussion	24
Project work		10
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 4,5
Essay		25	CLO 1,2,3,4,5
Examination		50	CLO 1,2,3,4,5
Presentation		5	CLO 1,2,3,4,5

Required/recommended reading and online materials

Tom S. Garrison: Oceanography: An Invitation to Marine Science
Frederick K. Lutgens and Edward J. Tarbuck: The Atmosphere: An Introduction to Meteorology

EASC2406 Geochemistry (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S H Li, Earth Sciences *(shli@hku.hk)*		
Teachers Involved	Dr S H Li, Earth Sciences		
Course Objectives	This course provides an understanding of the fundamentals and approaches for geochemical analysis. It introduces students to the basic chemical principles, modern techniques and quantitative analysis for studying the earth.		
Course Contents & Topics	- Physical and chemical state of the earth, - Differentiation of and cosmic abundance of elements, - Aqueous solutions and chemistry of natural water, - Trace element, - Chemistry of igneous rocks, - Chemical controls on soil formation, - Radioactive isotope geochemistry, - Stable isotope geochemistry, - Oxidation and reduction, - Atmospheric chemistry, - Chemical weathering		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	demonstrate an understanding of basic principles of geochemistry and their applications to geological studies
CLO 2	describe element distribution in major rocks

	CLO 3	apply the principles of isotopes to dating and studies of petrogenesis and climate changes
	CLO 4	demonstrate knowledge of the chemical weathering processes

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC1402 Principles of geology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate extensive knowledge and skills at an advanced level required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply highly effective lab skills and techniques to solve problems. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply effective lab skills and techniques to solve problems. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply moderately effective lab skills and techniques to solve problems. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities, and limited ability to apply partially effective lab skills and techniques to solve problems. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking, and ability to apply minimally effective or ineffective lab skills and techniques to solve problems. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	paper exercises	24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		40	CLO 1,2,3,4
Examination		60	CLO 1,2,3,4

Required/recommended reading and online materials

Fure G.: Principle and applications of Geochemistry (Prentice Hall, 1998, 2nd ed.)
Krauskopf K.B. and Bird D.K. Introduction to Geochemistry (McGraw-Hill, Inc. 1995, 3rd ed.)
Walther J.V. : Essentials of Geochemistry (Jones and Bartlett Publishers 2005)

EASC2407 Mineralogy (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	30
Course Co-ordinator	Prof M Sun, Earth Sciences *(minsun@hku.hk)*		
Teachers Involved	Prof M Sun, Earth Sciences Dr Y Li, Earth Sciences		
Course Objectives	To provide essential knowledge of mineralogy, to familiarize students with common minerals that are basis for study of petrography of igneous, sedimentary and metamorphic rocks.		

Course Contents & Topics

- Mineral crystallization, mineral chemistry
- Mineral symmetry, Miller indices
- Physical properties of minerals
- Mineral composition, structure and classification
- Identification of rock forming minerals-hand specimens
- Use of petrographic microscope
- Optical properties under plane polarized light
- Optical properties under orthoscopic illumination
- Optical properties under conoscopic illumination
- Identification of rock forming minerals-thin sections
- Precious minerals
- Chemical variations of minerals
- Trace elements
- Instrument analysis for minerals

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe the methods and systems used in classification of minerals
CLO 2	apply the physical and chemical properties used in identification of rock-forming mineralogy and mineral structure
CLO 3	describe the principle of optical mineralogy

	CLO 4	identify the common rock-forming minerals in hand specimens and thin sections
	CLO 5	understand some principles of mineral chemistry
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC1402 Principles of geology	
Offer in 2015 - 2016	Y 1st sem	**Examination** Dec
Offer in 2016 - 2017	Y	
Course Grade	A+ to F	

Grade Descriptors

A	Demonstrate extensive knowledge and skills at an advanced level required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply highly effective lab skills and techniques to solve problems. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply effective lab skills and techniques to solve problems. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply moderately effective lab skills and techniques to solve problems. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities, and limited ability to apply partially effective lab skills and techniques to solve problems. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking, and ability to apply minimally effective or ineffective lab skills and techniques to solve problems. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	12 sessions x 2 hours	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2,3,4,5
Examination		50	CLO 1,2,3,4,5

Required/recommended reading and online materials

C. Klein and C.S. Hurlbat: Manual of Mineralogy (Wiley, 1999, 1st ed.)
W.D. Nesse: Introduction to Optical Mineralogy (Oxford University Press, 1998, 2nd ed).

EASC2408 Planetary geology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr M H Lee, Earth Sciences *(mhlee@hku.hk)*		
Teachers Involved	Dr M H Lee, Earth Sciences		
Course Objectives	This course provides students with an introduction to the origin, evolution, structure, composition and distribution of matter in the Solar System condensed in the form of planets, satellites, comets, asteroids and rings, with particular emphasis on surface features, internal structures and histories from a geological point of view. The course incorporates the findings from recent space investigations, planetary imagery, remote sensing and Earth analogues to extraterrestrial features into a fascinating portrayal of the geological activities and histories in our Solar System.		
Course Contents & Topics	Formation, evolution, internal structure and surface processes of planetary bodies; the terrestrial planets Mercury, Venus, the Earth-Moon system, and Mars; the giant planets Jupiter, Saturn, Uranus, and Neptune and their moons; Pluto, Charon and the Kuiper Belt; asteroids, meteorites, comets and the Oort cloud; Origin of our Solar System.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe the basic features of our Solar System and its constituents
CLO 2	explain how this knowledge is acquired through observations and experiments
CLO 3	demonstrate knowledge and understanding of the key geological, physical and chemical processes governing the structure, formation and evolution of planetary bodies
CLO 4	compare and contrast our own planet Earth with other planetary bodies

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology or PHYS1650 Nature of the universe		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May

Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	12 sessions x 2 hours	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination		50	CLO 1,2,3,4
Presentation		15	CLO 1,2,3,4
Test		15	CLO 1,2,3,4

Required/recommended reading and online materials: N. McBride and I. Gilmour: An Introduction to the Solar System (Cambridge University Press, 2004)

EASC2409 Regional field studies (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences Prof M Sun, Earth Sciences Dr S C Chang, Earth Sciences Dr J A King, Earth Sciences Prof J J Jiao & Prof M F Zhou, Earth Sciences		
Course Objectives	This course is field-based and introduces geology of China, Taiwan and/or regions in the vicinity of Hong Kong through hands on studies and field excursions. The course will be compulsory for majors in Geology (accredited pathway)		
Course Contents & Topics	The course will introduce the following topics: Geological studies in Southern China and/or Taiwan - Geological history of S. China & Taiwan - Recognition of rock units and minerals in the field - Field recognition and description of geological structures - Stratigraphic measurements - Field geology of active and passive margins - Engineering geology - Management of geological hazards - Basic geological mapping techniques		

Course Learning Outcomes: On successful completion of this course, students should be able to:

CLO 1	have acquired a broad understanding of the geology of east Asia, in particular, Taiwan and South China
CLO 2	be able to undertake basic field observations, stratigraphic measurements and identifications of rocks and minerals
CLO 3	have acquired at least 3 days of experience in independent stratigraphic logging and geological mapping
CLO 4	develop skills in integrating geological field data in determining a geological history and writing a structured field report

Pre-requisites (and Co-requisites and Impermissible combinations): Pass in EASC1401 Blue planet or EASC1402 Principles of geology and consent of course coordinator

Offer in 2015 - 2016	Y 1st sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate an advanced level of understanding of the geology of the study sites, ability to give a detailed account of the geological history of the study region, as well as strong ability to produce good-quality reports on independent field measurements. **B** Demonstrate a satisfactory understanding of the geology of the study sites with evidence on efforts to unravel the geological history of the study region and acceptable level of competence in field measurement techniques. **C** Could only demonstrate an incomplete understanding of the geology of the study sites and some ability to make field observations and a basic knowledge on field measurement techniques. **D** Demonstrate limited understanding of the geology of the study sites and limited ability to apply field measurement techniques. **Fail** Show no or little knowledge of the geology of the study sites and lack of ability in making field observations and applying field measurement techniques.		
Course Type	Field camps		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Field work / 15 days / 100 Reading / Self study / / 20		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Report / / 100 / CLO 1,2,3,4		
Required/recommended reading and online materials	Comprehensive course notes provided		

EASC3020 Global change: anthropogenic impacts (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Z H Liu, Earth Sciences *(zhliu@hku.hk)*		
Teachers Involved	Dr Z H Liu, Earth Sciences		
Course Objectives	This course will explore the role of humans in global change and the environmental responses to such changes. Causes and impacts of climate change will be discussed.		
Course Contents & Topics	Global warming, greenhouse gas emission, past climates, climatic and environmental changes vs. culture evolution, natural vs. anthropogenic climate change, model projections of future climate change, scientific uncertainty, impacts of climate change, including sea level, fresh water, food, ecosystems and human health		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 recognise the complexity of global climate systems CLO 2 recognise the controversy of anthropogenic global warming CLO 3 identify modern environmental issues CLO 4 assess the credibility of various scientific arguments		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate critical use of data and results to draw appropriate and insightful conclusions. Show insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate correct use of data and results to draw appropriate conclusions. Show critical use of relevant information from sources and ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Demonstrate mostly correct but some erroneous use of data and results to draw appropriate conclusions. Show use of relevant information from sources and ability to make comparisons between different interpretations and to quote/reference aptly. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate limited ability to use data and results to draw appropriate conclusions. Show use and reference of several sources, but mainly through summary rather than analysis and comparison. **Fail**		

		Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate misuse of data and results and/or unable to draw appropriate conclusions. Show limited use of secondary sources and no critical comparison of them.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Project work		30
Tutorials		12
Discussion		24
Reading / Self study		48

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Essay	Coursework Assessment	25	CLO 1,2,4
Examination	One 2-hour written examination	50	CLO 1,2,4
Project report		25	CLO 2,3,4

EASC3402 Petrology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof G Zhao, Earth Sciences *(gzhao@hku.hk)*		
Teachers Involved	Prof G Zhao, Earth Sciences Prof M Sun, Earth Sciences Dr M Pittman, Earth Sciences		
Course Objectives	To give students an understanding of the features in sedimentary, igneous and metamorphic rocks, as well as the ability to identify major rock types and their textures and structures in both hand specimens and under microscope.		
Course Contents & Topics	- Magma and magmatism; textures and structures of igneous rocks, classification of igneous rocks, including volcanism and plutonism - Basic igneous rocks - Intermediate igneous rocks - Acid igneous rocks - Sedimentary diagenesis, classification of sedimentary rocks; textures and structures of sedimentary rocks. - Clastic sedimentary rocks: conglomerate and sandstone, siltstone and mudstone - Biochemical sedimentary rocks: limestone and dolostone - Metamorphism; controlling factors of metamorphism; textures and structures of metamorphic rocks; classification of metamorphic rocks - Meta-pelitic rocks - Meta-basic rocks - Meta-carbonate rocks and meta-felsic rocks		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	identify major igneous rocks and their textures and structures in both hand specimens and under microscope
CLO 2	identify major sedimentary rocks and their textures and structures in both hand specimens and under microscope
CLO 3	identify major metamorphic rocks and their textures and structures in both hand specimens and under microscope
CLO 4	make full description and write report on the above rock types

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2407 Mineralogy		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.

	Fail — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	(see table below)

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	specimen descriptions & thin-section observations under microscope	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2,3,4
Examination		50	CLO 1,2,3,4

Required/recommended reading and online materials: Harvey Blatt and Robert J. Tracy, Petrology (Second Edition; W.H. Freman and Company, New York)

EASC3403 Sedimentary environments (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S C Chang, Earth Sciences *(suchin@hku.hk)*		
Teachers Involved	Dr S C Chang, Earth Sciences Dr J A King, Earth Sciences		
Course Objectives	This course discusses the origin, diagenesis, classification and economic importance of sedimentary rocks. Students will learn features and processes of sedimentary geology, paleontology and depositional processes.		
Course Contents & Topics	- Overview of sedimentary geology - Physics of erosion, transportation and sedimentation - Sedimentary structures - Depositional environments (non-marine) - Depositional environments (marine) - Sequence stratigraphy - Basin analysis - Sedimentary environment around Hong Kong - Sedimentary environment on Mars		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe the nature and significance of sedimentary features and structures
CLO 2	identify carbonate and siliciclastic rocks in hand sample
CLO 3	describe the facies in a depositional environment
CLO 4	undertake detailed study of a stratigraphic section in the field
CLO 5	conduct basic observations and interpretations from outcrops

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2402 Field methods or EASC3402 Petrology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical abilities and logical thinking, with evidence of original thought. Apply highly effective lab/fieldwork skills and techniques. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject. Show strong analytical abilities and logical thinking. Apply effective lab/fieldwork skills and techniques. Apply highly effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject. Show some analytical abilities and logical thinking. Apply moderately effective lab/fieldwork skills and techniques. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited grasp of the subject. Show some analytical abilities and logical thinking. Apply partially effective lab/fieldwork skills and techniques. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no grasp of the subject. Evidence of little or lack of analytical abilities and logical thinking. Apply minimally effective lab/fieldwork skills and techniques. Organization and presentational skills are ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	6 sessionsx 2 hours	12

Field work	1 day trip with field project	8
Project work	Examples for sedimentary environments	12
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		40	CLO 1,2,3,4
Laboratory reports		20	CLO 1,2,3,4,5
Presentation		10	CLO 3
Test	Mid-term examination	30	CLO 1,2,3

Required/recommended reading and online materials: Sedimentology and Stratigraphy (Second Edition), Gary Nichols

EASC3404 Structural geology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences		
Course Objectives	The course covers the mechanical properties of rocks and how and why rocks deform, geological maps and their use in interpreting structure.		
Course Contents & Topics	- Stress, strain, stress-strain relation, Mohr circle techniques; - Strain types; - Stereonets; - Faults: strike-slip faults, dip-slip faults and thrusts; - Joints; - Extensional structures, listric faults; - Folds; Satellite folds; - Shear Zones; - Fabrics (foliations, lineations); - Pressure solution cleavages; - Microscopic deformation, Dislocations; - Structurally focused map interpretation; - Key Structures in HK.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand a moderate level rock deformation
CLO 2	interpret structural data from a geology map
CLO 3	plot and interpret structural data on a stereonet
CLO 4	appreciate 3D rock and 4D rock-time relationships

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2402 Field methods and EASC3402 Petrology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough grasp of the subject; evidence of strong critical abilities and logical thinking; apply knowledge to a wide range of complex, familiar and unfamiliar situations; highly effective fieldwork skills and techniques; critical use of data and results to draw appropriate and insightful conclusions; integration of the full range of appropriate theories, principles, evidence and techniques.
B	Substantial grasp of the subject; evidence of critical abilities and logical thinking; apply knowledge to familiar and some unfamiliar situations; effective fieldwork skills and techniques; correct use of data and results to draw appropriate conclusions; general integration of theories, principles, evidence and techniques.
C	General but incomplete grasp of the subject; evidence of some critical abilities and logical thinking; apply knowledge to most familiar situations; moderately effective fieldwork skills and techniques; mostly correct but some erroneous use of data and results to draw appropriate conclusions; some partial integration of theories, principles, evidence and techniques.
D	Limited grasp of the subject, retention of some relevant information of the subject; evidence of limited critical abilities; limited ability to apply knowledge to solve problems; partially effective fieldwork skills and techniques; limited ability to use data and results to draw appropriate conclusions; limited integration of theories, principles, evidence and techniques.
Fail	Little or no grasp of the knowledge and understanding of the subject; little or no evidence of critical abilities and coherent thinking; very little or no ability to apply knowledge to solve problems; minimally effective or ineffective fieldwork skills and techniques; misuse of data and results and/or unable to draw appropriate conclusions; little or no or inapt integration of theories, principles, evidence and techniques.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	eleven 2-hour sessions	22

	Laboratory	stereonets, map interpretation with a structural focus	22
	Field work	3 days field work	24
	Project work	additional 1-2 days self directed 'field' studies of facing stones showing interesting structural features	20
	Reading / Self study		50

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		50	CLO 1,2,3,4
	Examination		50	CLO 1,2,3,4

Required/recommended reading and online materials	Park, R. G.: Foundations of Structural Geology (Blackie, 1989) Davies and Reynolds 1996; Ben A. van der Pluijm & Stephen Marshak. 2004.
Additional Course Information	Structural geology has lots of associated textbooks and web hosted materials, so the three named works are not required purchases.

EASC3405 Environmental remote sensing (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	25
Course Co-ordinator	TBC, Earth Sciences *()*		
Teachers Involved	TBC, Earth Sciences		
Course Objectives	This course provides an introduction to the methods and applications of remote sensing for measuring, from a distance with instruments carried by satellites or aircraft, the spectral features of the earth's surface and atmosphere for inferring the nature and characteristics of the land, vegetation, seasurface and atmosphere and for solving environmental problems.		
Course Contents & Topics	1. Basic princioles of remotesensing 2. Key remote sensing platforms, sensers and their purposes 3. Image procesing, analysis, evaluation and interpretation 4. Integration with environmental geographic information systems 5. Applications of remote sensing for environmental management		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	demonstrate knowledge of how remotely sensed data are acquired
	CLO 2	comprehend the basic techniques of image processing
	CLO 3	handle remotely sensed data within geographic information systems
	CLO 4	understand how remotely sensed be used for environmental assessment
	CLO 5	evaluate and interpret remotely sensed data
	CLO 6	present and discuss results

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2306 Ecology and evolution or EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Excellent, well organised structure appropriate to report. Clear and consistent organisation. All sections clearly written and laid out, very clear and precise summary and conclusions. Appropriate use of clear, well chosen very good graphs, diagrams, figures, tables and maps. Results critically assessed and discussion well organised and supported by wide background reading.
	B	Well organised, appropriate structure. Well written, clear summary and conclusions. Good use of appropriate graphs, diagrams, figures, tables and maps. Good analysis and interpretation of results, supported by some background reading.
	C	Adequate structure. Presentation and writing is satisfactory, summary and/or conclusions lack sharpness. Satisfactory use of appropriate graphs, diagrams, figures, tables and maps. Competent, straightforward analysis and discussion of results.
	D	Basic organisation, lacks clarity of thought. Adequate presentation, style of writing makes some parts difficult to follow. Summary and conclusions rather basic. Limited use of often poorly selected and executed graphs, diagrams, figures, tables and maps. Limited analysis and discussion of results, possibly some misunderstanding of the data.
	Fail	Poor organisation, lacking coherence. Poorly written, summary and /or conclusions rudimentary. Limited use of often inappropriate and poorly executed graphs, diagrams, figures, tables and maps. Little or no interpretation of results, or misinterpretation of the results. Discussion very basic or absent.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		20
	Laboratory		12

	Project work		12
	Discussion		6
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		30	
	Examination		40	
	Project report	Individual project report	30	
Required/recommended reading and online materials	Remote Sensing and Image Interpretation [6th edition], Thomas Lillesand et al., 2007 Computer processing of remotely sensed images: an introduction, Mather and Koch, 2011 Environmental remote sensing and system analysis, Chang, 2012			
Additional Course Information	Due to the restriction of lab space, places			

EASC3406 Reconstruction of past climate (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S H Li, Earth Sciences *(shli@hku.hk)*		
Teachers Involved	Dr S H Li, Earth Sciences Prof Y Q Zong, Earth Sciences		
Course Objectives	This course provides students with an understanding of how dynamic earth is and how it has changed over the last 2.6 million years. This course introduces the theory and methods of climate reconstructions.		
Course Contents & Topics	The Quaternary period (1), Ice sheet in north hemisphere(1), Driven forces of climate change (1) Quantitative reconstruction methods (1) Pollen analysis and biological proxies (2) Climate change in arid regions (1) Quaternary geochronology (1) Sea-level and coastal change (1) Climate changes in East Asia (1) Climate change impacts on human evolution and society (1) Global warming and future climate change (1)		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	understand the earth climate change during last 2.6 million years
	CLO 2	understand the driving forces of climate changes in different scales
	CLO 3	learn the methods for palaeo-environment reconstruction
	CLO 4	understand the impacts of climate changes
	CLO 5	synthesize and interpret data sets of climate change proxies

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2401 Fluid/solid interactions in earth processes		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures	12 sessions x 2 hours	24
	Laboratory	2 sessions	4
	Field work	1 half-day fieldtrip	5

Tutorials	8 sessions	16
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2,3,5
Examination		50	CLO 1,2,3,4

Required/recommended reading and online materials	J.J. Lowe and M.J.C. Walker Reconstructing Quaternary Environments. (Harlow, Essex : Addison Wesley Longman, 1997, 2nd ed) W.F. Ruddiman: Earths climate: Past and future (Freeman, 2008, 2nd ed.) D.E. Anderson, A.S. Goudie and A.G. Parker: Global Environments through the Quaternary (Oxford, 2007)
Additional Course Information	Previous course code & title: EASC2131 A Cool World: Ice Ages and Climate Change

EASC3408 Geophysics (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof P P C Wu, Earth Sciences *(ppwu@hku.hk)*		
Teachers Involved	Prof P P C Wu, Earth Sciences		
Course Objectives	An overview of the geophysical characteristics and processes of the solid earth and a survey of the various geophysical disciplines, including seismology, gravity, geothermometry, geomagnetism and paleomagnetism, as well as exploration geophysical methods for studying the earth's interior and near subsurface structure.		
Course Contents & Topics	- Earth's Dimension and Motion in Space - Earthquake Seismology - Seismic waves and free oscillations - Seismicity Analysis - Gravity and gravity anomalies - Isostasy and Geodesy - Geomagnetism - Paleomagnetism and rock magnetism - Thermal Properties of the Earth - Applied Geophysical Methods: Electrical methods - Applied Geophysical Methods: seismic method - Applied Geophysics: marine seismic - Application of geophysics in HK		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe the approaches and methods geophysicists use to study the interior of the earth
CLO 2	apply basic techniques in measurements of earthquakes and interpret a seismogram
CLO 3	describe the procedure to determine gravity anomalies and their interpretation
CLO 4	understand the methods of paleomagnetism and describe the processes of rock magnetisation
CLO 5	describe how density, pressure and temperature of the earth's interior are determined

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2401 Fluid/solid interactions in earth processes or EASC2402 Field methods or PHYS2250 Introductory mechanics		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrated an in-depth understanding of the subject well above the expected level of an university undergraduate and achieving over 80% of total marks and an ability to pursue advance-level study in some of the geophysics subdisciplines.
B	Demonstrate an understanding of the subject at the appropriate level of a university student and achieving 70% of the total course marks. A greater effort and further preparation are needed if student plans to pursue further study of geophysics.
C	Coursework and examination results reflect only only a basic understanding of the subject without the ability to carry out in-depth analysis. Achieved 60-70% of total course marks.
D	Demonstrated an insufficient understanding of the subject as total course mark achieved is below 60%. The pass grade is reflective only of the time the student puts in on the subject.
Fail	A total lack of effort and insufficient ability to understand the subject and failure to achieve 50% of the available course marks.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	8 paper exercises, 2 field exercises on exploration geophysical methods	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		60	CLO 1,2,3,4,5
Laboratory reports		40	CLO 1,2,3,4,5

EASC3409 Igneous and metamorphic petrogenesis (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	30
Course Co-ordinator	Prof M Sun, Earth Sciences *(minsun@hku.hk)*		
Teachers Involved	Prof M Sun, Earth Sciences Prof G Zhao, Earth Sciences		
Course Objectives	To provide a comprehensive coverage of the principles and techniques used in the study of petrogenesis of igneous and metamorphic rocks and their cause-and-effect relationships with tectonic settings and crustal evolution.		
Course Contents & Topics	- Magma generation: physiochemical conditions and tectonic settings. - Application of trace elements and isotopes to the study of magma genesis - Basaltic magmatism and mantle characteristics - Granitic magma and crustal characteristics - Magmatism at convergent boundaries - Magmatism and crustal growth - Types of metamorphism - Chemical equilibrium/disequilibrium in metamorphism; metamorphic phase diagrams (ACF, A'KF, AFM, etc) - Metamorphic processes and reactions - Metamorphic petrogenesis and evolution of pelitic rocks - Metamorphic petrogenesis and evolution of mafic rocks - Metamorphism in different tectonic settings; metamorphic pressure-temperature-time (P-T-t) paths and their tectonic implications.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	use rock associations, textures, structures and geochemical characteristics to infer the petrogenesis of major igneous rocks
CLO 2	use magmatic rocks to study the mantle and crustal characteristics
CLO 3	apply mineral assemblages, microtextures, mineral reaction relationships and metamorphic P-T paths to infer the tectonothermal evolution of metamorphic rocks
CLO 4	demonstrate knowledge and understanding of magmatic and metamorphic processes and their cause-and-effect relationships with tectonic settings and crustal evolution

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC3402 Petrology		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate extensive knowledge and skills at an advanced level required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply highly effective lab skills and techniques to solve problems. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply effective lab skills and techniques to solve problems. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply moderately effective lab skills and techniques to solve problems. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities, and limited ability to apply partially effective lab skills and techniques to solve problems. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking, and ability to apply minimally effective or ineffective lab skills and techniques to solve problems. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping

	Assignments		50	CLO 1,2,3,4
	Examination		50	CLO 1,2,3,4
Required/recommended reading and online materials	M.G. Best: Igneous and Metamorphic Petrology (Oxford Blackwell Science, 2003, 2nd ed.)			
Additional Course Information	John D Winter: An Introduction to Igneous and Metamorphic Petrology (Prentice Hall, 2001)			

EASC3410 Hydrogeology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof J J Jiao, Earth Sciences *(jjiao@hku.hk)*		
Teachers Involved	Prof J J Jiao, Earth Sciences		
Course Objectives	This course aims to introduce some basic concepts and theories of groundwater flow with special reference to case studies in HK. It consists of three components: 1) fundamentals of groundwater physics; 2) well hydraulics and evaluation of groundwater as a resource; and 3) influence of groundwater on geotechnical and environmental engineering		
Course Contents & Topics	Hydrologic Cycle And water Budgets, Introduction to Hydrogeology (1 Week) Properties Of Aquifers (2 Weeks) Hydraulic head and flow net(2 Weeks) Basic Equations of Groundwater Flow (1 Week) Groundwater Flow To Wells (1 Week) Analysis Of Aquifer Test(2 Weeks) Well installation & pumping test design(1 Week) Regional Groundwater Flow Systems (HK case study)(1 Week) Groundwater contamination (China case study)(Week 12)		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	appreciate the importance of hydrogeology in geotechnical and environmental engineering
CLO 2	understand basic concepts of hydrological cycle and water balance, and interaction between groundwater and surface water
CLO 3	appreciate the close relationship between groundwater system and geology and topography
CLO 4	understand basic concepts of aquifer and aquifer properties, hydraulic head, flow net, and basic principles of groundwater flow
CLO 5	use basic field aquifer tests to estimate some important aquifer parameters

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2402 Field methods		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex practical problems. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to most practical problems. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to some practical problems. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve practical problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve practical problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures	12 sessions x 2 hours	24
Laboratory	10 x 2 hours	20
Field work	Half day field trip	5
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		30	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4,5

Required/recommended reading and online materials	C. W. Fetter: Applied Hydrogeology (Pearson Education Limited, 2014, 4th ed.)

EASC3412 Earth resources (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof M F Zhou, Earth Sciences *(mfzhou@hku.hk)*		
Teachers Involved	Prof M F Zhou, Earth Sciences Prof G Zhao, Earth Sciences		
Course Objectives	To provide students with knowledge about the classification of mineral deposits and their basic features; to understand the processes that lead to their formation; to gain hand on experience with mining procedures. In addition, students should gain knowledge about the world wide distributions of mineral and industrial resources.		
Course Contents & Topics	Concepts in mineral deposits and mining industrial; exploration and mining methods, classification of mineral deposit, mineral deposit models, magmatic oxide and sulfide deposits, skarn deposits, porphyre deposits, volcanogenic massive sulfide deposits, coal, oil and gas, resource evaluation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the terminology and nomenclature in the mining industrial and mineral deposits CLO 2 understand factors that are key to the formation of metallic and industrial resources CLO 3 understand the controls of earth resources in a global scale CLO 4 understand methods of exploration and exploitation for mineral deposits		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2402 Field methods or EASC3402 Petrology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking. Evidence of original thoughts, excellent field observation and ability to solve problems. Highly effective organization and presentation skills. **B** Demonstrate substantial understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show analytical and critical abilities and logical thinking. Evidence of original thoughts and abilities of field observation. Effective organization and presentation skills. **C** Demonstrate general but incomplete understanding required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking. Moderately effective organization and presentation skills. **D** Demonstrate partial but limited understanding for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** No or little knowledge about the subject. No evidence for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Very little or no ability for field observation and for solving problems. Poor organization and presentational skills.		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	see table below		

Activities	Details	No. of Hours
Lectures	2 hour lectures per week for 10 weeks	20
Laboratory		20
Field work	1 overseas camp	40
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Oversea field trip	20	CLO 1,2,4
Examination		60	CLO 1,2,3,4
Laboratory reports		20	CLO 1,2

Required/recommended reading and online materials	TBC

EASC3413 Engineering geology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof J J Jiao, Earth Sciences *(jjiao@hku.hk)*		
Teachers Involved			

	Prof J J Jiao, Earth Sciences Prof A Malone, Earth Sciences
Course Objectives	To present some of the concepts and skills of importance in the profession of Engineering Geology and illustrate their use by case histories.
Course Contents & Topics	Introduction to engineering design and the role of the Engineering Geologist; site investigation concepts and skills (air photo interpretation, soil and rock description, engineering geological plans, reporting); slopes, foundations. Case histories from Hong Kong.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 appreciate how civil engineering design is carried out and understand the work of the geologist on engineering projects, particularly the economic- and safety-critical duties CLO 2 make simple engineering-geological models and understand how desk study, site reconnaissance survey and ground investigation design should be carried out CLO 3 carry out simple air photo interpretation tasks and elementary soil and rock description and classification for engineering purposes CLO 4 understand major types of slope failures and basic methods to control and mitigate landslides CLO 5 carry out stability analyses using methods such as the limit equilibrium and stereographic projection method
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC3410 Hydrogeology, or already enrolled in this course. This course is only for final year students
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge and skills to solve a wide range of complex, familiar and unfamiliar practical problems. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge and skills to solve familiar and some unfamiliar practical problems. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge and skills to solve most familiar, but not unfamiliar, practical problems. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge and skills to solve familiar practical problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge and skills to practical problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Field work	half day field trip	5
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	including field report	30	CLO 2,3,4,5
Examination		70	CLO 1,2,3,4,5

Required/recommended reading and online materials	Goodman, R. E.: Engineering Geology (Wiley, 1993).

EASC3414 Soil and rock mechanics (6 credits)		**Academic Year**	2015
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof J J Jiao, Earth Sciences *(jjiao@hku.hk)*		
Teachers Involved	Prof J J Jiao, Earth Sciences TBC, TBC		
Course Objectives	To provide a basic knowledge of soil and rock mechanics for those wishing to consider further studies on a career in engineering geology/geotechnics.		
Course Contents & Topics			

	Stress and strain; properties and classifications of soil and rock; clay minerals; pore pressure and effective stress; strength and failure criteria, initial stresses and their measurement; deformation; consolidation; planes of weakness in rocks; ground treatment methods.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand basic concepts of stress and strain, pore pressure and effective stress, strength and failure criteria CLO 2 understand basic properties and classifications of soil and rock CLO 3 appreciate the process of rock deformation and soil consolidation
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC3410 Hydrogeology, or already enrolled in this course
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Course Type	Lecture with laboratory component course

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3
Examination		70	CLO 1,2,3

Required/recommended reading and online materials

R. F. Craig: Soil Mechanics (Chapman & Hall, 6th ed.)
R. E. Goodman: Introduction to Rock Mechanics (John Wiley & Sons, 1989)

EASC3415 Meteorology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Z H Liu, Earth Sciences *(zhliu@hku.hk)*		
Teachers Involved	Dr Z H Liu, Earth Sciences Dr M H Lee, Earth Sciences		
Course Objectives	This course provides students with a modern understanding of weather by examining at an advanced level the processes that govern atmospheric structure and behavior, weather elements, and weather systems.		
Course Contents & Topics	Energy budget, radiative forcing, and greenhouse effect; stability, convection, and lapse rates; equation of state and pressure; thermodynamic diagrams; weather charts; Forces, winds, and general circulation; Monsoons, air masses, and fronts; thunderstorms, mid-latitude cyclones, and tropical cyclones; basic equations of the atmosphere; weather forecasting.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe key aspects of weather phenomena CLO 2 explain essential elements of atmospheric processes governing weather CLO 3 apply physical principles to construct models for some basic aspects of weather CLO 4 explain synoptic charts (weather maps) CLO 5 interpret Hong Kong weather (typhoons etc.)		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2404 Introduction to atmosphere and hydrosphere		

Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate critical use of data and results to draw appropriate and insightful conclusions. Show insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate correct use of data and results to draw appropriate conclusions. Show critical use of relevant information from sources and ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Demonstrate mostly correct but some erroneous use of data and results to draw appropriate conclusions. Show use of relevant information from sources and ability to make comparisons between different interpretations and to quote/reference aptly. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate limited ability to use data and results to draw appropriate conclusions. Show use and reference of several sources, but mainly through summary rather than analysis and comparison. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate misuse of data and results and/or unable to draw appropriate conclusions. Show limited use of secondary sources and no critical comparison of them.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities			

Activities	Details	No. of Hours
Lectures		36
Project work		36
Tutorials		12
Reading / Self study		48

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 1,2,3
Examination	2-hour written exam	50	CLO 1,2,4
Project report		25	CLO 1,4,5

Required/recommended reading and online materials	C. Donald Ahrens, Meteorology Today, An Introduction to Weather, Climate and the Environment (Brooks/Cole, 2013). Roland B. Stull, Meteorology for Scientists and Engineers (Brooks/Cole, 2000).

EASC3416 Advanced geochemistry and geochronology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	50
Course Co-ordinator	Prof M F Zhou, Earth Sciences *(mfzhou@hku.hk)*		
Teachers Involved	Prof M F Zhou, Earth Sciences Dr S H Li, Earth Sciences Prof M Sun, Earth Sciences		
Course Objectives	To present key concepts of modern geochemistry and geochronology and their application to environmental and Earth science problems.		
Course Contents & Topics	1. Principles of radiogenic isotopic dating and modern instruments 2. Zircon U-Pb isotopic dating and its application 3. Principles and techniques for dating mineral deposits 4. Introduction to Quaternary geochronology 5. Principle, development and applications of Luminescence dating		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge of concepts and ideas of modern geochemistry CLO 2 explain principles of radiogenic isotopic dating CLO 3 understand how modern analytical techniques are applied to dating earth materials CLO 4 understand how geochemical methods are applied to gain insight into process in environmental and Earth sciences		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2401 Fluid/solid interactions in earth processes or EASC2406 Geochemistry or EASC2407 Mineralogy		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Student demonstrates thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Shows strong analytical and critical abilities and logical thinking, with evidence of original thought, and the ability to apply his/her knowledge to a wide range of problems in geochemistry, and at the same, can combine fundamental knowledge in geochemistry to understand the interactions among minerals, fluids and gases and how these processes impact fluxes of materials over geological time periods and on a global scale. Student shows the ability to apply highly effective organizat-ional and presentational skills.
B	Student demonstrates substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and apply his/her knowledge to a range of problems in geochemistry, and at the same combine knowledge in geochemistry to understand material fluxes among minerals, fluids and gases over geological time periods and on a global scale. Student shows the ability to apply effective organizational and presentational skills.
C	Student demonstrates general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply his/her knowledge to a range of problems in geochemistry and how interactions among minerals, fluids and gases impact material fluxes on a global scale. Student shows the ability to apply moderately effective organizational and presentational skills.
D	Student demonstrates partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to understand key topics in geochemistry and limited capability to transfer this knowledge to geological phenomena. Student shows the ability to apply limited or barely effective organizational and presentational skills.
Fail	Student demonstrates little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Shows very little or no ability to apply knowledge to understand basic topics related to the geochemistry and the application of these principles to geological problems. Organization and presentational skills are minimally effective or ineffective.

Course Type

Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	Up to 24 hours	24
Group work		24
Discussion	Up to 24 hours	24
Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination	One 2-hour written examination	60	CLO 1,2,3,4
Presentation		20	CLO 1,2,3,4
Project report		20	CLO 1,2,3,4

Required/recommended reading and online materials

Geochemistry by William M. White (Wuley, Apr 1, 2013)

EASC3999 Directed studies in earth sciences (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof M Sun, Earth Sciences *(minsun@hku.hk)*		
Teachers Involved	Various teachers in the Department, Earth Sciences		
Course Objectives	To enhance the student's knowledge of a particular topic and the student's self-directed learning and critical thinking skills.		
Course Contents & Topics	The student undertakes a self-managed study on a topic in earth sciences under the supervision of a staff member. The topic is preferably one not sufficiently covered in the regular curriculum. The directed study can be a critical review or a synthesis of published work on the subject, or a laboratory or field study that would enhance the student's understanding of the subject. The project may not require an element of originality.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	enhance the ability in self-learning, data-collection and analysis, critical thinking, doing independent research in earth sciences
CLO 2	write scientific dissertation, and conduct oral presentation of the research results

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology or Earth System Science Majors; and Cumulative GPA of 2.5 or above. This course is not a capstone course and students cannot use this course to fulfill the capstone requirement of the Earth System Science and Geology Majors. The earliest that a student is allowed to take this course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw insightful conclusions and solve problems. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable creative thinking and additional work beyond that is required in wider areas relevant to the topic.]

	B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions to draw insightful conclusions and solve problems. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	The student is expected to spend at least 120 hours on the project	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Research report	Report and presentation	100	CLO 1,2

EASC4403 Biogeochemical cycles (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Y Li, Earth Sciences *(yiliang@hku.hk)*		
Teachers Involved	Dr Y Li, Earth Sciences		
Course Objectives	This course presents how the basic geochemistries of the Earth system, from atmosphere to the geosphere and to hydrosphere, have been and are being affected by the origin, evolution and existence of life. Human activities in particular, from the rapid consumption of resources to the destruction of the rainforests and the expansion of cities, are leading to rapid changes in the geochemistry of the Earth systems.		
Course Contents & Topics	1) Origin of elements, the Solar system and the Earth 2) Geobiology and biogeochemical cycles: their role in the Earth system 3) Terrestrial biogeochemical cycles 4) Aquatic biogeochemical cycles 5) Marine biogeochemical cycles 6) Phosphorous cycle 7) Sulfur cycle 8) Carbon cycle 9) Nitrogen cycle 10) Biogeochemical cycles and impacts from human activities		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in ENVS3313 Environmental oceanography or EASC3403 Sedimentary environments or EASC3416 Advanced geochemistry and geochronology		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Course Learning Outcomes

CLO 1	describe the major geochemical cycles on Earth
CLO 2	illustrate the interactions between the geochemical cycles and the main environments on Earth
CLO 3	draw connections between changes to the Earth systems and the cause/effect relationships of changes to biogeochemical cycles
CLO 4	knows why the anthropogenic activities become a significant part of globe change

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical activities and logical thinking.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcome. Show evidence of analytical and critical abilities and logical thinking.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Apply moderately effective organizational and presentational skills. Show interest in the taught topics, and to answer most questions correctly.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. She limited ability to apply knowledge to solve problems. Show some interest in the taught topics. Able to answer more than half of question correctly.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Does not show positive attitude in learning; not able to answer most of questions.

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		28
	Tutorials		10
	Field work		8
	Group work	PBL group work	10
	Project work	Writing course thesis	30
	Reading / Self study		54

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Essay		60	CLO 1,2,3,4
	Examination		40	CLO 1,2,3,4

Required/recommended reading and online materials	1. Biogeochemistry: An Analysis of Global Change, William H. Schlesinger, Emily Bernhardt. 2. Introduction to marine biogeochemistry, Susan M. Libes, Elsevier, 2009.

EASC4406 Earth dynamics & global tectonics (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof G Zhao, Earth Sciences *(gzhao@hku.hk)*		
Teachers Involved	Prof G Zhao, Earth Sciences Prof P P C Wu, Earth Sciences		
Course Objectives	To review the concepts and processes that shape the configuration of the Earth, from core to crust. This course is intended to provide students with an understanding of the driving forces of Earth processes and the global outcome of these processes through an examination of direct and indirect observations, the evolution of hypotheses, and critical thinking.		
Course Contents & Topics	- Earth as a heat engine; Earth's interior; major features of the continents and oceans; - Plate tectonics; orogenesis; crustal growth. - Mantle convection; hot spots and plumes; - Energy and driving forces of Earth processes; - Methods of investigation of large scale structures and processes; - Structure and physical properties of the planet; - Isostasy; continental drift; - Sea floor spreading; ocean ridges; transform faults; - Subduction zones; mountain belts and orogenesis; - Formation of continental crust; - Continental rifts and continental margins; - Sedimentary basins; - Mechanism, consequence and implication of plate tectonics.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	have an appreciation of the Earth as a dynamic planet
CLO 2	understand how energy release within the Earth is translated into geological processes
CLO 3	appreciate the importance of a knowledge of the history of investigation of global scale tectonic processes
CLO 4	distill of a wide range of data to differentiate competing geological theories
CLO 5	produce concise written and oral summaries of literature research on specific topics in global dynamics

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3408 Geophysics or EASC3409 Igneous and metamorphic petrogenesis		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	The student should show a thorough mastery of the knowledge and skills necessary to attain all of the course outcomes, have an in-depth grasp of the subject, and provide evidence of strong analytical and logical thinking, where possible with original thought. Show outstanding and effective organizational and presentation skills, and the insightful use of data, literature reviews and other sources to undertake a high level of critical analysis and draw appropriate conclusions. Be able to integrate the full range of appropriate theories, principles, and evidence.
B	The student should show a substantial knowledge of a significant range of the skills necessary for attaining most, if not all, of the course outcomes, and have a substantial grasp of the subject. Show evidence of the ability to think critically and to have effective organizational and presentational skills and make critical use of relevant information from different sources, showing the ability to make comparisons between consequent interpretations. Be capable of the general integration of theories, principles and evidence.
C	The student should have a general command of the knowledge, competencies and skills required for attaining the majority of the course outcomes, and a general grasp of the subject. Show some evidence of critical ability and logical thinking and moderately effective organizational and presentational skills. The student should be moderately effective in the use of data to draw appropriate conclusions, should be able to use relevant information from sources and able to make comparisons between different interpretations, through partial integration of theories, principles and evidence.

	D	The student should have a partial but limited command of the knowledge, competencies and skills necessary for attaining a number of the course learning outcomes, and a limited grasp of the subject. Show evidence of some analytical competence and critical thinking and at least marginally effective organizational and presentational skills. Have limited ability to use data and results to draw appropriate conclusions and use and reference a variety of sources mainly in summary rather than through analysis and comparison.
	Fail	The student shows little or no evidence of knowledge and skills required for attaining even the minority of course learning outcomes, lacks an overall grasp of the subject area and shows an absence of analytical and critical thinking abilities. Shows little ability to a apply knowledge to solve problems and has poor and ineffective presentation and/or organizational skills. Shows little evidence of the integration of theories, principles and evidence.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	student seminars and exercises	12
Reading / Self study	essay, presentation plus additional reading	100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5
Essay	Including essays and seminars	50	CLO 1,2,3,4,5
Examination		30	CLO 1,2,3,4,5

Required/recommended reading and online materials

Kearey, P and Vine, F.J. Global tectonics (Oxford: Blackwell Science, 1996, 2nd ed.)
Turcotte, D and Schubert, G. Geodynamics (Cambridge Univ Press, 2002, 2nd ed.)
Davies, Geoffrey F., Mantle convection for geologists (Cambridge 2011)

EASC4407 Regional geology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences Prof G Zhao, Earth Sciences		
Course Objectives	To examine the key events and phenomena associated with the tectonic evolution of East-SE-South Asia, including that of Hong Kong.		
Course Contents & Topics	Introduction; Tools; China assembly; China origins; Emeishan LIP, SW China; Mesozoic South China; Geology of HK: igneous; HK seds; deep structure; upper-level structure; Philippine Sea Plate-Taiwan; Tibet: India-Asia collision SE Asia (Java orogen, Sumatra orogen, Banda Sea, Molucca Sea, South China Sea); Formation and evolution of Archean crust in the Eastern Block of the North China Craton: Plate tectonics vs. mantle plumes; Paleoproterozoic amalgamation of the North China Craton; Late Mesoproterozoic to early Neoproterozoic igneous events in the Yangtze Block: review of recently proposed models; Supercontinents from Columbia, through Rodinia, to Pangea: records in Chinese blocks.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	have an appreciation of the various "tools" that are a commonly used by earth scientists to decipher the evolution of a tectonically complicated region
CLO 2	have an awareness of the influential (and in some cases conflicting) models that have been proposed to explain how the collage of crustal elements that comprises East-SE-South Asia has been assembled over the last 250 million years, and where the "pieces" may have originated
CLO 3	carry out an in-depth scientific review (in this case a key geological issue associated with the region) of the literature (particularly hot-of-the-press journal papers and/or chapters in monographs) and to present the findings both orally at a seminar, and as an academic paper

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3409 Igneous and metamorphic petrogenesis		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough grasp of the subject; evidence of strong critical abilities and logical thinking; highly effective organizational and presentational skills; insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly.
B	Substantial grasp of the subject; evidence of critical abilities and logical thinking; effective organizational and presentational skills; critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly.
C	General but incomplete grasp of the subject; evidence of some critical abilities and logical thinking; moderately effective organizational and presentational skills; use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly.
D	Limited grasp of the subject, retention of some relevant information of the subject; evidence of limited critical abilities; limited or barely effective organizational and presentational skills; use and reference of several sources, but mainly through summary rather than analysis and comparison.
Fail	Little or no grasp of the knowledge and understanding of the subject; little or no evidence of critical abilities and logical / coherent thinking; incoherent organization and poor presentational skills; limited use of secondary sources and no critical comparison of them.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 28 Laboratory / guided literature surveys / 20 Reading / Self study / / 80
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Assignments / / 50 / CLO 3 Examination / / 50 / CLO 1,2

EASC4408 Special topics in earth sciences (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	TBC, Earth Sciences *()*		
Teachers Involved	TBC, Earth Sciences		
Course Objectives	TBC		
Course Contents & Topics	TBC		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in any EASC3XXX or EASC4XXX course		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** **B** **C** **D** **Fail**		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping**		
Required/recommended reading and online materials	TBA		

EASC4911 Earth system: contemporary issues (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Y Li, Earth Sciences *(yiliang@hku.hk)*		
Teachers Involved	Dr Y Li, Earth Sciences Dr S C Chang, Earth Sciences		
Course Objectives	This is a capstone course that provides students with an opportunity to synthesize and correlate the knowledge gained in previous courses in Earth System Science for them to gain a more in-depth appreciation and awareness of the Earth System, the interplay between its component parts, and some of the global issues. Students will also get some basic concepts on how to do strategic analysis on global trends of natural resources.		
Course Contents & Topics	The Earth as an integrated system. The interactions between Earth's component parts. The evolution of Earth's global climates in deep time. The Earth as a fine-tuning system. Natural resource and managements. Natural hazards and managements. Bio-resources and Bioethics. Global trend in oil and natural gas. Global trend in mineral resources (non-metals, ferrous metals and rare earth elements).		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1		

		comprehend in some depth the nature of the issues confronting humankind as part of the Earth System
	CLO 2	understand the basis of interrelationships through feedback loops within the Earth System
	CLO 3	synthesize scientific data available from a variety of sources and apply the data to problem solving, particularly in areas of contemporary concern
	CLO 4	understand how past and present activities on the planet will affect its future

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Earth System Science Major including at least two of the following courses: EASC3410 Hydrogeology; EASC3415 Meteorology; ENVS3313 Environmental oceanography. This capstone course is for Earth System Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all of the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to synthesize and apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate critical use of data, literature reviews, and other sources to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to synthesize and apply knowledge to familiar and some unfamiliar situations. Demonstrate correct use of data, literature reviews, and other sources to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to synthesize and apply knowledge to most familiar situations. Demonstrate mostly correct but some erroneous use of data, literature reviews, and other sources to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to synthesize and apply knowledge to solve problems. Demonstrate limited ability to use of data, literature reviews, and other sources to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to synthesize and apply knowledge to solve problems. Demonstrate misuse of data, literature reviews, and other sources and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		18
Tutorials		14
Project work		48
Reading / Self study		50

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	A series of short essays on the first half of teaching contents	20	CLO 1,2,3,4
Presentation	Present the course thesis to the class	30	CLO 1,2,3,4
Project reports	Writing one course thesis	50	CLO 1,3,4

Required/recommended reading and online materials

Natural resources: technology, economics and policy / editor, U. Aswathanarayana.
Boca Raton : CRC Press/Balkema, c2012.

Living in the environment / G. Tyler Miller, Jr., Scott E. Spoolman.
Belmont, CA : Brooks/Cole, c2012.

EASC4955 Integrated field studies (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	36
Course Co-ordinator	Dr J A King, Earth Sciences *(jessking@hku.hk)*		
Teachers Involved	Dr J A King, Earth Sciences Dr T P Y Tam, Earth Sciences Dr S W P Ng, Earth Sciences Dr K H Lemke, Earth Sciences		
Course Objectives	The aims of a geological field camp are to provide 1) essential training and experience in geological mapping techniques and 2) opportunities to study at first-hand areas of particular geological interest and importance of an overseas locality. The course requires integration of geological knowledge from multiple geological disciplines.		
Course Contents & Topics			

	Students will visit an area of geological interest and will undertake independent and group mapping and problem solving exercises in the area. The scope of study includes: Geological setting and stratigraphy, tectonic evolution structural geology, petrography and petrogenesis of rocks and minerals, economic deposits and geomorphology of the area. Students will undertake field mapping of an area in small groups.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — synthesize geological information pertaining to an area and derive a model of tectonic evolution
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology Major. This must include either a PASS in, or student must be already enrolled in EASC3403 Sedimentary environments, EASC3404 Structural geology, EASC3409 Igneous and metamorphic petrogenesis. This capstone course is for Geology Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 2nd sem — **Examination** No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly fieldwork skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Apply effective fieldwork skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective fieldwork skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective fieldwork skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Field camps

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	18 sessions x 1 hour	18
Field work	18 field days x 5 hours/day	90
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Report	3 reports x 30% each	90	CLO 1
Test	1 field test	10	CLO 1

EASC4966 Earth sciences internship (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr X R Zuo, Earth Sciences *(xuranzuo@hku.hk)*		
Teachers Involved	Dr X R Zuo, Earth Sciences		
Course Objectives	This course aims to offer students the opportunities to gain work experience in the industry related to their major of study. The workplace learning experience would be of great benefits to the students to apply their knowledge gained in the study to the real work environments. Students have to take on at least 160 hours of internship work either within the University or outside the University arranged by the School/Departments.		
Course Contents & Topics	(1) Within the university: The student will be supervised by a staff member (Supervisor), working on a project or various tasks as instructed by the Supervisor. (2) Outside the university: The student will work in an external agency related to the major of study. The student will be supervised under a staff member of the external agency (the External Supervisor) and a staff member of the Department/School of the student (the Internal Supervisor). The work to be performed by the student will normally be instructed by the External Supervisor, with prior agreement of the Internal Supervisor.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — gain at least 4 weeks of work experience in a geosciences-related firm or the Government CLO 2 — acquire an understanding and appreciation of the real work environment CLO 3 — have some experience with applying learned knowledge to solving real world problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology or Earth System Science Majors. This course is not a capstone course and students cannot use this course to fulfill the capstone requirement		

	of the Earth System Science and Geology Majors. The earliest that a student is allowed to take this course is their year 3 study.
Offer in 2015 - 2016	Y 2nd sem Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	Pass/Fail
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.
Course Type	Internship
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Additional Course Information	This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Internship work	it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time)	160

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Written report	written report, employer's feedback and oral presentation	100	CLO 1,2,3

EASC4999 Earth sciences project (12 credits)	**Academic Year**: 2015
Offering Department	Earth Sciences — **Quota**: ---
Course Co-ordinator	Prof M Sun, Earth Sciences *(minsun@hku.hk)*
Teachers Involved	Various teachers in the Department, Earth Sciences
Course Objectives	To enhance the student's knowledge, ability and interest in advanced studies in the Earth Sciences by providing the student with an opportunity to be engaged in an advanced research project.
Course Contents & Topics	The student undertakes a research project in the form of a senior thesis under the supervision of a staff member. The project could be based on a particular component of a staff member's research or one proposed and designed by the student. The student must involve in the project in a non-trivial manner, and play a major role in the project formulation, data collection and analysis, and presentation. The project should contain an element of originality.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: acquire first-hand research experience in earth sciences by doing an individual research project independently under the supervision of a supervisor CLO 2: select research topics, design research path, choose research technology, and more importantly use critical thinking CLO 3: enhance the ability in doing independent earth/environmental research with field/laboratory components
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in the Geology or Earth System Science Majors; and Cumulative GPA of 2.7 or above. This course is not a capstone course and students cannot use this course to fulfill the capstone requirement of the Earth System Science and Geology Majors. The earliest that a student is allowed to take this course is their year 3 study.
Offer in 2015 - 2016	Y Year long — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and creative thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of first-hand data and results to draw insightful conclusions and solve problems. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable creative thinking and additional work beyond that is required in wider areas relevant to the topic.] **B**: Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and creative thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of first-hand data of results to draw appropriate conclusions to draw insightful conclusions and solve problems. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and creative thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of first-hand data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.

	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use first-hand data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of first-hand data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	The student is expected to spend at least 240 hours on the project	240

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation	Dissertation and presentation	100	CLO 1,2,3

ENVS1401 Introduction to environmental science (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr C Dingle, Earth Sciences *(cdingle@hku.hk)*		
Teachers Involved	Dr C Dingle, Earth Sciences		
Course Objectives	To provide students with an inter-disciplinary introduction to Environmental Science highlighting the interconnections between biological, geological, and chemical processes. To convey the basic science behind environmental interactions and place it within the context of human impacts and dependence on the natural world. To better understand how humans interact, manage, and sustain the environment within the context of our economies, governments and individual choices.		
Course Contents & Topics	The teaching and learning will be organized around key issues, and loosely divided into three sections. Part I: The basics: application of science to solve environmental problems; key ecological, chemical, and earth science concepts essential to environmental science, understanding the underlying causes of environmental problems (human population growth and economics). Part II: Using and conserving our resources: how we use and misuse key natural resources; the difficulty in assuring a sustainable supply of energy; waste management and air pollution issues. Part III: Global issues: How do our actions change the face of the planet? Urban ecology and understanding our contribution to global climate change.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	explain and describe connections between the physical and biological components of the environment and discuss the impact of human activities on the environment
CLO 2	explain the concept of environmental sustainability, give examples of how society can adapt behavior to achieve sustainability
CLO 3	understand how we are overusing our resources and compare different approaches to resolving specific problems presented in class

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough understanding of the subject and an ability to apply knowledge gained in class to a wide range of complex, familiar and unfamiliar situations. Show evidence of logical thinking and some original thought. Coursework completed on time and to a high academic standard.
B	Demonstrate a good understanding of the subject and an ability to apply knowledge to familiar and some unfamiliar situations. Show evidence of logical thinking abilities. Coursework completed on time and to a good academic standard.
C	Demonstrate general but incomplete understanding of the subject and an ability to apply knowledge to most familiar situations. Show some evidence of logical thinking, but with some inconsistencies. Some coursework incomplete, but submitted on time and in an adequate academic standard.
D	Demonstrate partial but limited grasp of the subject and a limited ability to apply knowledge to some familiar situations. Show only able to apply knowledge to simple examples. Show little evidence of logical thinking. Coursework submitted late to a poor standard.
Fail	Demonstrate little or no understanding of the subject and very little or no ability to apply knowledge to familiar situations. Show no evidence of logical or coherent thinking. Coursework missing or substandard.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Tutorials	group discussion/case studies	24
Field work	two half day field trips	10
Reading / Self study		112

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td>Field trips, group project, media assignment</td><td>30</td><td>CLO 1,2,3</td></tr><tr><td>Examination</td><td>Final Exam</td><td>40</td><td>CLO 1,2,3</td></tr><tr><td>Test</td><td>Three in class quizzes</td><td>30</td><td>CLO 1,2,3</td></tr></table>
Required/recommended reading and online materials	Miller: Living in the Environment (Thomson, 2007, 15th ed.) Keller and Botkin: Essential Environmental Science (Wiley, 2008)

ENVS3004 Environment, society and economics (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof Y Q Zong, Earth Sciences *(yqzong@hku.hk)*		
Teachers Involved	Prof Y Q Zong, Earth Sciences		
Course Objectives	This course follows up issues highlighted in the introductory course and provides in-depth studies about rural and urban environments for students to examine the problems of resource scarcity and pollutant accumulation in the natural environment, which human society is confronted. The course will focus on major environmental problems and explore how Environmental Economics can be applied for resource management and environmental protection. Students will analyze the nature of key natural resources such as land, air and water, and explore ways to improve resource management, protect the environment and develop sustainable economies.		
Course Contents & Topics	Valuing the environment Basic concepts of Environmental Economics Resourse management for energy, land, water and air Management of waste Planning and regulations for a sustainable future		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>demonstrate knowledge and critical understanding of the complexity and interconnectedness between human society and the natural environment</td></tr><tr><td>CLO 2</td><td>recognise appropriate use and misuse of natural resources</td></tr><tr><td>CLO 3</td><td>assess economic solutions and policies for solving environmental problems</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in one of the following: CHEM2041 Principles of chemistry, EASC2404 Introduction to atmosphere and hydrosphere, ENVS2001 Environmental field and lab course, and ENVS2002 Environmental data analysis		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery of the course material. Show strong ability for analytical, critical and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate highly effective organizational and presentational skills.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of the course material and an ability to apply knowledge to familiar and some unfamiliar situations. Show evidence of analytical, critical thought to some complex issues. Apply effective organizational and presentational skills.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of the course material and an ability to apply knowledge to most familiar situations. Show evidence of some critical and logical thinking abilities. Apply moderately effective organizational and presentational skills.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of the course material and a limited ability to apply knowledge to solve problems. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective organizational and presentational skills.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of course material with very little or no ability to apply knowledge to solve problems. Lack of critical thinking abilities and incoherent thinking. Organization and presentational skills are minimally effective or ineffective.</td></tr></table>		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td>12 sessions of 2 hrs</td><td>24</td></tr><tr><td>Group work</td><td></td><td>12</td></tr><tr><td>Project work</td><td></td><td>12</td></tr><tr><td>Discussion</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Essay</td><td></td><td>50</td><td>CLO 1,2,3</td></tr><tr><td>Examination</td><td></td><td>50</td><td>CLO 1,2</td></tr></table>		

Required/recommended reading and online materials	Tietenberg and Lewis: Environmental economics and policy Keller and Botkin: Essential Environmental Science (John Wiley & Sons, 2008) Kaufmann and Cleveland: Environmental Science (Amazon, 2008) Middleton N.: The Global Casino: An Introduction to Environmental Issues (Arnold, 1999)
Additional Course Information	Previous course code: ENVS2004 Compulsory to 4-year students

ENVS3007 Natural hazards and mitigation (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof Y Q Zong, Earth Sciences *(yqzong@hku.hk)*		
Teachers Involved	Prof Y Q Zong, Earth Sciences		
Course Objectives	This course introduces students the mechanisms of major natural hazards including earthquake, storm and flood, landslide and tsunami. The teaching emphasizes the fundamental concepts: natural hazards are not entirely natural, and understanding the frequency and processes of these hazards is essential in developing prevention, protection and mitigation measures. With case studies, the course will help students explore the political, economical and engineering means of dealing with natural hazards.		
Course Contents & Topics	Key characteristics of natural hazards Geological hazards and mitigation measures Climatic hazards and mitigation measures Preparedness and responses to large natural disasters Risk assessment and disaster management Financial (insurance) instruments for economic recovery		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate knowledge and critical understanding of the key characteristics of major natural hazards, the human aspects of the hazards, and technologies used to protect lives and properties		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate thorough mastery of the course material. Show strong ability for analytical, critical and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate highly effective organizational and presentational skills.
B	Demonstrate substantial command of the course material and an ability to apply knowledge to familiar and some unfamiliar situations. Show evidence of analytical, critical thought to some complex issues. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of the course material and an ability to apply knowledge to most familiar situations. Show evidence of some critical and logical thinking abilities. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of the course material and a limited ability to apply knowledge to solve problems. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of course material with very little or no ability to apply knowledge to solve problems. Lack of critical thinking abilities and incoherent thinking. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Tutorials	Project tutorials	8
Discussion	Group discussion	16
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1
Project reports		50	CLO 1

Required/recommended reading and online materials	Smith K.: Environmental Hazards: Assessing Risk and Reducing Disaster (Routledge, 2004) Bryant E.: Natural Hazards (Cambridge University Press, 2005) Hyndman and Hyndman: Natural Hazards and Diasters (Amazon, 2009)
Additional Course Information	Previous course code: ENVS2007

ENVS3020 Global change ecology (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	50
Course Co-ordinator	Dr C Dingle, Earth Sciences *(cdingle@hku.hk)*		

Teachers Involved	Dr C Dingle, Earth Sciences
Course Objectives	To introduce students to the ways in which environmental change affects biodiversity from organisms to ecosystems. This course will explore the contributions that human population growth and globalization have made to increases in greenhouse gases and associated climate change, biological invasions, land degradation, disease, and, ultimately, impacts on biological systems.
Course Contents & Topics	Environmental change is a natural phenomenon, with ecosystems continually shifting, rearranging, emerging, and disappearing through geologic time with changes in climatic conditions. The activities of humans have added to this natural variation, increasing the magnitude and speed with which environmental change occurs. This course will focus principally on the effects of climate change on organisms and ecosystems but will also investigate other topics registering on a global scale including land use change, biological invasions, and pollution, as well as synergistic interactions between all of the environmental stressors. We will explore (1) what climate change is and how it is manifested including climate warming, sea level rise, and ocean acidification; (2) types and extents of land use change; (3) how globalization has contributed to the spread of alien species and disease. The course will investigate how these human-caused stressors affect the morphology, phenology, distribution, and evolution of organisms and their impacts on ecosystem functioning and biodiversity in freshwater, marine, and terrestrial ecosystems.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	develop a basic understanding of what climate change and other human-associated impacts, such as land use change, are and how they are manifested on a global scale
CLO 2	explain the ways that global change affects organisms' traits and distributions, and biodiversity at the ecosystem level
CLO 3	understand the differences between climate change on a geologic time scale and recent climate change
CLO 4	be aware of the relationships between humans and global change

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Tutorials		12
Project work	Problem-based exercises	20
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	problem-based exercises (10%), continuous assessment (10%)	20	CLO 1,2,3,4
Essay	Essay and presentation	30	CLO 1,2
Examination		30	CLO 1,2,3,4
Test	Mid-term test	20	CLO 1,2,3,4

Required/recommended reading and online materials

Recommended books:
Lovejoy, T.E. and Hannah, L. 2005. Climate Change and Biodiversity. Yale University Press, New Haven, CT, USA.
Newman et al. 2011. Climate Change Biology. CAB International, Oxford,UK.

Required articles:

	Araujo, M.B., and Rahbek, C. 2006. How does climate change affect biodiversity? Science 313:1396-1397. Grimm, N.B., Faeth, S.H., Golubiewski, N.E., Redman, C.L., Wu J., Bai, X., and Briggs, J.M. 2008. Global change and the ecology of cities. Science 319:756-760. Schlesinger, W.H. 2006. Global change ecology. Trends in Ecology and Evolution 21:348-351.
Course Website	http://moodle.hku.hk/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

ENVS3042 Pollution (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Dr B Thibodeau, Earth Sciences *(bthib@hku.hk)*		
Teachers Involved	Dr B Thibodeau, Earth Sciences		
Course Objectives	To introduce students to the most important physical, chemical and biological contaminants that pollute the environment. The course will provide the basics of contaminant transport, toxicology, pollution monitoring and environmental risk assessment. The course will also explore in details the different mechanisms and pathways for water, atmosphere, soil and land pollution.		
Course Contents & Topics	Overview of Global Pollution Physical, Chemical and Biological Contaminants Contaminants Transport Processes Environmental Toxicology Water Pollution Atmospheric Pollution Soil and Land Pollution Monitoring and Risk Assessment Strategy The Future Pollution		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 identify the most important pollutants CLO 2 describes the mechanisms responsible for the transport of pollutants in the environment CLO 3 evaluate the environmental toxicity of different type of contamination CLO 4 present the most important cases of environmental pollution CLO 5 analyze lab-generated data and communicate the results and interpretations		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in CHEM1042 General chemistry I; and Pass in ENVS1401 Introduction to environmental science or BIOL1110 From molecules to cells or ENVS1301 Environmental life science; and CHEM2041 Principles of chemistry or CHEM2442 Fundamentals of organic chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities			

Activities	Details	No. of Hours
Lectures		30
Laboratory		24
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		40	CLO 1,2,3,4,5
Laboratory reports	completion of all labs is mandatory to pass	15	
Presentation		10	
Project report	solo research project	15	

	Test | | 20 |
Required/recommended reading and online materials	Environmental and Pollution Science, Second Edition, 2006 by Ian L. Pepper (Author), Charles P. Gerba (Author), Mark L. Brusseau (Author)
Additional Course Information	Completion of ALL laboratory reports is mandatory to pass this course.

ENVS3313 Environmental oceanography (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr C A Not, Earth Sciences *(cnot@hku.hk)*		
Teachers Involved	Dr C A Not, Earth Sciences Dr D Baker, Biological Sciences		
Course Objectives	To provide students with a thorough introduction to coastal and ocean processes with key questions to highlight the importance of the (paleo)oceanographic processes to environmental and ecological conditions. To convey the basic science behind ocean-atmosphere and ocean-biosphere interactions and place it within the context of human's connectedness to the physical world.		
Course Contents & Topics	To provide a solid foundation of knowledge about the physical processes dictating the oceans movements and their impacts on the environment and ecosystems. The oceans take up 71% of earth's surface and contain 98% of the water. By looking at the structure of the atmosphere, thermodynamic principals and properties governing sea water, we will evaluate the critical roles the ocean plays in the environmental system including its influence on (paleo)climate, coastal resources, and nutrient cycling. Case studies specifically examining changes in sea level rise, El Nino, and (paleo)climate will be used to connect oceanographic principles to environmental problems.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution or EASC2404 Introduction to atmosphere and hydrosphere		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	(see below)		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	(see below)		
Assessment Methods and Weighting	(see below)		

Course Learning Outcomes:

CLO 1	describe the major surface and deep currents of the ocean
CLO 2	identify and describe important processes in the ocean controlling large scale circulation and nutrient transport
CLO 3	describe sources and distribution of critical chemicals and sea water properties in the ocean
CLO 4	illustrate connections between physical ocean processes, climate systems and biological activity

Grade Descriptors:

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining the entire course learning outcomes. Show ability to think logically and critically, with evidence of original thought. Critically evaluate data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of logical and critical thought. Apply effective organizational and presentational skills. Correctly use of data and results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some logical and critical thinking. Apply moderately effective organizational and presentational skills. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited critical abilities. Apply limited or barely effective organizational and presentational skills. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of critical, logical and/or coherent thinking. Organization and presentational skills are minimally effective or ineffective. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Teaching & Learning Activities:

Activities	**Details**	**No. of Hours**
Lectures	12 sessions x 2 hours	24
Laboratory	5 labs x 2 hours	10
Field work	1 day field trip	8
Project work	group presentation	12
Reading / Self study		96

Assessment Methods and Weighting:

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	3 tutorials of 5% each	15	CLO 1,2,3
Examination	2 hour written final exam	35	CLO 1,2,3,4
Presentation		30	CLO 3,4

		experiential learning activities (report 15%, presentation 10%, poster 5%)		
	Test	2 hour mid-term test	20	CLO 1,2,3
Required/recommended reading and online materials	Beer, 1997. Environmental Oceanography: Second Edition. CRC-Press. Abel and McConnell, 2009. Environmental Oceanography: Topics and Analysis. Jones & Bartlett Publishers. Garrison, 2004. Oceanography: An Invitation to Marine Science. 5th edition. Brooks Cole. Cronin, 2009. Paleoclimates: Understanding Climate Change Past and Present. Columbia University Press.			
Additional Course Information	Course will be offered every year starting from 2014-2015 and coordinated by DES.			

ENVS3999 Directed studies in environmental science (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr C Dingle, Earth Sciences *(cdingle@hku.hk)*		
Teachers Involved	Various teachers in the Department, Earth Sciences		
Course Objectives	To enhance students knowledge on a particular topic in environmental science and students self-directed learning and critical thinking skills.		
Course Contents & Topics	Students undertake extensive reading on a selected topic guided by a staff member. Reading should cover material beyond textbooks. Students are required to analyze the material read, formulate their own scientific argument, and present it in written form.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — complete a research task independently in one or more topical areas of the major CLO 2 — show competence in formulating their own scientific argument		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major. Cumulative GPA of 2.5 or above in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrates excellent understanding of the topic, excellent development of argument, logical analysis and insight into the topic, with evidence of original thought. Insightful use and critical analysis of information drawn from a full range of high quality sources to draw appropriate and insightful conclusions. Presented in high academic standard. Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.
B	Most aspects of the chosen topic were addressed and researched adequately. Demonstrates understanding of most key concepts, evidence of elementary analysis and development of argument. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations. Presented in adequate standard.
C	Demonstrate general but incomplete grasp of the chosen topic. Most aspects of the chosen topic were addressed and researched at a very basic level. Mostly correct but some erroneous use of relevant information from sources, demonstrates mainly description, and shows basic understanding, but lacking depth.
D	Demonstrate partial but limited grasp of the chosen topic, with retention of some relevant information. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited to draw appropriate conclusions from the sources.
Fail	Show little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	research work & report	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation		10	CLO 1,2
Research report		90	CLO 1,2

ENVS4966 Environmental science internship (6 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr C Dingle, Earth Sciences *(cdingle@hku.hk)*		
Teachers Involved	Dr C Dingle, Earth Sciences		
Course Objectives			

	This course offers students the opportunity to gain work experience related to their major of study. This work experience will allow the students to apply their knowledge gained in their studies to the real environmental issues.
Course Contents & Topics	Students will be supervised by a staff member (the Internal Supervisor) within the University of Hong Kong as instructed by the Internal Supervisor. In the case of the work being carried out in an external agency, students will be supervised by a staff member of the external agency (the External Supervisor) and a staff member of the University (the Internal Supervisor). The work to be performed by students will normally be instructed by the External Supervisor, with prior agreement of the Internal Supervisor.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain at least 4 weeks of work experience environmental-related firm or the Government CLO 2 acquire an understanding and appreciation of the real work environment CLO 3 have some experience with applying learned knowledge to solving real world problems
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	Pass/Fail
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.
Course Type	Internship

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Internship work	it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time)	160

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Written report	written report, employer's feedback and oral presentation	100	CLO 1,2,3

Course Website	http://moodle.hku.hk/
Additional Course Information	No formal lecture is to be given, but it is expected that students are to work for at least 160 hours (or the equivalent of 4 weeks full-time), supervised by a staff member. Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

ENVS4999 Environmental science project (12 credits)		**Academic Year**	**2015**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof Y Q Zong, Earth Sciences *(yqzong@hku.hk)*		
Teachers Involved	Various teachers in the Department, Earth Sciences		
Course Objectives	To enhance students knowledge and research skills in advanced level of environmental science.		
Course Contents & Topics	Students undertake a research project in the form of an undergraduate dissertation under the supervision of a staff member. The project could be based on one of the four areas covered by the major and must show elements of interdisciplinary nature. The dissertation should show an element of originality and the research in a non-trivial manner.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 complete a dissertation project of undergraduate level in one of the four areas of the major CLO 2 show competence in formulation, data collection, analysis, and presentation of a research project		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (level 3 or 4) disciplinary core/elective courses in Environmental Science Major; and Students must have a cumulative GPA of 3.0 or above in Environmental Science Major. This capstone course is for Environmental Science Major students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam

Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrates excellent understanding of the topic, excellent development of argument, logical analysis and insight into the topic, with evidence of original thought. Insightful use and critical analysis of information drawn from a full range of high quality sources to draw appropriate and insightful conclusions. Presented in high academic standard. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.] **B**: Most aspects of the chosen topic were addressed and researched adequately. Demonstrates understanding of most key concepts, evidence of elementary analysis and development of argument. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations. Presented in adequate standard. **C**: Demonstrate general but incomplete grasp of the chosen topic. Most aspects of the chosen topic were addressed and researched at a very basic level. Mostly correct but some erroneous use of relevant information from sources, demonstrates mainly description, and shows basic understanding, but lacking depth. **D**: Demonstrate partial but limited grasp of the chosen topic, with retention of some relevant information. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited to draw appropriate conclusions from the sources. **Fail**: Show little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course
Course Teaching & Learning Activities	**Activities**: Reading / Self study; **Details**: research work & report; **No. of Hours**: 240
Assessment Methods and Weighting	**Methods**: Dissertation; **Details**: ; **Weighting in final course grade (%)**: 100; **Assessment Methods to CLO Mapping**: CLO 1,2
Additional Course Information	Previous course code: ENVS3015. Consent from major coordinator is required.

MATH1009 Basic mathematics for business and economics (6 credits)		Academic Year	2015
Offering Department	Mathematics	**Quota**	380
Course Co-ordinator	Dr Y M Chan (1st sem); Dr K H Law (2nd sem), Mathematics *(ymchan@maths.hku.hk; lawkaho@maths.hku.hk)*		
Teachers Involved	Dr Y M Chan (1st sem), Mathematics Dr K H Law (2nd sem), Mathematics		
Course Objectives	This course aims at introducing important topics of mathematics for introductory or intermediate level courses in Business and Economics. Mathematical concepts and methods, as well as some Business and Economics applications, would be emphasized so that students could be furnished with the essential mathematical skills for the senior courses in these disciplines.		
Course Contents & Topics	1. Logic 2. Linear Equations 3. Quadratic Equations 4. Graphs and Functions 5. Differentiation 6. Unconstrained optimization 7. Partial differentiation 8. Constrained optimization 9. Integration 10. Geometric series 11. Difference equations 12. Differential equations (optional) 13. Matrix algebra (optional)		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate knowledge and understanding of the essential mathematics used in business and economics CLO 2: apply mathematical skills to model and solve basic problems in business and economics CLO 3: be more capable of coping with a higher level of mathematics required in various economic disciplines		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL The course has no pre-requisite, but students are expected to have already achieved Level 2 or above in HKDSE Mathematics or equivalent. Not for students who have passed MATH1011 University mathematics I or MATH1013 University mathematics II, or have already enrolled in these courses. This course is exclusively for non-Science and non-Engineering students (i.e. not for students from the Faculty of Science or Engineering).		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrates poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Tutorials and Assignments	10	CLO 1,2,3
Examination		50	CLO 1,2,3
Test		40	CLO 1,2,3

Required/recommended reading and online materials	M. J. Rosser: Basic Mathematics for Economists (London: Routledge, 2003, 2nd edition) Ian Jacques: Mathematics for Economics and Business (New York: Pearson Education, 2013, 7th edition)
Course Website	http://hkumath.hku.hk/course/MATH1009/

MATH1011 University mathematics I (6 credits)		Academic Year	2015
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr H Y Zhang, Mathematics *(hyzhang@maths.hku.hk)*		
Teachers Involved	Dr H Y Zhang, Mathematics		
Course Objectives	This course aims at students with only HKDSE Mathematics (or equivalent) background and provides them with basic knowledge of mathematics that serves as essential foundation in various disciplines. It is expected to be followed by MATH1013 University Mathematics II.		
Course Contents & Topics	- Sets, Venn diagram, set operations. - Permutations, combinations and elementary probabilities. - Mathematical induction. - Exponential and logarithmic functions. - Trigonometric functions, trigonometric formulae. - Limits of algebraic, exponential and logarithmic functions. - Derivatives of algebraic, exponential and logarithmic functions. - Differentiation rules: addition, product, quotient and chain rule. - Maxima and minima. - Indefinite and definite integrals. - Area. - Integration by substitution. - Trapezoidal rule with error estimation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — use the set notations; calculate probabilities; and prove by induction CLO 2 — solve problems involving exponential, logarithmic and trigonometric functions CLO 3 — evaluate limits and derivatives CLO 4 — compute simple definite and indefinite integrals CLO 5 — solve practical problems such as determining maxima and minima; finding area		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL The course has no pre-requisite, but students are expected to have achieved Level 2 or above in HKDSE Mathematics or equivalent before enrolling the course; and Not for students with Level 2 or above in Module 1 or Module 2 of HKDSE Mathematics or equivalent.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** — Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** — Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** — Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** — Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	(see table below)		
Assessment Methods and Weighting	(see table below)		
Required/recommended reading and online materials	(Custom textbook) MATH 1011 University Mathematics I (Pearson, 2014)		
Course Website	http://hkumath.hku.hk/course/MATH1011/		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assignments, tutorials, participation, etc	5	CLO 1,2,3,4,5
Examination		50	CLO 1,2,3,4,5
Test	3 tests	45	CLO 1,2,3,4,5

MATH1013 University mathematics II (6 credits)		Academic Year	2015
Offering Department	Mathematics	Quota	650
Course Co-ordinator	Dr C W Wong (1st sem); Dr Y M Chan (2nd sem), Mathematics *(cwwongab@hku.hk; ymchan@maths.hku.hk)*		
Teachers Involved	Dr C W Wong (1st sem), Mathematics Dr Y M Chan (2nd sem), Mathematics		
Course Objectives	This course aims at students with Core Mathematics plus Module 1 or Core Mathematics plus Module 2 background and provides them with basic knowledge of calculus and some linear algebra that can be applied in various disciplines. It is expected to be followed by courses such as MATH2012 (Fundamental Concepts of Mathematics), MATH2101 (Linear Algebra I), MATH2102 (Linear Algebra II), MATH2211 (Multivariable Calculus), and MATH2241 (Introduction to Mathematical Analysis).		
Course Contents & Topics	- Functions; graphs; inverse functions. - Limits; continuity and differentiability. - Mean value theorem; implicit differentiation; L'Hopital's rule. - Higher order derivatives; maxima and minima; graph sketching. - Radian, calculus of trigonometric functions. - Definite and indefinite integrals; integration by substitutions; integration by parts; integration by partial fractions. - Complex numbers, polar form, de Moivre's formula. - Basic matrix and vector (of orders 2 and 3) operations, determinants of 2x2 or 3x3 matrices. - First order ordinary differential equations. (optional)		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe properties of a function and an inverse function
CLO 2	evaluate various kinds of limits, and determine continuity and differentiability of functions
CLO 3	apply advanced rules/techniques of differentiation and integration to compute derivatives and; integrals; sketch graphs of functions
CLO 4	solve problems involving complex numbers
CLO 5	perform matrix and vector operations, compute determinants of 2x2 or 3x3 matrices
CLO 6	solve simple first order ordinary differential equations

Pre-requisites (and Co-requisites and Impermissible combinations)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University mathematics I; and Not for students who have passed MATH1821 Mathematical methods for actuarial science I, or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics), or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	Examination	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4,5,6
Examination		50	CLO 1,2,3,4,5,6
Test		40	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Adrian Banner: The Calculus Lifesaver: All the Tools You Need to Excel at Calculus (Princeton University Press, 2007) George B. Thomas, Maurice D. Weir and Joel Hass: Thomas' Calculus (12th edition, Addison Wesley)
Course Website	http://hkumath.hku.hk/course/MATH1013/

Additional Course Information	Students who have passed MATH1013 are not allowed to take MATH1009.

MATH1641 Mathematical laboratory and modeling (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	20
Course Co-ordinator	TBC, Mathematics *()*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This course introduces a powerful and free computer software Scilab for scientific research. The programming language will be taught via a number of mathematical models in Physics, Chemistry, Biology, Ecology, Statistics and Management. Some basic and important techniques in Calculus and Linear Algebra will also be covered.		
Course Contents & Topics	Scilab. Elementary mathematical modeling, predator-prey models, epidemic models, host-parasite model etc. Data fitting models and simulation of simple random variable. Random walk models and inventory models. Differentiation and integration of one variable. Elementary linear algebra.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: recognize the importance of numerical methods in mathematical modeling CLO 2: demonstrate basic algebraic and arithmetic computations in the Scilab environment CLO 3: write and interpret programs in Scilab programming language CLO 4: solve simple numerical problems using interactive Scilab commands CLO 5: solve moderately complicated numerical problems by writing Scilab programs		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and Scilab skills by being able to identify the appropriate Scilab environments and their applications through correctly analysing problems, clearly and efficiently presenting correct algorithms and being able to solve numerical problems by writing Scilab programs carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and Scilab skills by being able to identify the appropriate Scilab environments and their applications through correctly analysing problems, but with some minor inadequacies in identifying the appropriate Scilab components or presenting correct algorithms or with some minor programming/computational errors. **C**: Demonstrate an acceptable understanding of key concepts and Scilab skills by being able to correctly identify appropriate Scilab environments, but with some inadequacies in solving numerical problems with Scilab through incorrectly analysing problems with inappropriate Scilab environments or with a number of minor programming/computational errors. **D**: Demonstrate some understanding of key concepts and Scilab skills by being able to correctly identify appropriate Scilab environments, but with substantial inadequacies in solving numerical problems with Scilab through incorrectly analysing problems with inappropriate Scilab environments or with substantial programming/computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate Scilab environments or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	See table below		
Assessment Methods and Weighting	See table below		
Required/recommended reading and online materials	To be decided by the course instructor. F. R. Giordano, M. D. Weir, W. P. Fox: A first course in mathematical modeling (Pacific Grove, CA: Brooks/Cole Thomson Learning, 2003)		

Course Teaching & Learning Activities:

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	
Test		50	

MATH1821 Mathematical methods for actuarial science I (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J T Chan, Mathematics *(jtchan@hku.hk)*		
Teachers Involved	Dr J T Chan, Mathematics		
Course Objectives	This course is the first of the two mathematics courses designed to provide actuarial science students with a solid background of calculus of one and several variables and an introduction to linear algebra. The course focuses on single variable calculus and elementary matrix theory. It aims at students with Core Mathematics plus Module 1 or Core Mathematics plus Module 2 background.		

Course Contents & Topics	- Functions; graphs; inverse functions. - Limits, continuity and differentiability. - Mean value theorem; implicit differentiation; L'Hopital's rule. - Bisection method and Newton's method. - Higher order derivatives, maxima and minima, graph sketching. - Taylor approximation and error estimation. - Improper integrals, partial fractions, integration by parts. - Numerical integration, Trapezoidal rule and Simpson's rule. - Basic matrix and vector (of orders 2 and 3) operations, determinants. - Simple differential equations.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	describe properties of a function and an inverse function
CLO 2	evaluate various kinds of limits, and determine continuity and differentiability of functions
CLO 3	apply advanced rules/techniques of differentiation and integration to compute derivatives and integrals; sketch graphs of functions
CLO 4	approximate integrals by numerical methods
CLO 5	perform matrix and vector operations, compute determinants
CLO 6	solve simple first and second order ordinary differential equations

Pre-requisites (and Co-requisites and Impermissible combinations)	Level 4 or above in HKDSE Mathematics plus Module 1, or Level 4 or above in HKDSE Mathematics plus Module 2, or equivalent; and Not for students who have passed MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, Probability and statistics), or have already enrolled in these courses. For BSc(ActuarSc) students only.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4,5,6
Test	2 tests	50	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	George B. Thomas; as revised by Maurice D. Weir and Joel Hass: Thomas' Calculus (Addison Wesley, 12th edition) Steven J. Leon: Linear Algebra with Applications (Pearson Prentice Hall)
Course Website	http://hkumath.hku.hk/course/MATH1821/

MATH1851 Calculus and ordinary differential equations (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	640
Course Co-ordinator	Prof K M Tsang (1st sem); Dr Y K Lau (2nd sem), Mathematics *(kmtsang@maths.hku.hk; yklau@maths.hku.hk)*		
Teachers Involved	Prof K M Tsang (1st sem), Mathematics Dr Y K Lau (2nd sem), Mathematics Prof K W Chow (1st & 2nd sem), Mechanical Engineering Dr W Li (2nd sem), Mechanical Engineering		
Course Objectives	In this course, students will be introduced to fundamental concepts of calculus and ordinary differential equations with a view on applications in different engineering fields. A concrete foundation of mathematics		

	that underpins the various engineering subjects will be built. Mathematical concepts and principles, as well as some typical engineering applications, would be emphasized so that students could enhance their mathematical skills in solving engineering problems, and be well prepared in learning a higher level of applied mathematics required in different engineering disciplines.
Course Contents & Topics	- Differential and Integral Calculus (Single Variable) . - Ordinary Differential Equations. - Laplace Transforms. For more information, please refer to http://hkumath.hku.hk/MathWWW/ucourse.php?MATH1851.description
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	demonstrate knowledge and understanding of basic calculus and ordinary differential equations as well as their relationship with some typical physical/engineering applications
CLO 2	apply mathematical skills to model and solve some basic physical/engineering problems
CLO 3	have a general grasp on the interrelation among mathematical theory, result and the engineering problem
CLO 4	be well prepared to cope with a higher level of engineering mathematics required in different engineering disciplines

Pre-requisites (and Co-requisites and Impermissible combinations)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University mathematics I (This course is exclusively for Engineering students.)		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and methods or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and methods or their applications, and not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination		70	CLO 1,2,3,4
Test	2 tests	20	CLO 1,2,3,4

Required/recommended reading and online materials	(Textbook) Introduction to Calculus and Differential Equations (Pearson) G.B. Thomas, et al.: Thomas' Calculus (Pearson Education, 2005, 11th ed.) R.K. Nagle, et al.: Fundamentals of Differential Equations and Boundary Value Problems (Pearson Education, 2008, 5th ed.)
Course Website	http://hkumath.hku.hk/course/MATH1851/
Additional Course Information	There will be no 'make-up' for a missed test or assignment under normal circumstances. Students are not allowed to take MATH1851 and MATH1853 together in the same semester. This course is offered by the Department of Mathematics and the Faculty of Engineering.

MATH1853 Linear algebra, probability and statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	640
Course Co-ordinator	Dr G Han, Mathematics *(ghan@maths.hku.hk)*		
Teachers Involved	Dr G Han (1st & 2nd sem), Mathematics Dr N Wong (1st sem), Electrical & Electronic Engineering Dr Y C Wu (2nd sem), Electrical & Electronic Engineering		
Course Objectives			

	As the consecutive course of MATH1851, students will be introduced to more topics of mathematics commonly applied in engineering so that students could be further enhanced with a concrete skill in mathematics underpinned for different engineering subjects. The course emphasizes mathematical concepts, principles, analysis, and their relationship to the modelling of engineering systems. Students could be furnished with the essential mathematical skill to analytically tackle some typical engineering problems to prepare for all the engineering subjects.
Course Contents & Topics	- Vector Algebra; Matrix Algebra; Eigenvalues Problems. - Elementary Complex Variables. - Basic Probability Laws; Random Variables, Probability Distributions, Expectation and Variance. - Binomial, Geometric, and Poisson Distribution; Normal Distribution. - Sampling distribution, Point Estimates and Confidence Interval. For more information, please refer to http://hkumath.hku.hk/MathWWW/ucourse.php?MATH1853.description
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate knowledge and understanding of the essential engineering mathematics as well as their relationship to engineering problems in general CLO 2: model an engineering problem into a mathematical form or a mathematical model, which can be an algebraic equation, a differential equation, a graph, or some other mathematical expression CLO 3: solve the model by selecting and applying a suitable mathematical method, skill or technique learned CLO 4: have a general grasp on the interrelation among mathematical theory, result and the engineering problem
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University Mathematics I. (This course is exclusively for Engineering students.)
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and methods or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and methods or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination		80	CLO 1,2,3,4

Required/recommended reading and online materials	D.C. Lay: Linear Algebra and its Applications (Addison-Wesley, 2012, 4th ed.) S.J. Leon: Linear Algebra with Applications (Pearson Education, 2006, 7th ed.) G. James, et al.: Modern Engineering Mathematics (Pearson Education, 2008, 4th ed.) C. Rorres and H. Anton: Applications of Linear Algebra (Wiley, 1984, 3rd ed.) E. Kreyzig: Advanced Engineering Mathematics (Wiley, 2006, 9th ed.)
Course Website	http://hkumath.hku.hk/course/MATH1853/
Additional Course Information	There will be no 'make-up' for a missed quiz or assignment under normal circumstances. Students are not allowed to take MATH1851 and MATH1853 together in the same semester. This course is offered by the Department of Mathematics and the Faculty of Engineering.

MATH2012 Fundamental concepts of mathematics (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Y M Chan, Mathematics *(ymchan@maths.hku.hk)*		

Teachers Involved	Dr Y M Chan, Mathematics
Course Objectives	To provide students with solid background on fundamental concepts of mathematics and methods of mathematical proofs. Such concepts and methods are important for subsequent studies in all higher level courses in mathematics. This course can be taken concurrently with other Level 2 or above courses.
Course Contents & Topics	- Elementary set theory. - Statement calculus. - Mathematical proofs. - Relations and functions. - Finite and infinite sets. - Natural numbers and mathematical induction. - Axiomatic systems in mathematics. - Real numbers and the limit of a sequence. - Examples of groups.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the definition of a set and apply set theory in simple daily life problems CLO 2 construct the truth table of a given statement CLO 3 apply different proof strategies (e.g. proof by contradiction and mathematical induction) in proving a mathematical statement CLO 4 demonstrate the basic properties of equivalence relations CLO 5 understand the definition of the limit of a sequence of real numbers CLO 6 demonstrate the operational properties of groups
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1013 University mathematics II or MATH1821 Mathematical methods for actuarial science I or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics).
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Tutorials and Assignments	10	CLO 1,2,3,4,5,6
Examination		50	CLO 1,2,3,4,5,6
Test		40	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Gary Chartrand, Albert D. Polimeni, Ping Zhang: Mathematical Proofs: A Transition to Advanced Mathematics (Pearson, 2012, Third Edition)
Course Website	http://hkumath.hku.hk/course/MATH2012/
Additional Course Information	Students with good grades in HKDSE Math Module 1 or Math Module 2 and have strong interests in math may also apply.

MATH2014 Multivariable calculus and linear algebra (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr H Y Zhang, Mathematics *(hyzhang@maths.hku.hk)*		
Teachers Involved	Dr H Y Zhang, Mathematics		
Course Objectives			

	To provide students with a solid foundation in calculus of several variables and linear algebra, which they will need in the study of mathematics related subjects.
Course Contents & Topics	- Vectors and Matrices: Vectors in space, dot product and cross product, determinants (with geometric interpretations). - Partial Derivatives: Functions of several variables, partial derivatives, extreme values and Lagrange multipliers, Taylor's formula. - Multiple Integrals: Double and triple integrals, substitution in multiple integrals. - Matrix Algebra: Matrix addition and multiplication, system of linear equations as a matrix equation. - Vector Spaces: The Euclidean spaces as vector spaces, its subspaces, span of vectors, linear independence, basis and dimension. - Eigenvalues and Eigenvectors: Diagonalization and computing powers. - Numerical Methods: Bisection method and Newton's method for finding roots of equations, Simpson's rule and Trapezoidal rule for numerical integration.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	understand the geometric meaning of partial and directional derivatives
CLO 2	optimize multivariate objective functions (with/without constraints)
CLO 3	evaluate integrals over curvilinear regions in space
CLO 4	understand the concept of vector spaces, basis, dimension
CLO 5	solve simple eigenvalue problems and apply the theory to practical problems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics). Not for students who have passed MATH2822 Mathematical methods for actuarial science II or ((MATH2101 Linear algebra I or MATH2102 Linear algebra II) and MATH2211 Multivariable calculus), or have already enrolled in these courses.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analyzing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analyzing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analyzing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analyzing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting	

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4,5
Test		50	CLO 1,2,3,4,5

Required/recommended reading and online materials	TBC
Course Website	http://hkumath.hku.hk/course/MATH2014/

MATH2101 Linear algebra I (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@maths.hku.hk)*		
Teachers Involved	Dr K H Law, Mathematics		
Course Objectives	This is a first university level course on linear algebra, which aims at introducing to students the basic concept of linear structure through many concrete examples in the Euclidean spaces. The course also enriches students' exposure to mathematical rigor and prepares them for studying more advanced mathematical courses.		
Course Contents & Topics	- Vector Geometry in R^2 and R^3: Revision of addition and scalar multiplication of vectors, dot product, lines and planes; and applications to geometry.		

	- Matrix Algebra: Matrix addition and multiplication, determinant and inverse of square matrices, system of linear equations as a matrix equation. - Systems of Linear Equations: Gauss-Jordan elimination, elementary row operations, row echelon form, elementary matrices, matrix inversion. - Vector Spaces: Coordinate system in R^n, the Euclidean spaces as vector spaces, its subspaces, span of vectors, linear independence, basis, dimension, applications. - Linear Transformations: Definition and examples of linear transformations in R^2 and R^3, standard matrices of linear transformations. - Eigenvalue Problem: Eigenvalues and eigenvectors, diagonalization of matrices (with distinct eigenvalues), applications. - Inner Product: Gram-Schmidt process, least square problems.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: handle matrix operations and use them in some practical problems CLO 2: solve systems of linear equations by Gauss-Jordan elimination and also compute inverses of square matrices CLO 3: understand the concept of vector spaces, basis, dimension, and linear transformations and compute the matrix representations of some linear transformations CLO 4: solve some simple eigenvalue problems and apply the theory to some practical problems CLO 5: solve some minimization problems by the least squares method
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1013 University mathematics II or MATH1821 Mathematical methods for actuarial science I or (MATH1851 calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics).
Offer in 2015 - 2016	Y 1st sem 2nd sem; **Examination**: Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assignments, tutorials, participation, etc	10	CLO 1,2,3,4,5
Examination		50	CLO 1,2,3,4,5
Test	2 tests	40	CLO 1,2,3,4,5

Required/recommended reading and online materials	Spence, Insel & Friedberg: Elementary Linear Algebra -- A Matrix Approach (Pearson, 2014)
Course Website	http://hkumath.hku.hk/course/MATH2101/

MATH2102 Linear algebra II (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	Prof W Zang, Mathematics		
Course Objectives	This is a follow up of the course Linear Algebra I. It aims at introducing the general concept of vector spaces, subspaces, dimensions, inner product spaces, etc. The course prepares the foundation on linear algebra for students' future study in mathematics and other disciplines. Many examples of applications will be drawn on different subject areas.		
Course Contents & Topics	1. Vector spaces: definition of field, subspaces/quotient spaces, direct sum, existence of basis, dual space 2. Linear transformations: kernel and image, isomorphisms, matrix representations of linear		

	transformations, determinant 3. Linear operator: eigenvalues and eigenspaces, algebraic/geometric multiplicity, diagonalizability, Caley-Hamilton theorem, canonical form (optional) 4. Inner product space: Inner product, orthonormal basis, orthogonal complement and projection 5. Linear operators on inner product space: adjoints of operators, orthogonal/unitary operators, orthogonal/unitary diagonalization of self-adjoint/normal operators, symmetric bilinear form and quadratic form 6. Additional selected topics up to the instructor
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: identify vector space structures and apply relevant knowledge to some practical problems CLO 2: understand the notion of subspaces and compute basis, dimension, etc CLO 3: understand the base-free nature of linear transformations/operators. Relate the calculations of linear transformations to that of matrices by choosing particular basis CLO 4: be able to solve eigenvalue problem for linear operators and apply it to the problem of diagonalization CLO 5: understand the notions of inner product space and adjoints of operators. Be able to do calculation involving properties of adjoints
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).
Offer in 2015 - 2016	Y 2nd sem; **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4,5
Test		50	CLO 1,2,3,4,5

Required/recommended reading and online materials	S. Friedberg, A. Insel, L. Spence: Linear algebra (Pearson, 4th edition)
Course Website	http://hkumath.hku.hk/course/MATH2102/

MATH2211 Multivariable calculus (6 credits)		**Academic Year**	2015
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Hua (1st sem); Dr C W Wong (2nd sem), Mathematics *(huazheng@maths.hku.hk; cwwongab@hku.hk)*		
Teachers Involved	Dr Z Hua (1st sem), Mathematics Dr C W Wong (2nd sem), Mathematics		
Course Objectives	Students of this course will learn the theory of multivariable calculus and learn how to apply the theory to solve practical problems. This is a required course for students majoring in Mathematics or Mathematics/Physics, and is suitable for all students majoring in sciences, engineering, economics and finance and other students who will use multivariable calculus in their area of study. Students who want to minor in Mathematics may take this course as one of the required courses. This course is a pre-requisite of many mathematics courses of more advanced level.		
Course Contents & Topics	- Vectors: vectors in 2-, 3-, and n-dimensions; dot product and cross product; lines and planes; polar, cylindrical, and spherical coordinates.		

	- Differentiation in several variables: limits and derivatives; the chain rule; directional derivatives and gradients. - Vector-valued functions: parametrized curves; arc-length; vector fields; gradient, divergence, curl, and the del operator. - Maxima and minima: differentials and Taylor's Theorem of several variables; extrema of functions; Lagrange multipliers; applications of extrema. - Multiple integration: double and triple integrals; change of variables; applications. - Line integrals: scalar and vector line integrals; Green's Theorem; conservative vector fields. - Surface integrals and vector analysis: parametrized surfaces; surface integrals; Stoke's and Gauss's Theorems.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand and demonstrate the basic theory of calculus of functions in several real variables CLO 2: evaluate partial derivatives and multiple integrals; compute line integrals and surface integrals CLO 3: apply the knowledge to solve some practical problems, such as constrained optimization problems and other problems involving differentiation and integration of multivariable functions
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1013 University mathematics II or MATH1821 Mathematical methods for actuarial science I or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics).
Offer in 2015 - 2016	Y 1st sem 2nd sem **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	Activities / Details / No. of Hours Lectures: 36 Tutorials: 12 Reading / Self study: 100
Assessment Methods and Weighting	Methods / Details / Weighting in final course grade (%) / Assessment Methods to CLO Mapping Assignments: 10, CLO 1,2,3 Examination: 50, CLO 1,2,3 Test: 40, CLO 1,2,3
Required/recommended reading and online materials	Susan J. Colley: Vector Calculus (Pearson, 2011, 4th edition)
Course Website	http://hkumath.hku.hk/course/MATH2211/
Additional Course Information	Students are assumed to have mastered calculus of one-variable prior to taking this course.

MATH2241 Introduction to mathematical analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr B Kane (1st sem); Prof N Mok (2nd sem), Mathematics *(bkane@maths.hku.hk; nmok@hku.hk)*		
Teachers Involved	Dr B Kane (1st sem), Mathematics Prof N Mok (2nd sem), Mathematics		
Course Objectives	To introduce students to the basic ideas and techniques of mathematical analysis.		
Course Contents & Topics	- The real number system: the real numbers as an ordered field, supremum and infimum, the completeness axiom, denseness of the rational numbers. - Sequences and series of real numbers: limits of sequences, properties of convergent sequences, monotone sequences and Cauchy sequences, subsequences, series, tests of convergence for series. - Continuity of real-valued functions: properties of continuous functions, the extreme value theorem, the intermediate value theorem, uniform continuity, limits of functions. - Differentiation: properties of differentiable functions, the mean value theorem, Taylor's theorem and its		

	applications. - Integration: construction of the Riemann integral using Darboux sums and Riemann sums, the fundamental theorem of calculus.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 comprehend and use abstract mathematical arguments such as the epsilon-delta argument CLO 2 demonstrate convergence or non-convergence of a sequence/series using properties of convergent sequences/series CLO 3 elucidate important properties of continuous functions such as the extreme value theorem and the intermediate value theorem CLO 4 articulate the construction of the Riemann integral and its relation to differentiation
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics) or MATH2822 Mathematical methods for actuarial science II. Students are strongly recommended to have taken MATH2012 Fundamental concepts of mathematics if they wish to take this course.
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate a thorough mastery of the mathematical notions and proof techniques taught in the course by being able to handle abstract mathematical arguments, to apply appropriate theorems correctly, and to make use of those proof techniques in novel situations. Ability to present solutions clearly and logically, and the use of innovative ideas in solving problems are expected. **B** Demonstrate a substantial command of the mathematical notions and proof techniques taught in the course by being able to handle abstract mathematical arguments, to apply appropriate theorems correctly, and, with guidance, to make use of those proof techniques in novel situations. Ability to present solutions clearly and logically, and evidence of innovative ideas in solving problems are expected. **C** Demonstrate a good understanding of the mathematical notions and proof techniques taught in the course by being able to handle abstract mathematical arguments and to apply appropriate theorems correctly. Ability to present solutions clearly and logically is expected. **D** Demonstrate some understanding of the mathematical notions taught in the course by being able to correctly identify appropriate theorems for applications and to carry out logical arguments that are leading to complete solutions. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems for applications, or not being able to apply the theorems correctly.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see table below

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Tutorials and Assignments	10	CLO 1,2,3,4
Examination		50	CLO 1,2,3,4
Test		40	CLO 1,2,3,4

Required/recommended reading and online materials	Robert G. Bartle, Donald R. Sherbert: Introduction to Real Analysis (Wiley, 2011, Fourth Edition) Kenneth A. Ross: Elementary Analysis: The Theory of Calculus (Springer, 2013, Second Edition)
Course Website	http://hkumath.hku.hk/course/MATH2241/

MATH2822 Mathematical methods for actuarial science II (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J T Chan, Mathematics *(jtchan@hku.hk)*		
Teachers Involved	Dr J T Chan, Mathematics		
Course Objectives	This course is the second of the two mathematics courses designed to provide actuarial science students with a solid background of calculus of one and several variables and an introduction to linear algebra. The course focuses on multivariable calculus and linear algebra. It aims at students with MATH1821. It can be followed by other 2000 or 3000 level mathematics courses.		
Course Contents & Topics	- Matrices, systems of linear equations, determinants. - Eigenvalues and eigenvectors, diagonalization of matrices. - Quadratic functions and their standard forms. - Vector spaces and subspaces. - Functions of several variables; partial differentiation. - Gradients and directional derivatives. - Taylor approximation, Newton's method. - Maxima and minima; Lagrange multipliers. - Double and triple integrals, areas and volumes.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	understand and recognize various topics in linear algebra such as the basic arithmetic of matrices, determinants, systems of linear equations, eigenvalues and eigenvectors, diagonalizable matrices, basis and dimension, and the rank-nullity theorem
	CLO 2	understand and recognize various topics in functions of several variables including partial differentiation, the Hessian test for local extrema, vector-valued functions, Jacobians, the method of Lagrange multipliers, double/triple integrals and the change of variable formula

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1821 Mathematical methods for actuarial science I. For BSc(ActuarSc) students only.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2
Test	2 tests	50	CLO 1,2

Required/recommended reading and online materials	George B. Thomas; as revised by Maurice D. Weir and Joel Hass: Thomas' Calculus (Addison Wesley, 12th edition) Steven J. Leon: Linear Algebra with Applications (Pearson Prentice Hall)
Course Website	http://hkumath.hku.hk/course/MATH2822/

MATH3001 Development of mathematical ideas (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	To acquaint the students with the origin and growth of basic mathematical concepts. To assist the students to gain a deeper insight and broader view of mathematics as a discipline and human endeavour. To provide the students with an opportunity to write on and talk about mathematics, and to engage in independent study.		
Course Contents & Topics	- Selected topics in the development of mathematics from ancient to modern times depending on interest of the students and the lecturer, with attention paid to the evolvement of mathematical ideas and the process of mathematical thinking and problem solving.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand and describe the origin and development of basic mathematical concepts
CLO 2	recognize and demonstrate the intellectual and the socio-cultural aspects of mathematics, and appreciate mathematics as both an academic discipline and a human endeavour
CLO 3	discuss, argue, and write about the development of various mathematical concepts and ideas
CLO 4	engage in independent study on a topic about the history or development of mathematics

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		

Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Critical use of information from sources to draw appropriate and insightful conclusions. Actively engage in and contribute substantially and fruitfully to class discussions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Correct use of information from sources to draw appropriate conclusions. Good participation in class discussions with generally good contributions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Mostly correct but some erroneous use of information from sources to draw appropriate conclusions. Make some but not substantial fruitful contributions to class discussions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Limited ability to use information from sources to draw appropriate conclusions. Contribute only in a limited way to fruitful and meaningful class discussions. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Misuse of information from sources and/or unable to draw appropriate conclusions. Make little or no meaningful contributions to class discussions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	Activities / Details / No. of Hours: Lectures — 36 Tutorials — 12 Reading / Self study — 100
Assessment Methods and Weighting	Methods / Details / Weighting in final course grade (%) / Assessment Methods to CLO Mapping: Examination — 50 — CLO 1,2,3,4 Test — 50 — CLO 1,2,3,4
Required/recommended reading and online materials	To be decided by the course instructor. H. Eves and C.V. Newsom: An Introduction to the Foundations and Fundamental Concepts of Mathematics (Holt, Reinhart and Winston, 1958; 1990, 3rd edition) G. Polya: How to Solve It (Princeton University Press, 1971, 2nd edition) R. Laubenbacher and D. Pengelley: Mathematical Expeditions (Springer-Verlag, 1999) R. Calinger (ed.): Classic of Mathematics (Prentice Hall, preprinted 1995) C. Boyer: A History of Mathematics (Wiley, 1968; 1989, 2nd edition (with V.C. Merzbach)) V. Katz: A History of Mathematics (Harper Collins, 1993)

MATH3002 Mathematics seminar (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	12
Course Co-ordinator	Prof T W Ng, Mathematics *(ntw@maths.hku.hk)*		
Teachers Involved	Prof T W Ng, Mathematics Prof W S Cheung, Mathematics		
Course Objectives	This is a seminar style course intended for those who have very strong interests and good ability in mathematics. Students will be given book chapters and elementary research articles for private study and then make presentations in front of the whole class. Individual meetings with the instructors will be arranged prior to their presentations. Active participation in all the discussions is expected. The aim of the course is to let students learn how to initiate self/independent study in mathematics.		
Course Contents & Topics	Topics chosen by the instructors, including chapters from books and elementary research articles.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — Initiate private independent study on some interesting mathematical topics		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2012 Fundamental concepts of mathematics, MATH2101 Linear algebra I, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis. (This course is for second year BSc students only.)		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Actively engage in and contribute substantially and fruitfully to class discussions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Good participation in class discussions with generally good contributions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Make some but not substantial fruitful contributions to class discussions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Contribute only in a limited way to fruitful and meaningful class discussions. Apply limited or barely effective organizational and presentational skills.		

	Fail — Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Make little or no meaningful contributions to class discussions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course
Course Teaching & Learning Activities	
Assessment Methods and Weighting	
Additional Course Information	Enrollment needs instructors' approval. This course is for second year BSc students only.

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Meeting with supervisor	meeting of the whole class for two hours each teaching week	24
Reading / Self study	individual meetings with the instructors	24

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Research report	written examination (30%), coursework (70%)	100	CLO 1

MATH3301 Algebra I (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Y K Lau, Mathematics *(yklau@maths.hku.hk)*		
Teachers Involved	Dr Y K Lau, Mathematics		
Course Objectives	This course aims to present those fundamental topics and techniques of algebra that are finding wide applications in mathematics and the applied sciences. It is complete in itself, and may also be followed by MATH4302 Algebra II and MATH7502 Topics in Applied Discrete Mathematics.		
Course Contents & Topics	- Groups: examples of groups, subgroups, cosets, Lagrange theorem, quotient groups, normal subgroups, group homomorphisms, direct product of groups, group actions. - Rings: examples of rings, integral domains, ideals, fields of fractions, principal ideal domains, unique factorization domains. - Fields: definition and examples of fields. - Polynomials: polynomial rings in one variable over fields and over the integers.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			
Course Type	Lecture-based course		
Course Teaching & Learning Activities			
Assessment Methods and Weighting			

Course Learning Outcomes:

CLO 1	write down the precise definitions of the basic concepts in the "Course Conents"
CLO 2	give examples for each of the concepts in the "Course Conents"
CLO 3	understand basic properties of groups, rings, and fields

Grade Descriptors:

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3
Examination		50	CLO 1,2,3

	Test		40	CLO 1,2,3

Required/recommended reading and online materials	To be decided by the course instructor. S. Lang: Undergraduate Algebra (Springer, 2004) J.B. Fraleigh: A First Course in Abstract Algebra (Addison-Wesley, 1989, 4th edition) I.N. Herstein: Abstract Algebra (Prentice-Hall, 1996) T.W. Hungerford: Abstract Algebra: An Introduction (Saunders College Publishing, 1990, 2nd edition)
Course Website	http://hkumath.hku.hk/course/MATH3301/

MATH3303 Matrix theory and its applications (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr M Young, Mathematics *(myoung@maths.hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	Matrix theory has a close connection with other mathematical subjects such as linear algebra, functional analysis, and combinatorics. It also plays an important role in the development of many subjects in science, engineering, and social sciences. In this course, students will be taught the fundamentals of matrix analysis and its application to various kinds of practical problems. Mathematical software may be used in the course, so that students can learn how to use the computer to solve matrix problems.		
Course Contents & Topics	- Eigenvalues and eigenvectors: similarities, applications on difference equations and differential equations. - Orthogonality: inner products and the induced norms, orthogonality of null spaces and column spaces, applications to over- or under-determined systems, least squares fit. Unitary, normal, and hermitian matrices: Schur's triangularization theorem. Variational description of eigenvalues: applications in optimization and in eigenvalue estimation. - Singular value decomposition: polar decomposition, pseudo inverse, spectral norm of matrices, interlacing inequalities for singular values. Jordan form and applications.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	have a good understanding on matrices, determinants, linear transformations, eigenvalues and eigenvectors
CLO 2	understand the concept of similar matrices and the eigenvalue decomposition
CLO 3	understand the concept of orthogonality
CLO 4	understand the concept of unitary, normal, and Hermitian matrices
CLO 5	find the singular value decomposition of a matrix and apply the theory of singular values to study polar decomposition, pseudo inverse and spectral norm of matrices
CLO 6	understand the concept of the Jordan blocks, Jordan matrices and the Jordan canonical form of a matrix

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I and MATH2102 Linear algebra II.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequecies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3,4,5,6
Test		50	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Jack L. Goldberg: Matrix Theory with Applications (McGraw-Hill, 1991) Steven J. Leon: Linear Algebra with Applications (Macmillan, 1994, 4th edition) Chris Rorres & Howard Anton: Applications of Linear Algebra (Wiley, 1984, 3rd edition) Roger A. Horn & Charles R. Johnson: Matrix Analysis (Cambridge University Press, 1987) The Mathworks, Inc.: The Student Edition of Matlab (Version 4 for Microsoft Windows) (Prentice - Hall, 1995)

MATH3304 Introduction to number theory (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof K M Tsang, Mathematics *(kmtsang@maths.hku.hk)*		
Teachers Involved	Prof K M Tsang, Mathematics		
Course Objectives	To provide students with basic concepts about numbers, their properties and the arithmetic of congruences. The prime numbers are the basic building blocks of all the natural numbers under multiplication. The interplay between the multiplicative and additive properties of prime numbers is particularly interesting. The course will study further properties and the distribution of the prime numbers, and some of the longstanding open problems concerning them. Important applications of number theory to modern cryptography will also be introduced.		
Course Contents & Topics	- The course will begin with some basic notions in number theory, including divisibility, greatest common divisor, Euclidean algorithm, congruences, etc. It will then be followed by several fundamental theorems, such as Chinese remainder theorem, solutions of linear and polynomial congruences, Fermat's Little theorem, quadratic residues and the quadratic reciprocity law. - Many well-known folklore open problems will also be introduced. Application of number theory to public key cryptography will be explained. Basic properties and some research on the prime numbers will be discussed. - Depending on the time remaining, the course will cover a selection of further topics, such as the prime number theorem, sum of squares, Dirichlet's theorem on diophantine approximations, etc.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 solve a system of linear congruences CLO 2 solve polynomial congruences CLO 3 determine the solubility of quadratic congruences by computation of Legendre symbols CLO 4 determine the existence of primitive roots and use them in solving some exponential congruences CLO 5 understand the prime number theorem CLO 6 understanding some longstanding problems in number theory		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate a thorough and coherent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing number theoretic problems, clearly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing number theoretic problems, but with some minor errors/inadequacies in arguments and being able to present coherent logical reasoning and carry out computations carefully without major errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with weak and fragmentary argument and presentation, or with moderate computational errors.
D	Demonstrate some superficial understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation, or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding of the key concepts and ideas by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5,6
Examination		50	CLO 1,2,3,4,5,6
Test		30	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	David M. Burton: Elementary Number Theory (McGraw-Hill Higher Education, International Edition). T.M. Apostol: Introduction to Analytic Number Theory (Springer International Student Edition). A. Baker: A Concise Introduction to the Theory of Numbers (Cambridge University Press, Cambridge).
Course Website	http://hkumath.hku.hk/course/MATH3304/

MATH3401 Analysis I (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W S Cheung, Mathematics *(wscheung@maths.hku.hk)*		
Teachers Involved	Prof W S Cheung, Mathematics		
Course Objectives	This course extends to more general situations some basic results covered in Calculus and introduces some fundamental concepts which are essential for advanced studies in mathematical analysis.		
Course Contents & Topics	- Basic properties of metric spaces; openness; closedness; interior point; adherent point; accumulation point; boundary point; compactness; completeness; continuity; connectedness; pathwise connectedness; uniform continuity; uniform convergence; Banach's fixed point theorem.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2211 Multivariable calculus.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			
Course Type	Lecture-based course		
Course Teaching & Learning Activities			
Assessment Methods and Weighting			
Required/recommended reading and online materials	Apostol: Mathematical Analysis Rudin: Principles of Mathematical Analysis		
Course Website	http://hkumath.hku.hk/course/MATH3401/		

Course Learning Outcomes:

CLO 1	demonstrate knowledge and understanding of the basic features of mathematical analysis and point set topology (e.g., able to identify objects that are topological equivalent)
CLO 2	apply knowledge and skills acquired in mathematical analysis to analyze and handle novel situations in a critical way (e.g., able to determine whether a specific function is uniformly continuous)
CLO 3	think creatively and laterally to generate innovative examples and solutions to non-standard problems (e.g., able to provide counterexamples to inaccurate mathematical statements)

Grade Descriptors:

A	Demonstrate a thorough understanding of all concepts and ideas by being able to draw complex connections among various concepts and apply the theorems through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, reasoning, identifying the appropriate theorems, applications, or presentation.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with acceptable argument and presentation.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Teaching & Learning Activities:

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

MATH3403 Functions of a complex variable (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof T W Ng, Mathematics *(ntw@maths.hku.hk)*		
Teachers Involved	Prof T W Ng, Mathematics		
Course Objectives	This course is indispensable for studies in higher mathematical analysis and the more theoretical aspects of physics. In this course, the students are introduced to the fundamental concepts and properties of		

	analytic functions and are shown how to look at analyticity from different points of view. At the same time, the techniques of solving problems without losing sight of the geometric picture are emphasized.
Course Contents & Topics	- Complex number system. - Analytic functions and elementary functions. - The Cauchy-Riemann equations. - Cauchy's theorem and its applications. - Taylor's series. - Laurent's series. - Zeros, singularities and poles. - The Residue Theorem and its applications.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 recognize the theory of functions of a complex variable as a rigorous and foundational subject in mathematics CLO 2 grasp the techniques from Cauchy-Riemann equations, power series expansion and Cauchy integral formulas to study analytic functions from different perspectives CLO 3 compute contour integrals by calculating residues CLO 4 apply such techniques to determine improper integrals such as those for certain rational functions on the real line
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis.
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	(see table below)
Assessment Methods and Weighting	(see table below)
Required/recommended reading and online materials	E.C. Titchmarsh: The Theory of Functions (OUP) L.V. Ahlfors: Complex Analysis (McGraw-Hill, 3rd edition) J. Bak & D.J. Newman: Complex Analysis, Undergraduate Texts in Mathematics (Springer-Verlag) K. Kodaira: Introduction to Complex Analysis (Cambridge)
Course Website	http://hkumath.hku.hk/course/MATH3403/

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

MATH3405 Differential equations (6 credits)		**Academic Year**	2015
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr C W Wong, Mathematics *(cwwongab@hku.hk)*		
Teachers Involved	Dr C W Wong, Mathematics		
Course Objectives	The standard topics in the wide field of ordinary differential equations (ODEs) included in this course are of importance to students of sciences and engineering. Our emphasis is on principles rather than routine calculations and our approach is a compromise between diversity and depth.		
Course Contents & Topics	- Review of elementary differential equations. - Existence and uniqueness theorems. - Second order differential equations, Wronskian, variation of parameters. - Power series method, Legendre polynomials, Bessel functions. - Linear systems, autonomous systems.		

	- Qualitative properties of solutions. - The Laplace transform.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: solve simple first order and second order (linear or nonlinear) ODEs by various techniques, including auxiliary equations, variation of parameters, Laplace transform, and series method CLO 2: solve systems of first order linear ODEs with constant coefficients, of which the number of equations and the number of unknown functions are no more than three CLO 3: discuss qualitatively the solutions of nonlinear ODEs or systems of nonlinear ODEs by studying their linear approximations or their phase diagrams CLO 4: apply the theory of differential equations to study quantitatively/qualitatively problems arising from physical and life sciences
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	R. Nagle, E. Staff and A. Snider: Fundamentals of Differential Equations and Boundary Value Problems (Pearson, 6th edition) W.E. Boyce and R.C. DiPrima: Elementary Differential Equations and Boundary Value Problems (John Wiley, 6th edition) E.A. Coddington: An Introduction to Ordinary Differential Equations (Prentice-Hall)
Course Website	http://hkumath.hku.hk/course/MATH3405/

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

MATH3408 Computational methods and differential equations with applications (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr C W Wong, Mathematics *(cwwongab@hku.hk)*		
Teachers Involved	Dr C W Wong, Mathematics Prof W K Ching, Mathematics		
Course Objectives	This course covers topics in the fields of differential equations and numerical analysis which are of importance to sciences students. The emphasis is practical applications of basic principles.		
Course Contents & Topics	- Numerical differentiation and integration. - Solution of nonlinear systems of equations. - Elementary differential equations. - Power series method. - Numerical solutions of ordinary and partial differential equations. - Numerical solutions of systems of first-order ordinary differential equations.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: construct and implement numerical methods for numerical integration and differentiation, and the solution of nonlinear system of equations		

	CLO 2 explain mathematical ideas of numerical methods in solving ordinary and partial differential equations CLO 3 construct one-step and linear multistep methods for the numerical solution of initial-value problems for ordinary differential equations and systems of such equations and analyze their stability and accuracy properties CLO 4 construct finite difference methods for the numerical solution of partial differential equations and analyze their stability and accuracy properties CLO 5 implement numerical methods for solving initial and boundary value problems by software packages like Scilab
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and computational methods and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and computational methods and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and computational methods or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and computational methods, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and computational methods, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and computational methods or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4,5
Test		50	CLO 1,2,3,4,5

Required/recommended reading and online materials	D.F. Parkhurst: Introduction to Applied Mathematics for Environmental Science (Springer) E.A. Coddington: An Introduction to Ordinary Differential Equations (Prentice-Hall) A. Ralston and P. Rabinowitz: A First Course in Numerical Analysis (McGraw-Hill)
Course Website	http://hkumath.hku.hk/course/MATH3408/

MATH3600 Discrete mathematics (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@maths.hku.hk)*		
Teachers Involved	Dr K H Law, Mathematics		
Course Objectives	To introduce students to the basic ideas and techniques of discrete mathematics.		
Course Contents & Topics	- Counting: combinations, permutations, pigeonhole principle, inclusion-exclusion, recurrence relations, and generating functions. - Graph theory: paths, circuits, trees, connectivity, planarity, etc. - Applications of counting techniques and graph theory.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge and understanding of the basic ideas and techniques of discrete mathematics CLO 2 solve various real-world problems by using counting techniques and graph theory CLO 3 develop their ability to read, comprehend, and create mathematical arguments		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH1013 University mathematics II and any 1 of Level 2 MATH courses) or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics and any 1 of level 2 MATH courses) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).		

Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	see below		

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	To be decided by the course instructor.
Course Website	http://hkumath.hku.hk/course/MATH3600/

MATH3601 Numerical analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Zhang, Mathematics *(zhangzw@maths.hku.hk)*		
Teachers Involved	Dr Z Zhang, Mathematics		
Course Objectives	This course covers both the theoretical and practical aspects of numerical analysis. Emphasis will be on basic principles and numerical methods of solution, using high speed computers.		
Course Contents & Topics	- Round off errors. - Polynomial interpolation. - Solution of equations of one variable. - Direct and iterative methods for solving linear systems. - Numerical differentiation and integration. - Simple initial value problems.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	construct and implement algorithms to find the zeros of functions, apply the bisection, Newton, secant and fixed point iteration methods
CLO 2	construct and implement Newton's method to find the roots of a system of nonlinear equations
CLO 3	construct interpolation polynomials in Lagrange, Newton, Hermit and spline forms
CLO 4	apply the basic numerical integration and differentiation methods
CLO 5	solve initial value problems using Taylor series and Runge-Kutta methods of varying orders
CLO 6	use software package such as Scilab to solve numerical problems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and methods by being able to identify the appropriate theorems/algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out numerical procedures carefully and correctly, and with some innovative approaches to solving problems. **B**		

		Demonstrate a good understanding of key concepts and methods by being able to identify the appropriate theorems/algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate algorithms or their applications or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and methods by being able to correctly identify appropriate theorems/algorithms, but with some inadequacies in applying the theorems/methods through incorrectly analysing problems with poor argument and presentation or with a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and methods by being able to correctly identify appropriate theorems/algorithms, but with substantial inadequacies in applying the theorems/methods through incorrectly analysing problems with poor argument and presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems/algorithms or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3,4,5,6
Test		50	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Instructor's Lecture Notes A. Ralston and P. Rabinowitz: A First Course in Numerical Analysis (McGraw-Hill) K. E. Atkinson: An Introduction to Numerical Analysis (Wiley, 1989)
Course Website	http://hkumath.hku.hk/course/MATH3601/

MATH3603 Probability theory (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Qu, Mathematics *(zhengqu@maths.hku.hk)*		
Teachers Involved	Dr Z Qu, Mathematics		
Course Objectives	The emphasis of this course will be on probability models and their applications. The primary aim is to elucidate the fundamental principles of probability theory through examples and to develop the ability of the students to apply what they have learned from this course to widely divergent concrete problems.		
Course Contents & Topics	- Basic probability theory and decision theory: discrete probability distributions, continuous probability distributions, conditional probability, expectation, variance, moment generating function, limit theorems, Bayes' Theorem, decision analysis, decision tree method. - Poisson process and reliability theory: exponential distribution, Markov property, Poisson process, concepts of reliability, components in series, components in parallel, maintenance models. - Markov chain theory: concepts of states and transition probability, irreducibility, stationary distribution, applications in marketing and genetic problems, branching process, other Markov models. - Inventory theory: concepts of EOQ, lead time effect, newsboy models, stochastic inventory systems.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand and recognize the fundamental principles of probability theory
CLO 2	explain the typical proofs and computational techniques in probability theory and apply them to concrete problems
CLO 3	demonstrate knowledge and understanding of various types of probability models

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**: Lectures — 36; Tutorials — 12; Reading / Self study — 100

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	S.M. Ross: Introduction to Probability Models (Academic Press, 2007, 9th ed.)
Course Website	http://hkumath.hku.hk/course/MATH3603/

MATH3901 Operations research I (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Qu, Mathematics *(zhengqu@maths.hku.hk)*		
Teachers Involved	Dr Z Qu, Mathematics		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of Linear Programming (LP) and its related topics in operations research. There is an equal emphasis on all three aspects of understanding, algorithms and applications. The course serves, together with a course on network models, as essential concept and background for more advanced studies in operations research.		
Course Contents & Topics	- Linear Programming. - Matrix Game. - Goal Programming.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2014 Multivariable calculus and linear algebra or MATH2101 Linear algebra I or MATH2102 Linear algebra II.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Course Learning Outcomes

CLO 1	understand the fundamental concept and approach of linear programming appropriate to the further study of operations research
CLO 2	demonstrate knowledge and understanding of the underlying techniques of the Simplex Method and its extensions such as the revised Simplex and dual Simplex algorithms
CLO 3	understand and apply the theory of LP duality such as in the theory and computations of matrix games

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	J.P. Ignizio and T.M. Cavalier: Linear Programming (Prentice-Hall International, 1994) J.P. Ignizio: Goal Programming and Extensions (Lexington Books, 1976) H.A. Taha: Operations Research (Prentice-Hall International, 7/e 2003) P.R. Thie: An Introduction to Linear Programming and Game Theory (Wiley 2/e 1988) W.L. Winston: Introduction to Mathematical Programming (Duxbury 4/e 2003)
Course Website	http://hkumath.hku.hk/course/MATH3901/

MATH3904 Introduction to optimization (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	Prof W Zang, Mathematics		
Course Objectives	This course introduces students to the theory and techniques of optimization, aiming at preparing them for further studies in operations research, mathematical economics and related subject areas.		
Course Contents & Topics	- Unconstrained and constrained optimization. - Necessary conditions and sufficient conditions for optimality, convexity, duality. - Algorithms and numerical examples.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: demonstrate knowledge and understanding of the basic theory and techniques of optimization CLO 2: solve various optimization problems encountered in practice CLO 3: understand the connection between the purely analytical character of an optimization problem and the behavior of algorithms for solving it		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	Lectures: 36 hours Tutorials: 12 hours Reading / Self study: 100 hours		
Assessment Methods and Weighting	Examination: 50% (CLO 1,2,3) Test: 50% (CLO 1,2,3)		
Required/recommended reading and online materials	Instructor's lecture notes		
Course Website	http://hkumath.hku.hk/course/MATH3904/		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

MATH3905 Queueing theory and simulation (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Zhang, Mathematics *(zhangzw@maths.hku.hk)*		
Teachers Involved	Dr Z Zhang, Mathematics		
Course Objectives	This course introduces students to the models and theory of queueing system, as well as the technique of simulation as a practical tool of analysis.		

Course Contents & Topics	- Markov, birth-and-death, and Poisson processes, exponential models. - Markovian queueing networks. Imbedded Markov-chain queueing models. - Simulation of queueing models and discrete-event systems.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the terminology and nomenclature appropriate to queueing theory CLO 2: demonstrate knowledge and understanding of various queueing models CLO 3: formulate concrete problems using queueing theoretical approaches CLO 4: become familiar with fundamental principles of simulation and compare different simulation techniques
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

Required/recommended reading and online materials	R.B. Cooper: Introduction to Queueing Theory (Edward Arnold, 1981, 2nd ed.) S.M. Ross: Introduction to Probability Models (Academic Press, 1993, 5th ed.) S.M. Ross: A Course in Simulation (Macmillan, 1991)
Course Website	http://hkumath.hku.hk/course/MATH3905/

MATH3906 Financial calculus (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr S P Yung, Mathematics *(spyung@hku.hk)*		
Teachers Involved	Dr S P Yung, Mathematics		
Course Objectives	This course gives an elementary treatment for the modeling of financial derivatives, asset pricing and market risks from an applied mathematician's point of view. Stochastic calculus and solution methods will be introduced.		
Course Contents & Topics	- An introduction to financial instruments: stocks, bonds, foreign exchange, options, forward and future contracts. - Asset pricing: risk neutral relationship, no arbitrage principle. Brownian motion, stochastic calculus, Ito's Lemma, Black-Scholes model and its pricing partial differential equation. - Variations on the Black-Scholes model: American options, path dependent options. Binomial tree Models.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the terminology and nature of bonds, interest rates, forwards, futures, stocks, options, and the no-arbitrage-principle CLO 2: demonstrate knowledge on using binomial tree models to find option prices via the risk-neutral concept CLO 3: describe basic properties of a Brownian motion and the Black-Scholes stock price model CLO 4:		

	implement stochastic calculus (such as Ito's Lemma) to derive Black-Scholes pricing partial differential equation on various type of options; and find a solution to this partial differential equation
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II) or STAT2601 Probability and statistics I.
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

Required/recommended reading and online materials	A. Etheridge: A Course in Financial Calculus (Cambridge University Press) M. Baxter and A. Rennie: Financial Calculus: An Introduction to Derivative Pricing (Cambridge University Press, 1996) P. Wilmott, S. Howison, J. Dewynne: The Mathematics of Financial Derivatives (Cambridge University Press, 1995) R. Jarrow and S. Turnbull: Derivative Securities (South-Western College Publishing, 1994)
Course Website	http://hkumath.hku.hk/course/MATH3906/

MATH3911 Game theory and strategy (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@maths.hku.hk)*		
Teachers Involved	Dr K H Law, Mathematics		
Course Objectives	Game theory is the logical analysis of situations of conflict and cooperation. This course will introduce the students to the basic ideas and techniques of mathematical game theory in an interdisciplinary context.		
Course Contents & Topics	- Combinatorial games and Zermelo's Theorem; Prisonner's Dilemma; pure and mixed strategies, minimax theorem; mixed Nash equilibria. - Application to biology: evolutionary stable strategies; games in coalition form; Shapley value. - Application to politics: Shapley-Shubik power index; core and von Neumann-Morgenstern solution; bargaining set.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the basic terminology and solution concepts in game theory
CLO 2	compute explicitly different solution concepts for some simple cooperative and non-cooperative games
CLO 3	apply game theoretical ideas and methods to solve some problems in economics and biology

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II).		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**		

		Demonstrate an excellent understanding of key concepts and ideas of Game Theory by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
	B	Demonstrate a good understanding of key concepts and ideas of Game Theory by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and ideas of Game Theory by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas of Game Theory by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	assignments, tutorials, participation etc	5	CLO 1,2,3
Examination		50	CLO 1,2,3
Project reports		20	CLO 1,2,3
Test		25	CLO 1,2,3

Required/recommended reading and online materials	L.C. Thomas: Games, Theory and Applications (Dover Publications, 1993)
Course Website	http://hkumath.hku.hk/course/MATH3911/

MATH3943 Network models in operations research (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of network models in operations research. There is an equal emphasis on all three aspects of understanding, algorithms and applications. The course serves, together with a course on linear programming, to provide essential concept and background for more advanced studies in operations research.		
Course Contents & Topics	- Graphs and algorithms. - Trees, matchings and paths. - Network models of transportation and assignment problems. - Ford-Fulkerson network flow theory and computation for maximum flow and minimum cost flow algorithms. - Applications to combinatorial optimization problems such as allocation, location and sequencing. - Project networks, if time permits.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the fundamental concept and approach of graphs and network models appropriate to the further study of operations research
CLO 2	demonstrate knowledge and understanding of the underlying techniques of the various graph and network algorithms and their extensions
CLO 3	understand the theory of network flows and the duality aspects in such methods of flow computations

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH2014 Multivariable calculus and linear algebra); and Pass in MATH3901 Operations research I, or already enrolled in this course.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies

		in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials

M.S. Bazaraa, J.J. Jarvis and H.D. Sheral: Linear Programming and Network Flows. (2/e 1990)
R.K. Ahuja, T.L. Magnanti and J.L. Orlin: Network Flows: Theory Algorithms, and Applications. (1993)
H.A. Taha: Operations Research: an Introduction. (7/e 2003)

MATH3999 Directed studies in mathematics (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	All teaching staff, Mathematics		
Course Objectives	This course is designed for students who would like to have early experiences on research related independent studies.		
Course Contents & Topics	The subject matter of the project will be determined by consultation between the student and the supervisor. The student must achieve good standing and get the approval from both the prospective supervisor and the course coordinator to take this course.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors, in addition to a pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Project-based course		

Course Learning Outcomes:

CLO 1	study independently a topic that is not available in the regular curriculum
CLO 2	understand how mathematical theories are applied and/or extended in problem-solving
CLO 3	gain experience in project writing and oral presentation

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical evaluation of information drawn from a broad range of high quality sources and to reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Reading / Self study	independent work & to attend meetings & seminars	100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Dissertation	Written report plus oral presentation	100	CLO 1,2,3

MATH4302 Algebra II (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof J H Lu, Mathematics *(jhlu@maths.hku.hk)*		
Teachers Involved	Prof J H Lu, Mathematics		
Course Objectives	This course is an extension of MATH3301 Algebra I and goes deeper into the various topics treated in that course. Together, the two courses are complete in themselves, and may be followed by MATH7501 Topics in Algebra and MATH7502 Topics in Applied Discrete Mathematics.		
Course Contents & Topics	- Structure theorem for finitely generated modules of principal ideal domains, with applications to finitely generated abelian groups and canonical forms of matrices; - Field extensions; elements of Galois theory.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the classification of finitely generated abelian groups and certain canonical forms of matrices CLO 2: understand and compute splitting fields of irreducible polynomials CLO 3: compute examples of Galois groups		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3301 Algebra I.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		
Course Website	http://hkumath.hku.hk/course/MATH4302/		

Grade Descriptors

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3
Examination		50	CLO 1,2,3
Test		40	CLO 1,2,3

Required/recommended reading and online materials

T.W. Hungerford: Abstract Algebra: An Introduction (Saunders College Publishing, 1990, 2nd ed.)
J.B. Fraleigh: A First Course in Abstract Algebra (Addison-Wesley, 1989, 4th ed.)
I.N. Herstein: Topics in Algebra (Wiley, 1975)
N. Jacobson: Basic Algebra (Freeman, 1974)
S. Lang: Undergraduate Algebra (Springer, 1996)

MATH4402 Analysis II (6 credits)		**Academic Year**	**2015**

Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr M Young, Mathematics *(myoung@maths.hku.hk)*		
Teachers Involved	Dr M Young, Mathematics		
Course Objectives	This course gives a comprehensive and rigorous treatment on calculus of several variables, and a modern treatment of integration theory in the language of differential forms which is essential for more advanced studies in analysis and geometry.		
Course Contents & Topics	- Differentiation of functions of several variables: partial derivatives, differential, differentiability, inverse function theorem, implicit function theorem, free extremum problems, constrained extremum problem, method of Lagrange multipliers. - Integration in R^n: Basic definitions, measure zero and content zero sets, integrability, Fubini's Theorem, partition of unity, change of variables. - Integration on chains: tensors, alternating tensors, vector fields, differential forms, Poincare Lemma, Stokes' Theorem.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate knowledge and understanding of the modern language of mathematical analysis and geometry (e.g., able to manipulate differential forms) CLO 2 apply knowledge and skills acquired in mathematical analysis to analyze and handle novel situations in a critical way (e.g., able to determine the differentiability and integrability of specific functions) CLO 3 think creatively and laterally to generate innovative solutions to novel problems (e.g., able to do integration of specific functions on chains)		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3401 Analysis I.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	Apostol: Mathematical Analysis Munkres: Analysis on Manifolds Rudin: Principles of Mathematical Analysis Spivak: Calculus on Manifolds
Course Website	http://hkumath.hku.hk/course/MATH4402/

MATH4404 Functional analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J T Chan, Mathematics *(jtchan@hku.hk)*		
Teachers Involved	Dr J T Chan, Mathematics		
Course Objectives	This course introduces students to the basic knowledge of linear functional analysis, an important branch of modern analysis.		
Course Contents & Topics	- Metric spaces: Open and closed sets. Convergent sequences. Completeness. - Normed spaces, Banach spaces: Finite dimensional normed spaces and subspaces. Compactness and		

	finite dimension. Bounded linear operators. Normed spaces of operators, dual space. - Inner product spaces, Hilbert spaces: Orthogonal complements, direct sums. Orthonormal sets and sequences, series related to orthonormal sets and sequences. Total orthonormal sets and sequences. Special polynomials. Riesz's representation theorem. Adjoint operator, self-adjoint, normal and unitary operators. - Fundamental theorems for normed and Banach spaces: Hahn-Banach theorem. Reflexive spaces. Category theorem, uniform boundedness principle. Open mapping theorem. Closed graph theorem. - Spectral theory of linear operators.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	compare and contrast (i) finite and infinite dimensional linear spaces, (ii) complete and incomplete linear space, and (iii) normed and inner product spaces; in particular, recognize the importance of completeness and discuss how vectors are represented in these spaces
CLO 2	understand the notions of Banach spaces and Hilbert Spaces. State and apply fundamental theorems in these spaces
CLO 3	discuss the dual spaces of some standard Banach spaces
CLO 4	discuss the boundedness of linear operators and the spectra of special linear operators
CLO 5	apply functional analysis to the study of differential equations and optimization problems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis and MATH3401 Analysis I.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4,5
Test		50	CLO 1,2,3,4,5

Required/recommended reading and online materials	Erwin Kreyszig: Introductory Functional Analysis with Applications (John-Wiley and Sons, 1978)
Course Website	http://hkumath.hku.hk/course/MATH4404/

MATH4406 Introduction to partial differential equations (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr H Y Zhang, Mathematics *(hyzhang@maths.hku.hk)*		
Teachers Involved	Dr H Y Zhang, Mathematics		
Course Objectives	This course introduces students to the basic techniques for solving partial differential equations as well as the underlying theories.		
Course Contents & Topics	- Laplace, heat and wave equations. Classification of partial differential equations. Boundary-value, initial-value and eigenvalue problems. Separation of variables, Fourier series, linearity and superposition, Duhamel's principle, characteristic method. - Green's function, generalized functions and fundamental solutions. - Maximum principle, existence, uniqueness and continuous dependence on data. - If time permits Cauchy-Kowalevski theorem, variational method, nonlinear partial differential equations.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1 apply the tools of calculus, linear algebra, mathematical analysis in a coherent way to PDE problems CLO 2 understand the basic theory of partial differential equations and the methods to solve them CLO 3 apply the knowledge of partial differential equations to physical sciences and engineering
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2241 Introduction to mathematical analysis; and Pass in MATH3405 Differential equations, or already enrolled in this course.
Offer in 2015 - 2016	Y 2nd sem **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	W.A. Strauss: Partial Differential Equations: An Introduction, 2nd ed. (Wiley) D. Bleecker & G. Scordas: Basic Partial Differential Equations (International Press) L.C. Evans: Partial Differential Equations (American Mathematical Society)
Course Website	http://hkumath.hku.hk/course/MATH4406/

MATH4501 Geometry (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J Fullwood, Mathematics *(fullwood@maths.hku.hk)*		
Teachers Involved	Dr J Fullwood, Mathematics		
Course Objectives	As geometric forms often appear in nature, the study of geometry helps us to understand better the universe in which we live. Moreover, geometry has much intrinsic beauty and the study of it is an excellent training in intuitive thinking. In this course we study the differential geometry of curves and surfaces in 3-space. In the study of regular surfaces in 3-space we exhibit geometric notions that are definable in terms of metrical properties of these surfaces alone, leading to the intrinsic geometry of surfaces.		
Course Contents & Topics	- Plane and space curves, regular surfaces in three-dimensional Euclidean space. - The Gauss map, Gaussian and mean curvatures, Gauss's Theorema Egregium, Gauss-Bonnet Theorem.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the fundamental theorems on curves CLO 2 compute the Gaussian and mean curvatures CLO 3 understand the basics of intrinsic geometry of surfaces		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I and MATH3401 Analysis I.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical		

		reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
	B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	M P Do Carmo: Differential Geometry of Curves and Surfaces (Prentice-Hall, 1976)
Course Website	http://hkumath.hku.hk/course/MATH4501/

MATH4511 Introduction to differentiable manifolds (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof J H Lu, Mathematics *(jhlu@maths.hku.hk)*		
Teachers Involved	Prof J H Lu, Mathematics		
Course Objectives	The course aims at introducing students to the notion of differentiable manifolds and basic concepts and tools for their study, such as differential forms, exterior differentiation and integration; vector fields, distributions, and integrability; and covariant differentiation through affine connections. The course also aims at presenting concrete examples that are relevant to further fields of study.		
Course Contents & Topics	- Review on functions of several variables, inverse mapping theorem, implicit function theorem. - Differentiable manifolds: definitions and examples. - Maps between manifolds, submanifolds. Differential forms and exterior differentiation. - Integration on manifolds. - The tangent bundle, distributions and Frobenius Theorem. - Further topics.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the basic language and concepts of modern differential geometry with examples CLO 2 apply the knowledge of algebra and analysis learned previously to solve geometric problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3401 Analysis I (having taken MATH4501 Geometry would be helpful; the course can also be taken concurrently with MATH4402 Analysis II).		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Examination</td><td></td><td>50</td><td>CLO 1,2</td></tr><tr><td>Test</td><td></td><td>50</td><td>CLO 1,2</td></tr></table>
Required/recommended reading and online materials	Dennis Barden and Charles B. Thomas: An Introduction to Differential Manifolds (Imperial College Press, 2003) W. Boothby: An introduction to differential manifolds and Riemannian Geometry (Academic Press, 2002, 2nd Ed.) John M. Lee: Introduction to smooth manifolds (Springer, 2002)
Course Website	http://hkumath.hku.hk/course/MATH4511/

MATH4602 Scientific computing (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This course introduces mathematical theories and computational techniques for solving various kinds of matrix computation problems that are often encountered in scientific or industrial applications.		
Course Contents & Topics	- Introduction to scientific computing, systems of linear equations, direct methods, matrix norms, von Neumann series, iterative methods, eigenvalues, power method, spectral radius, Schur's Theorem, Gershgorin's Theorem. - Some selected topics: multigrid methods, projection methods, recursion methods, fast Fourier transform, linear least squares, singular values, boundary value problems, partial differential equations, parallel computing, etc.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>apply direct method in solving a linear system</td></tr><tr><td>CLO 2</td><td>analyze the complexity of a numerical algorithm</td></tr><tr><td>CLO 3</td><td>give a proof for Schur's Theorem and Gershgorin's Theorem</td></tr><tr><td>CLO 4</td><td>apply iterative methods in solving a linear system</td></tr><tr><td>CLO 5</td><td>compute the singular values of a matrix</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3601 Numerical analysis.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and numerical algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.</td></tr><tr><td>**B**</td><td>Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and numerical algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and numerical algorithms or their applications and presentation or with some minor computational errors.</td></tr><tr><td>**C**</td><td>Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and numerical algorithms, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.</td></tr><tr><td>**D**</td><td>Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and numerical algorithms, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.</td></tr><tr><td>**Fail**</td><td>Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and numerical algorithms or their applications, or not being able to complete the solution.</td></tr></table>		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Examination</td><td></td><td>50</td><td>CLO 1,2,3,4,5</td></tr></table>		

	Test		50	CLO 1,2,3,4,5
Required/recommended reading and online materials	Michael T. Heath: Scientific Computing (McGraw Hill, 1997) Charles F. Van Loan: Introduction to Scientific Computing, Matlab Curriculum Series (Prentice Hall, 1997)			

MATH4902 Operations research II (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr G Han, Mathematics *(ghan@maths.hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of integer programming (IP), dynamic programming (DP) and Markov decision processes (MDP) in operations research. There is emphasis on aspects of algorithms as well as applications. The course serves, together with courses on linear programming and network models, to provide essential optimization concept and algorithms for more advanced studies in operations research.		
Course Contents & Topics	- Integer programming and heuristics. - Dynamic programming (deterministic/stochastic). - Markov decision process (discounted/average costs).		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the terminology and nomenclature appropriate to integer programming, dynamic programming and Markov decision process CLO 2: explain the typical techniques employed in integer programming, dynamic programming and Markov decision process CLO 3: demonstrate the knowledge on algorithms for a variety of problems in operations research		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus; and Pass in MATH3901 Operations research I, or already enrolled in this course.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials

S. Dreyfus and A. Law: The Art and Theory of Dynamic Programming (Academic Press, 1977)
P. Thie: Markov Decision Processes (COMAP, Inc. 1983)
G.L. Nemhauser and L.A. Wolsey: Integer and Combinatorial Optimization (Wiley, 1988)

MATH4907 Numerical methods for financial calculus (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	TBC, Mathematics *()*		
Teachers Involved	TBC, Mathematics		
Course Objectives			

	This course aims at providing effective numerical methods as well as their theoretical aspects for solving problems arisen from financial derivatives and asset pricing.
Course Contents & Topics	- Introduction to the mathematical theory of vanilla and exotic options, both the PDE and the Martingale approach. - Numerical methods for Black-Scholes pricing differential equations and their performance analyses. - Binomial tree methods, Monte Carlo simulations and their performance analyses.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	demonstrate knowledge and understanding of the martingale theory in option pricings as well as related financial derivatives
CLO 2	implement and analyse various numerical methods on the Black-Scholes pricing differential equation
CLO 3	understand the connection between the binomial tree method and the finite difference method of the Black-Scholes pricing differential equation
CLO 4	implement and analyse Monte Carlo simulation methods on the martingale pricing formula

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3906 Financial calculus or equivalent.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

Required/recommended reading and online materials	J. Strikwerda: Finite Difference Schemes and PDEs (Wadsworth & Brooks, 1989) Alison Etheridge: A Course in Financial Calculus (Cambridge University Press) Wilmott, Dewynne and Howison: Option Pricing: Mathematical Models and Computation (Latest Edition) (Oxford Financial Press) P. Glasserman: Monte Carlo Methods in Financial Engineering (Latest Edition) (Springer-Verlag)
Course Website	http://hkumath.hku.hk/course/MATH4907/

MATH4910 Senior mathematics seminar (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	12
Course Co-ordinator	Prof T W Ng, Mathematics *(ntw@maths.hku.hk)*		
Teachers Involved	Prof T W Ng, Mathematics Dr Y K Lau, Mathematics Dr B Kane, Mathematics		
Course Objectives	This seminar style capstone course aims to provide students the experience of intense reading of journal articles and book chapters, followed by group discussions through which knowledge acquisition and synthesis will be attained. Students will look at particular mathematical topics in depth, and will master the topics through reading, listening, discussing and writing.		
Course Contents & Topics	This seminar course may be in the form of research seminar, reading seminar, or a combination of both. Research seminar provides first-hand research experience to students, who will discuss the advancement of knowledge brought about by the readings, and the difficulties they encounter in the research process. Reading seminar involves discussions on arguments delivered by the authors of books or articles, and how convincing the arguments are. Participants will experience the process of argumentation in the construction		

	of knowledge and development of research idea. Student performance is manifested in their preparedness, quality of comments, responsiveness to comments and overall engagement in the seminar. The end product is a research paper or written report and oral presentations. Topics chosen by the instructors, including journal articles and book chapters.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: explain and discuss the contents of the topics they studied CLO 2: critique and argue about the ideas and theories of the work they studied CLO 3: organize and synthesize the material they have learned, and report orally and in writing using mathematical language
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors including MATH3301 Algebra I, MATH3401 Analysis I, and MATH3403 Functions of a complex variable. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	N — **Examination**: ---
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	

Grade	Descriptor
A	Demonstrate an excellent understanding of the material by lucid exposition. Engage constructively by providing insightful analyses and raising critical points in group discussion. Demonstrate clear and critical analysis, coherent synthesis, and effective application of the knowledge through writing and oral presentation using mathematical language.
B	Demonstrate a good understanding of the material by mostly clear and effective presentation. Engage actively in group discussion most of the time by providing helpful points and asking questions that advance the discussion. Demonstrate mostly clear and effective analysis, synthesis, and application of the knowledge through writing and oral presentation using mathematical language.
C	Demonstrate a general understanding of the material by moderately effective presentation. Engage in group discussion most of the time with some useful input. Demonstrate moderately clear and effective analysis, synthesis, and application of the knowledge through writing and oral presentation using mathematical language.
D	Demonstrate a basic but limited understanding of the material by partially effective presentation. Plays a passive role, or gives limited useful contribution to group discussion. Demonstrate limited or barely effective analysis, synthesis, and application of the knowledge through writing and oral presentation using mathematical language.
Fail	Demonstrate inadequate understanding of the material by barely effective or ineffective presentation. Little or no participation in and contribution to group discussion. Demonstrate inadequate or ineffective analysis, synthesis, and application of the knowledge through writing and oral presentation using mathematical language.

Course Type	Project-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Meeting with supervisor	Seminars: Students take turns to give presentations to the whole class; group discussions.	36
Reading / Self study	Reading material and preparation for presentations and discussions; writing of reports/research papers.	100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation	Coursework assessment: Based on class participation and group discussions.	20	CLO 1,2,3
Oral presentation	Seminar presentations by students	30	CLO 1,2,3
Research report	Written report / research paper: Individual and/or group reports/research papers totally no more than 10,000 words.	50	CLO 1,2,3

Required/recommended reading and online materials	TBC
Course Website	http://hkumath.hku.hk/course/MATH4910/

MATH4911 Mathematics capstone project (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr S P Yung, Mathematics *(spyung@hku.hk)*		
Teachers Involved	Dr S P Yung, Mathematics		
Course Objectives	This course aims to provide students an experience of engaging in a project which requires integration and/or application of the mathematical knowledge they have acquired.		
Course Contents & Topics	Students will work collaboratively in small groups on a project under the guidance of their supervisor(s). Emphasis of this capstone project is on the integration and/or application of mathematical knowledge		

	acquired by the students. The project topic is not limited to academic context, but can also be extended to a community or corporate outreach project. Projects may take the form of a combination of literature research, survey, data analysis, creation of artifacts or media contents, exhibition, public lectures, development of solution plan for the problem under study, etc. Assessment may take the form of written report, oral presentation, media production, portfolio, and/or peer evaluation, etc. Topics are either chosen by the supervisor(s), or proposed by the students and approved by their supervisor(s).
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 integrate and apply mathematical knowledge they have previously acquired CLO 2 work collaboratively with others CLO 3 communicate their project topic to experts and/or lay audiences through suitable media using appropriate mathematical terms and language
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. (This course is for third and fourth year students only. The earliest that a student is allowed to take this capstone course is their year 3 study.)
Offer in 2015 - 2016	N — **Examination** ---
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate excellent and creative integration and/or application of the mathematical knowledge previously acquired. Take initiative in, and collaborate highly effectively on, the project. Communicate effectively through suitable media using appropriate mathematical terms and language. **B** Demonstrate good integration and/or application of the mathematical knowledge previously acquired. Participate actively in, and collaborate mostly effectively on, the project. Communicate mostly effectively through suitable media using appropriate mathematical terms and language. **C** Demonstrate a general level of integration and/or application of the mathematical knowledge previously acquired. Demonstrate moderately effective collaboration on the project. Moderately effective communication using mathematical terms and language. **D** Demonstrate some partial integration and/or application of the mathematical knowledge previously acquired. Demonstrate barely effective collaboration on the project. Show limited ability to effectively communicate using mathematical terms and language. **Fail** Demonstrate weak or poor integration and/or application of the mathematical knowledge previously acquired. Show passive participation in, and ineffective collaboration on, the project. Communicate ineffectively using mathematical terms and language.
Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Meeting with supervisor	Students meet with their supervisor(s) to present results or to discuss their progress.	20
Assessment	Project work: Students work on their project	130

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Dissertation	Coursework assessment: Based on participation and collaboration throughout the whole project.	20	CLO 1,2,3
Oral presentation	Oral presentation components of the project may include seminars, lectures, oral reports, audio recordings, etc.	30	CLO 1,2,3
Research report	Written report / media production: This part may include written reports, booklets, exhibition materials, video productions, computer software, etc.	50	CLO 1,2,3

Required/recommended reading and online materials	TBC
Course Website	http://hkumath.hku.hk/course/MATH4911/

MATH4966 Mathematics internship (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof T W Ng, Mathematics *(ntw@maths.hku.hk)*		
Teachers Involved	All teaching staff, Mathematics		
Course Objectives	This course aims to offer students the opportunities to gain work experience in the industry related to their major of study. The workplace learning experience would be of great benefits to the students to apply their		

	knowledge gained in the study to the real work environments. Students have to take on at least 160 hours of internship work either within the University or outside the University arranged by the department.
Course Contents & Topics	Within the university: each student will be supervised by a staff member (supervisor), working on a project or various tasks as instructed by the supervisor. Outside the university: each student will carry out approved work under the guidance and supervision of an external supervisor.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain work experience in an industry related to mathematical sciences CLO 2 have an understanding of how mathematics is used to solve real-world problems
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	Pass/Fail
Grade Descriptors	**Pass**: Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail**: Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.
Course Type	Internship
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Internship work / it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time) / 160
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Written report / written report, employer's feedback and oral presentation / 100 / CLO 1,2
Additional Course Information	Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

MATH4999 Mathematics project (12 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	All teaching staff, Mathematics		
Course Objectives	The aim of the course is to provide students with the opportunity to formulate and to investigate, in depth, problems of practical interest and/or to have a foretaste of mathematical research. The work, to be done on an individual basis, is considered a highly desirable part of the training of a mathematician.		
Course Contents & Topics	The subject matter of the project will be determined by consultation between the student and his/her supervisor. The projects will be selected from areas of pure and applied mathematics. Students must achieve good standing and get the approval from both the prospective supervisor and the course co-ordinator to take this course.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 study independently and in depth an advanced topic that is not available in the regular curriculum CLO 2 analyze and synthesize information gathered from different sources CLO 3 articulate their findings and conclusions CLO 4 give an exposition of their work in a written report		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) in the Mathematics, and Mathematics/Physics Majors including MATH3301 Algebra I, MATH3401 Analysis I, and MATH3403 Functions of a complex variable. Subject to approval by the Department. This capstone course is for Mathematics, and Mathematics/Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam

Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical evaluation of information drawn from a broad range of high quality sources and to reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Reading / Self study / independent work & to attend meetings & seminars / 240
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Dissertation / Written report plus oral presentation / 100 / CLO 1,2,3,4

MATH7101 Intermediate complex analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof N Mok, Mathematics *(nmok@hku.hk)*		
Teachers Involved	Prof N Mok, Mathematics		
Course Objectives	The objective is to familiarize students with analytic, algebraic and geometric concepts and techniques in the study of Complex Analysis in a single variable beyond an introductory course on functions of a complex variable.		
Course Contents & Topics	- In the course we study meromorphic functions on compact Riemann surfaces and on open Riemann surfaces using analytic and algebraic techniques. Topics on meromorphic functions include the constructions of meromorphic functions on compact Riemann surfaces, elliptic functions, Poincare series, the Mittag-Leffler Problem and the Weierstrass Problem on compact Riemann surfaces and on open Riemann surfaces. - In the course of study of meromorphic functions, sheaf cohomology theory and cohomology theories in terms of differential forms will be introduced. - A choice of other topics will be included. Examples of possible topics include normal families, the Riemann Mapping Theorem, geometric theory of holomorphic mappings, potential theory in one complex variable, complex dynamics, and special functions.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 deal with rational functions on the Riemann Sphere and deal with elliptic functions, equivalently meromorphic functions on elliptic curves CLO 2 formulate various classical existence problems on meromorphic functions and reduce them to analytic or cohomological problems, being able to solve them in certain typical cases CLO 3 identify the key arguments in the proofs of various mathematical results concerning meromorphic functions on compact Riemann surfaces or on plain domains CLO 4 identify the key elements in the theoretic foundation of various additional topics covered in the course and to make use of them in solving problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in a first course in Complex Analysis such as MATH3403 Functions of a complex variable, and approval by the course coordinator.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.		

	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

Required/recommended reading and online materials

R. Narasimhan: Complex Analysis in One Variable (Birkhauser, 2001, 2nd edition)
O. Forster: Lectures on Riemann Surfaces (Springer-Verlag, 1981)
J.B. Conway: Functions of One Complex Variable I (Springer-Verlag, 1995)
K. Chandrasekharan: Elliptic Functions (Springer-Verlag, 1985)

MATH7201 Topics in geometry (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This course introduces to students a main area of differential geometry beyond the notion of manifolds and the calculus of differential forms and prepares them to study further and to do research in geometry.		
Course Contents & Topics	- The topic varies according to the year and the instructor. For example, it can be one of (but not restricted to) the following: (i) Riemannian geometry: affine and Levi-Civita connection, Riemann curvature tensor, spinor bundles, Laplace and Dirac operators, harmonic forms and spinors, applications in relativity; (ii) Symplectic geometry: symplectic vector spaces, symplectic manifolds, Lagrangian submanifolds, Hamiltonian group actions, moment maps, symplectic quotients, convexity theorems, localization; (iii) Vector bundles: vector bundles, connection and curvature, characteristic forms and classes, superconnections, transgression, topological K-theory, introduction to index theory.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	have a working knowledge of the calculus of differential forms beyond the level of MATH3511
CLO 2	understand the keys points of the particular subject chosen and be ready to learn other topics in Geometry

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH4402 Analysis II or MATH4501 Geometry) and (MATH4511 Introduction to differentiable manifolds or the approval of the course coordinator).		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details		

		Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2
Examination		50	CLO 1,2

Required/recommended reading and online materials	TBC

MATH7202 Complex manifolds (6 credits)		**Academic Year**	2015
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof N Mok, Mathematics *(nmok@hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This course aims to present the foundation of the theory of complex manifolds and to introduce students to a variety of research topics, focusing on compact complex manifolds.		
Course Contents & Topics	- This course contains an introductory part on basic notions on complex manifolds including sheaf cohomology, cohomology theories in terms of differential forms, Hermitian and Kahler manifolds, and Hermitian holomorphic vector bundles. - It proceeds to introduce the theory of harmonic forms, establishing fundamental results on compact complex manifolds including Serre duality, the Kodaira Vanishing Theorem, the Kodaira Embedding Theorem and Hodge decomposition on compact Kahler manifolds. - The course concludes with a choice of topics on analytic and geometric aspects of the theory of complex manifolds. Examples of such topics include (i) Siegel's Theorem on the field of meromorphic functions on a compact complex manifold; (ii) geometry of compact quotients of bounded symmetric domains and Hermitian symmetric manifolds; (iii) an introduction to the deformation theory of compact complex submanifolds in a complex manifold; (iv) an introduction to the deformation theory of complex structures on a compact complex manifold.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: grasp the notion of holomorphic line bundles, understand various ways for establishing the existence of global holomorphic sections of line bundles, and to relate them to the embedding of compact complex manifolds CLO 2: grasp the relationship between sheaf cohomology, de Rham cohomology and d-bar cohomology, and make use of the relationship to solve various existence problems by means of vanishing theorems on harmonic forms CLO 3: grasp the basics of complex differential geometry such as notions of connections and curvature on Kahler manifolds and on Hermitian holomorphic vector bundles, and be able to relate various notions of positivity of curvature and apply them to vanishing and embedding theorems CLO 4: identify the key elements in the theoretic foundation of various additional topics covered in the course and to make use of them in solving problems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in a first course in Complex Analysis such as MATH3403 Functions of a complex variable, a first course in Differential Geometry such as MATH4501 Geometry, and approval by the course coordinator.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

Required/recommended reading and online materials	P. Griffiths & J. Harris: Principles of Algebraic Geometry, Pure and Applied Mathematics (Wiley-Interscience Publishers, New York 1978) K. Kodaira: Complex Manifolds and Deformation of Complex Structures (Grundlehren der mathematischen Wissenschaften 283, Springer-Verlag, Berlin-Heidelberg 1986) N. Mok: Metric Rigidity Theorems on Hermitian Locally Symmetric Manifolds (World Scientific, Singapore-New Jersey 1989)

MATH7217 Topics in financial mathematics (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J Song, Mathematics *(txjsong@hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This course aims at introducing students to fundamental knowledge in financial mathematics and risk management. It can help preparing students to research or take more advanced courses in those directions.		
Course Contents & Topics	- Investment models and portfolio theory. - Interest rate modeling. - Mathematics of financial derivatives, pricing and hedging. - Estimation and modeling of volatilities. - Risk measures and risk management.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand and be able to utilize various models and results in investment and interest rate CLO 2: grasp the methodology in derivative pricings and the modeling of volatilities CLO 3: understand and be able to utilize the concept of risk measures and risk management, subject to the topics chosen that year		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in an advanced level mathematics courses (MATH3XXX, MATH4XXX, or MATH7XXX) and subject to the approval of the course coordinator.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	Lectures: 36 hours Reading / Self study: 100 hours		
Assessment Methods and Weighting	Assignments: 50% (CLO 1,2,3) Examination: 50% (CLO 1,2,3)		
Required/recommended reading and online materials	TBC		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2,3
Examination		50	CLO 1,2,3

MATH7219 Topics in applied functional analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr S P Yung, Mathematics *(spyung@hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This is a graduate to advanced undergraduate university level course on applied functional analysis, which aims at introducing to students the basic knowledge of using functional analysis on various applied topics in		

	mathematics. This course would lay a foundation for students in studying more advanced mathematical courses.
Course Contents & Topics	- Generalized functions (also called distributions), delta function, generalized Fourier Transform. Applications to differential equations, Fundamental solution, Green's function. - Sobolev spaces, Sobolev Embedding Theorem, Trace. - Hilbert space linear operator theory (bounded operators, compact operators, closed unbounded operators), spectral theory. Applications to differential equations (infinitesimal generator, semigroup of linear operators). - Applications to optimization problems. Wherever needed, we shall also review techniques for Metric spaces (Category Theorem), Banach spaces (Hahn-Banach Theorem, Opening Mapping Theorem, Closed Graph Theorem and Uniform Boundedness Principle) and Hilbert spaces (Orthogonality and best approximation, Fourier isometry).
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 apply generalized functions and their Fourier transform to practical problems CLO 2 understand Sobolev spaces and how to apply them in the process of solving differential equations CLO 3 understand Hilbert space linear operator theory and apply it in solving differential equations CLO 4 apply these results to optimization problems
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3401 Analysis I and MATH4404 Functional analysis, or approval of the course coordinator.
Offer in 2015 - 2016	N — **Examination** ---
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	
Examination		50	

Required/recommended reading and online materials	TBC

MATH7224 Topics in advanced probability theory (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr G Han, Mathematics *(ghan@maths.hku.hk)*		
Teachers Involved	Dr G Han, Mathematics Dr J Song, Mathematics		
Course Objectives	This course aims at introducing fundamental knowledge in probability theory to graduate students and senior undergraduate students. It can help preparing these students for advanced research in probability theory and its wide-range applications.		
Course Contents & Topics	Measure theory, law of large numbers, central limit theorems, random walks, martingales, Markov chains, ergodic theorems, Brownian motion.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 demonstrate in-depth understanding of basic concepts and terminologies in probability theory CLO 2		

	understand and apply the fundamental theorems for further problem solving in theory or practice, the learning outcomes are subject to the topics chosen that year
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3603 Probability theory and MATH4402 Analysis II and approval of the course coordinator.
Offer in 2015 - 2016	Y 1st sem — **Examination**: Dec
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
	B: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail: Demonstrates poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		50	CLO 1,2
Examination		50	CLO 1,2

Required/recommended reading and online materials	Rick Durrett: Probability: Theory and Examples, Cambridge Series in Statistical and Probabilistic Mathematics (Cambridge University Press, 2010, 4th edition)
Course Website	http://hkumath.hku.hk/course/MATH7224/

MATH7501 Topics in algebra (6 credits)		**Academic Year**	2015
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Hua, Mathematics *(huazheng@maths.hku.hk)*		
Teachers Involved	Dr Z Hua, Mathematics		
Course Objectives	To provide students specializing in mathematics with the opportunity to study some topics in algebra in greater depth.		
Course Contents & Topics	- A selection of advanced topics in algebra such as group theory; rings and modules; Galois theory; quadratic forms; multilinear algebra; algebraic number theory; group representations; commutative algebra; Grobner basis theory; introduction to algebraic geometry. Topics may vary from year to year.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1: acquire knowledge in the covered topics to considerable depth		
	CLO 2: if he/she wishes, pursue more advanced studies in areas of algebra		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH4302 Algebra II.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.		
	B: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.		
	C: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.		
	D:		

		Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	coursework assessments (may include presentations)	50	CLO 1,2
Examination	One 2.5-hour written examination	50	CLO 1,2

Required/recommended reading and online materials	To be decided by the course instructor.
Course Website	http://hkumath.hku.hk/course/MATH7501/

MATH7502 Topics in applied discrete mathematics (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	To provide students with the opportunity to study some further topics in applied discrete mathematics.		
Course Contents & Topics	- A selection of advanced topics in discrete mathematics, which may include algebraic coding theory, cryptography, discrete optimization, extremal combinatorics, and algebraic and probabilistic methods in discrete mathematics. The selection may vary from year to year.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	demonstrate knowledge and understanding of some research areas of applied discrete mathematics
CLO 2	solve various discrete mathematics problems using some advanced techniques

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3301 Algebra I and MATH3600 Discrete mathematics.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	coursework assessment	50	CLO 1,2
Examination	One 2.5-hour written examination	50	CLO 1,2

Required/recommended reading and online materials	Instructor's lecture notes.

MATH7503 Topics in mathematical programming and optimization (6 credits)		Academic Year	2015
Offering Department	Mathematics	Quota	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	Dr K Cai, Mathematics Prof W Zang, Mathematics		
Course Objectives	A study in greater depth of some special topics in mathematical programming or optimization. It is mainly intended for students in Operations Research or related subject areas.		
Course Contents & Topics	- A selection of advanced topics, which may include convex, quadratic, geometric, stochastic programming, multi-objective programming and goal programming; or discrete and combinatorial optimization. The selection may vary from year to year.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the advanced concept and approach of the mathematical programming topic(s) and/or optimization approaches as appropriate in Operations Research CLO 2: demonstrate knowledge and understanding of the underlying theory and techniques of the various formulations and algorithms plus their extensions		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3901 Operations research I, MATH3904 Introduction to optimization and MATH4902 Operations research II.		
Offer in 2015 - 2016	Y 1st sem	Examination	Dec
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequecies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	coursework assessment based on assignments and two class tests	50	CLO 1,2
Examination	One 2.5-hour written examination	50	CLO 1,2

Required/recommended reading and online materials	M.S. Bazaraa and C.M. Shetty: Nonlinear Programming (John Wiley & Sons, 1993, 2nd edition) S.P. Bradley, A.C. Hax and T. Magnanti: Applied Mathematical Programming (Addison-Wesley, 1977) N. Christofides et al (ed.): Combinatorial Optimization (John Wiley & Sons, 1979) S.S. Rao: Optimization Theory and Applications (Wiley Eastern Ltd., 1978) G. Nemhauser and L. Wolsey: Integer and Combinatorial Optimization (John Wiley & Sons, 1988) J.P. Ignizio: Introduction to Linear Goal Programming (Beverly Hills: Sage, 1985)
Course Website	http://hkumath.hku.hk/course/MATH7503/

MATH7504 Geometric topology (6 credits)		Academic Year	2015
Offering Department	Mathematics	Quota	---
Course Co-ordinator	Dr Z Hua, Mathematics *(huazheng@maths.hku.hk)*		
Teachers Involved	TBC, Mathematics		
Course Objectives	This course gives a geometric introduction to some of the methods of algebraic topology. The emphasis throughout will be on the geometric motivations and applications of the theory.		
Course Contents & Topics	- Continuity. Compactness. Connectedness. The fundamental group. Triangulations and classification of surfaces. Theory and applications of simplicial homology. Theory of covering spaces. Theory of attaching spaces.		

Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand basic ideas and constructions which are important both in pursuing the deeper theories as well as in many applications in algebraic topology CLO 2: understand the ideas of attaching space, complexes, lifting and extension properties, and surgery on manifolds
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3301 Algebra I and MATH3401 Analysis I.
Offer in 2015 - 2016	N — **Examination**: ---
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	coursework assessment	50	
Examination	One 2.5-hour written examination	50	

Required/recommended reading and online materials	M.A. Armstrong: Basic Topology (Springer-Verlag UTM) J. Rotman: An Introduction to Algebraic Topology (Springer-Verlag GTM)

MATH7505 Real analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W S Cheung, Mathematics *(wscheung@maths.hku.hk)*		
Teachers Involved	Prof W S Cheung, Mathematics		
Course Objectives	The aim of the course is to introduce the basic ideas and techniques of measure theory and the Lebesgue integral.		
Course Contents & Topics	- Lebesgue Measure on R: Measurable sets and Lebesgue measure, Measurable functions. - The Lebesgue Integral: The Lebesgue integral, modes of convergence. - Differentiation and Integration: Functions of bounded variation, Differentiation of an integral, absolute continuity. - General Measure and Integration Theory: Measurable spaces, measurable functions, integration, convergence theorems, the Radon-Nikodym theorem. - The L^p Spaces: The L^p spaces, convergence and completeness, bounded linear functionals.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: describe basic properties of Lebesgue measure and measurable functions CLO 2: construct the Lebesgue integral, elucidate its basic properties and appreciate the existence of other useful integration theories besides Riemann's CLO 3: understand the basic features of L^p spaces		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3401 Analysis I.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**		

		Demonstrate a thorough understanding of all concepts and ideas by being able to draw complex connections among various concepts and apply the theorems through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation, and with some innovative approaches to solving problems.
	B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, reasoning, identifying the appropriate theorems, applications, or presentation.
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with acceptable argument and presentation.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, and not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	coursework assessment	50	CLO 1,2,3
Examination	One 2.5-hour written final examination	50	CLO 1,2,3

Required/recommended reading and online materials	H.L. Royden: Real Analysis (Collier MacMillan) W. Rudin: Real and Complex Analysis (McGraw Hill)
Course Website	http://hkumath.hku.hk/course/MATH7505/

PHYS1050 Physics for engineering students (6 credits)		Academic Year	2015
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof M H Xie, Physics *(mhxie@hku.hk)*		
Teachers Involved	Prof M H Xie (Sem 1), Physics Prof K S Cheng (Sem 2), Physics Dr M K Yip (Sem 1 and 2), Physics		
Course Objectives	This course offers a comprehensive training of physics for engineers. It covers the major physical laws on mechanics, electricity and magnetism. A calculus-based approach is adopted.		
Course Contents & Topics	This course will introduce and discuss the following topics: Units and Dimensional Analysis, Motion of a Particle in One and Two Dimensions, Newton's Laws of Motion, Friction, Curvilinear and Circular Motion on a Plane, Force, Impulse and Momentum, Force Polygon and Static Equilibrium, Work and Energy, System of Particles, Moment of Inertia and Rotation of a Rigid Body, Simple Harmonic Motion and Pendulum; Electrostatic Fields and Potential, Gauss's Law, DC circuits, Magnetic field due to Moving Charges, Force on a Moving Charge in Magnetic Field, Biot-Savart law, Ampere's law, Electromagnetic Induction, Faraday's Law, Eddy Currents, AC circuits, Phases in Capacitive and Inductive Circuits, Power, DC and AC Generators, Transformer.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe and explain the physical principles of mechanics, electricity and magnetism CLO 2 apply these principles to situations of the physical and engineering world CLO 3 analyze and solve basic problems using the calculus-based approach CLO 4 acquire and interpret experimental data to examine the physical laws		
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in HKDSE Physics or Combined Science with Physics components or equivalent (This course is exclusive for Engineering students.)		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3
Examination	2-hour written exam	70	CLO 1,2,3
Laboratory reports		10	CLO 1,4
Test		10	CLO 1,2,3

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
R. Serway and J.W. Jewett: Physics for Scientists and Engineers (Thomson, 2009, 8th edition)
R. D. Knight: Physics for Scientists and Engineers (Pearson, 2008, 2nd edition)

Course Website: http://moodle.hku.hk

PHYS1055 How things work (6 credits)		Academic Year	2015
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M K Yip, Physics *(mankit@bohr.physics.hku.hk)*		
Teachers Involved	Dr M K Yip, Physics		
Course Objectives	This course is designed for students in all disciplines and all years who are curious about science in daily life. The course covers the working principles and mechanisms of the things and phenomena around us. Logical thinking and appreciation of science are emphasized with mathematics kept at a minimum. Students are trained to develop scientific intuition and to understand that many "magical" things in everyday life can be predictable.		
Course Contents & Topics	Topics include: the science in the household and the science of driving, sports and amusement. Daily applications are explored with simple and lucid explanations. Developments in optical recording, medical imaging for diagnosis and the magnetic levitated trains in public transportation are introduced as examples of the modern technology. Contents of the course are constantly updated to reflect the advances in modern science and technology.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe and discuss the physical principles that are behind the household appliances and the scientific issues in daily life
CLO 2	demonstrate their knowledge to related topics qualitatively
CLO 3	criticize and express views in logical and effective ways
CLO 4	recognize the significance of science and technology

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,3,4
Presentation		25	CLO 1,2,3,4

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator L. A. Bloomfield: How Things Work: The Physics of Everyday Life (John Wiley & Sons, Inc, 2008, 3rd edition)
Course Website	http://www.physics.hku.hk/~phys1055/

PHYS1056 Weather and climate (6 credits)		Academic Year	2015
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved			

	Dr K M Lee, Physics Dr T C Lee, Hong Kong Observatory Dr P W Li, Hong Kong Observatory Mr W K Wong, Hong Kong Observatory
Course Objectives	Weather and climate play an important role in human activities and history. In this course, we shall introduce to students the fundamentals of weather, climate and climate changes, to arouse their interests in the scientific and technological advancements.
Course Contents & Topics	The course will encompass topics on: basic physical principles on weather phenomena like: wind, temperature, humidity, cold/warm fronts, thunderstorms and tropical cyclones; introductory weather analysis, forecast and climate. Through real life examples, students will get familiarized with the weather/climate science and interpretation of meteorological information, climatology and climate change. Experts from the Hong Kong Observatory (HKO) will participate in the course to cover aspects on daily weather forecasts, public weather services, local severe weather phenomena, tropical cyclones, climatology of Hong Kong, and climate change. They will also supervise course projects that involve a visit to the HKO to study the meteorological facilities and understand the operational activities on weather and climate.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: recall the basic principles of weather and climate CLO 2: apply the principles to interpret weather / climate information, for example from the HKO web site, internet or media CLO 3: identify and explain the differences of weather and climate in Hong Kong as compared to other parts of the world CLO 4: explain the basic causes of climate change and its potential impacts CLO 5: describe and discuss the daily operational activities in the HKO
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL
Offer in 2015 - 2016	Y 1st sem; **Examination**: Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 1,2,3,4,5
Examination	2-hour written exam	50	CLO 1,3,4,5
Test		25	CLO 1,3,4,5

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Frederick Lutgens and Edward Tarbuck: The Atmosphere (Pearson Prentice Hall, 2013)
Course Website	http://moodle.hku.hk

PHYS1057 Kitchen science (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof A B Djurisic, Physics *(dalek@hku.hk)*		
Teachers Involved	Prof A B Djurisic, Physics		

Course Objectives	The course aims to improve students' understanding of basic science behind the common daily activities related to food and cooking and to develop their critical thinking skills.
Course Contents & Topics	The course will introduce basic scientific concepts and principles necessary to understand different methods of food preparation, as well as kitchen tools. The introduced concepts will be illustrated in recipes and practical demonstrations. The topics include: basic food molecules (water, carbohydrates, fats, protein); foams and bubbles (various examples, beer, sodas, ice-cream); colloids, emulsions, gelation (various sauces, jelly); crystallization (sugar, sugar syrups, honey, chocolate); taste and flavor (herbs, spices); cooking processes and chemical reactions (Maillard reactions, caramelization, etc.); chemical reactions for rising dough with application to cakes, bread and cookies; fermentation (alcoholic beverages, fermented dairy products, tofu); pH values in cooking, natural and artificial food colorings, culinary curiosities; molecular gastronomy (novel flavors and textures);principles of operation of kitchen tools, such as non-stick cookware, pressure cookers, induction heating ranges, microwave ovens, etc.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: describe principles of operation of kitchen tools encountered in daily life CLO 2: explain basic physical and chemical processes involved in food preparation CLO 3: illustrate how preparation method affects the flavor and texture of food CLO 4: analyze common methods of food preparation and understand scientific reasons for performing procedures in certain ways
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL
Offer in 2015 - 2016	N — **Examination**: ---
Offer in 2016 - 2017	N
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	inlcuding demonstration (12 hours)	24
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	essay & student presentations	70	CLO 1,2,3,4
Examination		30	CLO 1,2,3,4

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
T. Lister and H. Blumenthal: Kitchen Chemistry (Royal Society of Chemistry, 2005)
S. T. Beckett: The Science of Chocolate (Royal Society of Chemistry, 2005)
R. L. Wolke: What Einstein Told His Cook (W.W. Norton & Company Inc., New York, 2002
Peter Barham: The Science of Cooking (Springer-Verlag, Berlin, 2001) A. Gardiner and S. Wilson: The Inquisitive Cook (Exploratorium, Henry Holt and Company, LLC, New York, 1998)
H. McGee: On food and cooking: The Science and Lore of the Kitchen (HarperCollins Publishers, London, 1991)

PHYS1150 Problem solving in physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr S Z Zhang, Physics *(shizhong@hku.hk)*		
Teachers Involved	Dr S Z Zhang, Physics		
Course Objectives	This course provides a basic training on the methods and tools that are commonly used in physics. It prepares students the necessary knowledge to learn the subject. Students will explore the basic ideas, methods and skills through tackling physical problems. Rudimentary of analytic as well as numerical		

	calculation using Matlab will be introduced. It is complete in itself, or may also be followed by Methods in Physics I. This course can be regarded as a survival guide in physics study.
Course Contents & Topics	This course introduces the principles and theories of various tools that are useful to read physics and solve its problems. Topics include: Dimensional analysis, polynomials and complex numbers, rudimentary of matrix operation, conic sections and topics related to practical calculus: limits, differentiation and integration. Applications to physical systems and various practical problems solving skills are discussed. Whenever applicable, Matlab will be used to illustrate the topics discussed.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 state physical systems by the language of mathematics and employ mathematical logic and reasoning to read physics CLO 2 apply calculus to solve problems CLO 3 review the features of various solving tools in physics as well as plan and select appropriate tools when solving physical problems CLO 4 describe the connections between mathematical equations and physical problems CLO 5 formulate and operate physical problems both qualitatively and quantitatively CLO 6 interpret and judge the physical meaning of result after calculations
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course.
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective observation skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective observation skills and techniques. Correct use of data of results to draw appropriate conclusions. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5,6
Examination	2-hour written exam	50	CLO 1,2,3,4,5
Laboratory reports		10	CLO 3,5,6
Test		20	CLO 1,2,3,4,5

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator R. Shankar, Basic Training in Mathematics: A Fitness Program for Science, Springer, 1995
Course Website	http://moodle.hku.hk

PHYS1240 Physics by inquiry (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F K Chow, Physics *(judychow@hku.hk)*		

Teachers Involved	Dr F K Chow, Physics
Course Objectives	This course aims at providing students a solid background and knowledge in physics as well as its connection with our daily life phenomena and activities.
Course Contents & Topics	The course has a general coverage in most physics topics and is conducted with no descriptions in differential and integral calculus. Emphasis will be stressed on the understanding of various physical phenomena in daily life through qualitative and simple quantitative analysis. The course contents cover: Mechanics, Heat, Optics, Waves, Electricity and Magnetism.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe and distinguish the concepts and principles in introductory study of physics CLO 2 recognize the underlying physical principles behind various daily life phenomena CLO 3 explain physical phenomena using proper physical laws and theories CLO 4 apply simple mathematical techniques for quantitative analysis in solving physics problems CLO 5 analyse data of physics experiments
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL Not for students with level 3 or above in HKDSE Physics; and Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course; and Not for students who have passed in PHYS1250 Fundamental physics or already enrolled in this course.
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5
Examination	2-hour written exam	50	CLO 1,2,3,4
Test		30	CLO 1,2,3,4

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator John D. Cutnell and Kenneth W. Johnson: Introduction to Physics (John Wiley & Sons, Inc., 2013) Paul G. Hewitt: Conceptual Physics (Addison Wesley, 2009, 11th edition) Raymond A. Serway and Chris Vuille: College Physics (Brooks Cole, 2011, 9th edition)
Course Website	http://moodle.hku.hk

PHYS1250 Fundamental physics (6 credits)		**Academic Year**	2015
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M K Yip, Physics *(mankit@bohr.physics.hku.hk)*		
Teachers Involved	Dr M K Yip (Sem 1), Physics Dr Y Tu (Sem 2), Physics		
Course Objectives	This course covers the fundamental blocks in physics in one semester. It serves as a first course to students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics or astronomy as minor. Conceptual ideas in physics are emphasized and the mathematical treatment is moderate.		
Course Contents & Topics	Topics include: Mechanics, Wave Motions, Geometric and Physical Optics, Thermodynamics, Electromagnetism, and Modern Physics.		

Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe and explain the fundamental physical principles CLO 2 apply these principles, together with logical and mathematical reasoning, to situations of the physical world CLO 3 analyse and solve problems with the aids of mathematics CLO 4 acquire and interpret experimental data to examine the physical laws
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course; Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course.
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,3
Laboratory reports		15	CLO 1,4
Test		25	CLO 1,2,3

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Raymond A. Serway and John W. Jewett: Physics for Scientists and Engineers (Thomson, 2011, 8th edition) James S. Walker: Physics (Prentice Hall, 2009, 4th edition)
Course Website	http://www.physics.hku.hk/~phys1250/

PHYS1650 Nature of the universe (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee (Sem 1 and 2), Physics		
Course Objectives	This general education course is designed for students in all disciplines and all years. No prior knowledge in astronomy, physics, and higher mathematics is required, but will help.		
Course Contents & Topics	Topics covered include the observational aspect of astronomy (including constellations and planets), the physics of our solar system, and our own Sun, stars and their evolution, galaxies, blackholes, and cosmology. It also provides students with a basic understanding of the relationship of astronomy to life and how our nature works on the macroscopic level. Students are expected to participate actively in the night sky observations.		

Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 identify and describe the major objects in our Solar System and our universe (including stars and galaxies), and explain their main properties CLO 2 use the celestial sphere model to describe the apparent trajectories of celestial objects CLO 3 review the evolution of the world-view from the geocentric model to the heliocentric model and the discovery of the expansion of the universe on our world-view CLO 4 apply quantitative physical laws, including Kepler's three laws of planetary motion, Newton's law of universal gravitation, Doppler shift formula and Hubble's law to calculate and solve simple astronomical problems CLO 5 explain the evolution of stars and the evolution of the universe CLO 6 communicate astronomical problems and solutions using appropriate astronomical terminology and good English
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective observation skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective observation skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective observation skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective observation skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		12
Tutorials		8
Reading / Self study		64

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 1,2,3,4,5,6
Examination	2-hour written exam	50	CLO 1,2,3,4,5,6
Presentation		25	CLO 1,6

Required/recommended reading and online materials	E. Chaisson and S. McMillan: Astronomy Today (Pearson, 2011)
Course Website	http://moodle.hku.hk

PHYS2055 Introduction to relativity (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee, Physics		
Course Objectives	This course aims at introducing students the essence of special relativity. It is designed as an elective for students in all disciplines and all years with science background.		
Course Contents & Topics	Topics include: "Common-sense" concepts of space and time versus Einstein's conceptions of space and time, Examples of time dilation and space contraction, Paradoxes of relativity including the famous twin paradox and the "pole-in-the-barn", Four vectors and Lorentz invariant.		

Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 recall the setup and significance of Michelson-Morley experiment CLO 2 state the basic postulates and the spacetime concept of special relativity CLO 3 explain time dilation and length contraction CLO 4 describe Lorentz transformation and its applications CLO 5 state the resolution of the twin and pole-in-the-barn paradoxes
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1250 Fundamental physics or PHYS1150 Problem solving in physics or PHYS1050 Physics for engineering students
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Robert Resnick and David Halliday: Basic Concepts in Relativity and Early Quantum Theory (MacMillan Pub., 1992, 2nd revised edition) Edwin F. Taylor and John A. Wheeler: Spacetime Physics: Introduction to Special Relativity (W. H. Freeman, 1992, 2nd edition)
Course Website	http://moodle.hku.hk

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		25	CLO 2,4
Examination	2-hour written exam	50	CLO 1,2,3,4,5
Test		25	CLO 1,2,3,4,5

PHYS2150 Methods in physics I (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F K Chow, Physics *(judychow@hku.hk)*		
Teachers Involved	Dr F K Chow, Physics		
Course Objectives	This course provides students with experience in using mathematical tools and techniques to solve problems in physics. It is complete in itself, or may also be followed by Methods in Physics II.		
Course Contents & Topics	Solutions of ordinary differential equations in first, second and higher orders and their applications in particle dynamics, circuit theories and nuclear physics; Principles of vectors; Analytic geometry in three dimensions; Vector functions; Cartesian, cylindrical and spherical coordinates; Partial derivatives, extremes of multi-variable functions and the Taylor series in two-variable functions; Double and triple integrals in Cartesian, cylindrical and spherical coordinates; Change of variables and the Jacobians; Calculations of centers of mass, moments of inertia, and electric potentials.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 review the theory and principles of mathematical methods and compare the features of various methods CLO 2 describe the connections between mathematical equations and physical problems CLO 3		

		state and set up mathematical equations to describe the dynamics and evolution of physics systems
	CLO 4	demonstrate knowledge of choosing correct solution of mathematical equations
	CLO 5	interpret and judge the physical meaning of result after calculations

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,2,3,4,5
Examination	2 hour written exam	50	CLO 2,3,4
Test		35	CLO 1,2,3,4

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
J. Hass, M. D. Weir, and G. B. Thomas: University Calculus: Early Transcendentals (Pearson, 2014, 2nd edition)
M. R. Spiegel: Schaum's Outline of Advanced Mathematics for Engineers and Scientists (McGraw-Hill, 2009)
Susan J. Colley: Vector Calculus (Pearson, 2011, 4th edition)
K. F. Riley, M. P. Hobson, and S. J. Bence: Mathematical Methods for Physics and Engineering: A Comprehensive Guide (Cambridge University Press, 2006, 3rd edition)

Course Website: http://www.physics.hku.hk/~phys2150/

PHYS2155 Methods in physics II (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F C C Ling, Physics *(ccling@hku.hk)*		
Teachers Involved	Dr F C C Ling, Physics		
Course Objectives	This course provides students with experience in using mathematical tools and techniques to solve problems in physics. It is complete in itself, or may also be taken after Methods in Physics I.		
Course Contents & Topics	A review on coordinate systems in three dimensions; Gradient, divergence, curl and Laplacian; Line integrals, surface integrals and volume integrals; Conservative fields and potentials; Green's theorem, divergence theorem and the Stokes' theorem; Curvilinear coordinates; Applications of vector calculus in classical mechanics and electrodynamics; Vector spaces and matrix algebra; Properties of some special matrices: Hermitian matrices and unitary matrices, etc; Quadratic forms; Eigenvalue problems and diagonalization of matrices; Applications of matrix theory in physical problems; Numerical methods for finding roots of equations; Numerical differentiation and integration.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	review the theory and principles of mathematical methods and compare the features of various methods
CLO 2	describe the connections between mathematical equations and physical problems
CLO 3	state and set up mathematical equations to describe the dynamics and evolution of physics systems

	CLO 4	demonstrate knowledge of choosing correct solution of mathematical equations
	CLO 5	solve various problems and operate the calculations with computer
	CLO 6	interpret and judge the physical meaning of result after calculations

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		15	CLO 1,2,3,4,5,6
Examination	2-hour written exam	50	CLO 2,3,4
Test		35	CLO 2,3,4

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Riley K.F., Hobson M.P. and Bence S.J.: Mathematical Methods for Physics and Engineering (Cambridge, 2006, 3rd edition) Wylie C.R., Barrett L.C.: Advanced Engineering Mathematics (McGraw Hill, 1995)
Course Website	http://www.physics.hku.hk/~phys1316/

PHYS2250 Introductory mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M K Yip, Physics *(mankit@bohr.physics.hku.hk)*		
Teachers Involved	Dr M K Yip (Sem 1), Physics Prof J Gao (Sem 2), Physics		
Course Objectives	This course covers the foundation of mechanics in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in mechanics are emphasized.		
Course Contents & Topics	Topics include: Kinematics, Newton's Laws of Motion and Their Applications, Linear Momentum and its Conservation, Variable Mass Problems, System of Particles and Centre of Mass, Torque and Rotation, Angular Momentum and its Conservation, Work, Energy and its Conservation, Gravitation, Simple Harmonic Motions, Fluid Static and Pressure, Archimedes' Principle and Buoyancy, Bernoulli's Equation, Surface Tension and Capillary Tube.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe and explain the fundamental physical principles
CLO 2	apply these principles, together with logical and mathematical reasoning, to situations of the physical world
CLO 3	analyse and solve problems with the aids of mathematics
CLO 4	acquire and interpret experimental data to examine the physical laws

Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students

Pre-requisites (and Co-requisites and Impermissible combinations)	
Offer in 2015 - 2016	Y 1st sem 2nd sem · **Examination** · Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. **Fail** — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,3
Laboratory reports		15	CLO 1,4
Test		25	CLO 1,2,3

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator P.A Tipler and G. Mosca: Physics for Scientists and Engineers, (Freeman, 2008, 6th edition). D. Kleppner and Robert J. Kolenkow: An Introduction to Mechanics (McGraw Hill, 1978, International edition)
Course Website	http://www.physics.hku.hk/~phys2250/

PHYS2255 Introductory electricity and magnetism (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J C S Pun, Physics *(jcspun@hku.hk)*		
Teachers Involved	Dr J C S Pun, Physics		
Course Objectives	This course covers the foundation of electricity and magnetism in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in electricity and magnetsim are emphasized.		
Course Contents & Topics	Topics include: Vector notation and vector field, Electric force and electric field, Gauss' law and electric conductors, Electric potential energy and potential, Capacitance and DC circuits, Magnetic force, Magnetic field, Faraday's law of induction, Inductance, AC circuit, Maxwell's equations and electromagnetic waves.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	describe and explain the fundamental physical principles
CLO 2	apply these principles, together with logical and mathematical reasoning, to situations of the physical world
CLO 3	analyse and solve problems with the aids of mathematics
CLO 4	acquire and interpret experimental data to examine the physical laws

Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students

Pre-requisites (and Co-requisites and Impermissible combinations)			
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,3
Laboratory reports		15	CLO 1,4
Test		25	CLO 1,2,3

Required/recommended reading and online materials

P. A. Tipler and G. Mosca: Physics for Scientists and Engineers (Freeman, 2008, 6th edition)
R. D. Knight: Physics for Scientists and Engineers (Pearson, 2008, 2nd edition)
R. Resnick, D. Halliday, and K. Krane: Physics Volume 2 (John Wiley and Sons, 2002, 5th edition)
R. Serway and J. W. Jewett: Physics for Scientists and Engineers (Thomson, 2004, 5th edition)

Course Website: http://moodle.hku.hk

PHYS2260 Heat and waves (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F C C Ling, Physics *(ccling@hku.hk)*		
Teachers Involved	Dr F C C Ling, Physics		
Course Objectives	This course covers the foundation of heat and waves in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in heat and waves are emphasized.		
Course Contents & Topics	Topics include: type of waves; Sinusoidal wave including transverse velocity and phase, Wave propagation through a stretched string as an example for transverse wave, Sound wave as an example for longitudinal wave, Wave equation, Energy in wave motion, The principle of superposition, Interference of waves, Standing waves and resonance, Beats, The Doppler Effect, Light wave as an electromagnetic wave, Reflection, Refraction, Double slit interference, Interference from thin films, Single slit diffraction, Multiple slit and grating, Polarization, Temperature and equilibrium, Ideal gas law, Molecular view of pressure, Mean free path, distributions of molecular speed and energy, Concept of heat, First law of thermodynamic, Work done on or by an ideal gas, Internal energy of an ideal gas, Molar heat capacities at constant volume and constant pressure, Different thermodynamic processes including adiabatic, isothermal, constant-volume, cyclical and free expansion, Reversibility of process, definition of entropy change, The second law of thermodynamic, Carnot engine, Statistical view of entropy.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe and explain the fundamental physical principles

	CLO 2	apply these principles, together with logical and mathematical reasoning, to situations of the physical world
	CLO 3	analyse and solve problems with the aids of mathematics
	CLO 4	acquire and interpret experimental data to examine the physical laws

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,3
Laboratory reports		15	CLO 1,4
Test		25	CLO 1,2,3

Required/recommended reading and online materials

P. A. Tipler and G. Mosca: Physics for Scientists and Engineers (Freeman, 2008, 6th edition)
R. Resnick, D. Halliday, and K. Krane: Physics Volume 1 (John Wiley and Sons, 2002, 5th edition)
R. Resnick, D. Halliday, and K. Krane: Physics Volume 2 (John Wiley and Sons, 2002, 5th edition)

PHYS2265 Modern physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F K Chow, Physics *(judychow@hku.hk)*		
Teachers Involved	Prof H F Chau (Sem 1), Physics Dr F K Chow (Sem 2), Physics		
Course Objectives	This course covers the foundation of modern physics in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in modern physics are emphasized.		
Course Contents & Topics	Topics include: Particle Properties of Wave, Wave Properties of Particle, The Schrodinger Equation, Some Solutions to Time Independent Schrodinger Equation, The Hydrogen Atom, Spin and Many Particles System.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe and explain the fundamental physical principles
CLO 2	apply these principles, together with logical and mathematical reasoning, to situations of the physical world
CLO 3	analyse and solve problems with the aids of mathematics

	CLO 4 — acquire and interpret experimental data to examine the physical laws
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,3
Laboratory reports		15	CLO 1,4
Test		25	CLO 1,2,3

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
R. Harris: Modern Physics (Pearson, 2014, 2nd edition)
K. Krane: Modern Physics (John Wiley & Sons, 2012, 3rd edition)
R. A. Serway, C. J. Moses, and C. A. Moyer: Modern Physics (Brooks Cole, 2004, 3rd edition)
P. A. Tipler and G. Mosca: Physics for Scientists and Engineers Extended Version(Freeman, 2008, 6th edition)
R. Eisberg and R. Resnick: Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles (John Wiley & Sons, 1985)

Course Website: http://www.physics.hku.hk/~phys2265/

PHYS2850 Atomic and nuclear physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr S Z Zhang, Physics *(shizhong@hku.hk)*		
Teachers Involved	Dr S Z Zhang, Physics		
Course Objectives	This course will introduce students to the fundamentals of atomic physics and rudimentary nuclear physics. It aims to provide a coherent and concise coverage of traditional atomic and nuclear physics. Important topics of current research interest will be also discussed, such as laser cooling and trapping which plays an important role in the realization of Bose-Einstein condensate in atomic vapors.		
Course Contents & Topics	Topics include: Atomic structure of hydrogen and hydrogen-like atom, multi-electron atom, atom in electromagnetic field, spectroscopy, laser trapping and cooling; nuclear structure, shell model and nuclear reactions. Applications of the basic principles of atomic and nuclear physics will be mentioned when appropriate.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — apply general considerations of quantum physics to atomic and nuclear system; make general orders of magnitude of estimation of physical effects		

	CLO 2 explain how light interacting with atom; the working principle of laser trapping and cooling CLO 3 recognize the general features of atomic/nuclear spectroscopy CLO 4 apply quantum physics to understand the basic features of simple nuclei, binding of deuteron et al
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2265 Modern physics
Offer in 2015 - 2016	N — **Examination** ---
Offer in 2016 - 2017	N
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		18
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination		50	CLO 1,2,3,4
Test		30	CLO 1,2,3,4

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator W. Demtroder, Atoms, molecules and photons (Springer, 2nd, 2011) K. Krane, Introductory nuclear physics (John Wiley & Sons, 1988) B. H. Bransden and C. J. Joachain: Physics of Atoms and Molecules (Pearson, 2nd, 2003)
Course Website	http://www.physics.hku.hk/~phys2628/

PHYS3150 Theoretical physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof Z D Wang, Physics *(zwang@hku.hk)*		
Teachers Involved	Prof Z D Wang, Physics		
Course Objectives	The aim of this course is to provide students with the conceptual skills and key analytical tools for solving real problems in all major areas of physics.		
Course Contents & Topics	This course will introduce and address the following topics: Application of complex variables including the Cauchy's integral formula and calculus of residues, Partial differential equations (the general wave equation, the Schrodinger equation, the Poisson equation, and the diffusion equation), Properties of special functions widely used in Physics (Gamma functions, Beta functions, Bessel functions, spherical harmonics etc.), Fourier Series, and Fourier Transform.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	analyse and examine the analytical properties of complex functions
CLO 2	calculate various definite integrals using the method of residues
CLO 3	analyse and solve the first and second order ordinary equations, and typical partial differential equations
CLO 4	apply the special functions in handling various physical problems

	CLO 5 use the Fourier Series and Fourier transform in describing, respectively, any periodic function and wave		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (PHYS2250 Introductory mechanics or PHYS2255 Introductory electricity and magnetism or PHYS2265 Modern physics) and (PHYS2150 Methods in physics I or MATH2211 Multivariable calculus)		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,5
Examination	3-hour written exam	70	CLO 1,2,3,4,5
Test		10	CLO 1,2,3,4,5

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
G. Arfken and H. Weber: Mathematical Methods for Physicists (Academic Press, 2005)

PHYS3350 Classical mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr S Z Zhang, Physics *(shizhong@hku.hk)*		
Teachers Involved	Dr S Z Zhang, Physics		
Course Objectives	Build on the foundation course PHYS2250, this course discusses classical mechanics in the advanced undergraduate level using Lagrangian formalism. It serves as a core course for physics major students as well as an elective core for those who are interested in gaining a deep understanding of classical mechanics and to apply related techniques in their own majors. This is also an essential course for those who plan to pursue postgraduate studies in physics or related disciplines. Both conceptual ideas and mathematical treatment are emphasized.		
Course Contents & Topics	This course will be essentially divided into two parts. In the first part, fundamental concepts related to Lagrangian mechanics will be treated. Topics include the variational principle, conservation laws and its relation to Newtonian mechanics. In the second part, we shall discuss applications of the Lagrangian mechanics. Topics include the central force problem, the coupled harmonic oscillators and rigid-body dynamics. Lagrangian mechanics in non-inertial frame will also be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the logical structure of Lagrangian mechanics and its advantage over the Newtonian formulation; CLO 2 write down the form of Lagrangian for a mechanical system and solve the dynamic equations in simple cases CLO 3 understand the general feature of a many-body system and the role of center of mass frame in two-body, as well as many-body and rigid body dynamics		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2250 Introductory mechanics		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec

Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	see table below

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Assessment		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3
Examination	2-hour written exam	60	CLO 1,2,3
Laboratory reports		10	CLO 3
Test		10	CLO 1,2,3

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator David Morin: Introduction to Classical Mechanics, (Cambridge, 2007). Steven Thornton and Jerry Marion: Classical Dynamics of Particles and Systems, (Cengage Learning India, 2012)
Course Website	http://moodle.hku.hk

PHYS3351 Quantum mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr W Yao, Physics *(wangyao@hku.hk)*		
Teachers Involved	Dr W Yao, Physics		
Course Objectives	Build on the foundation course PHYS2265, this course discusses quantum mechanics in the advanced undergraduate level with vigorous mathematical treatment. It serves as a core course for physics major students as well as an elective core for those who are interested to gain a deep understanding of quantum mechanics and to apply related techniques in their own majors. This is also an essential course for those who plan to pursue postgraduate studies in physics or related disciplines. Both conceptual ideas and mathematical treatment are emphasized.		
Course Contents & Topics	Time-dependent Schrodinger equation; statistical interpretation of wave function; probability density; probability current and continuity equation; momentum; physical observable and expectation value; Heisenberg uncertainty principle; time-independent Schrodinger equation; Hamiltonian and stationary states; particle in a square well; transmission and reflection at a barrier; harmonic oscillator problem using ladder operators; free particle and wavepacket; delta function potential; Dirac notations; state vectors; Hilbert space; Hermitian operators; eigenstates and eigenvalues; generalized statistical interpretation; generalized uncertainty principle; angular momentum; hydrogen atom; atomic orbits; spin; non-degenerate perturbation theory.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe the statistical interpretation of quantum mechanical systems, and calculate expectation values and uncertainty of physical observables
CLO 2	formulate energy eigenvalue problems, and solve them in examples where potentials have simple analytical forms
CLO 3	formulate time evolution of the wavefunction and the expectation value of physical observables with known energy eigenfunctions

	CLO 4 judge the applicability of time-independent perturbation theory and formulate leading order energy corrections in certain perturbations applied to the physical system CLO 5 acquire and interpret experimental data to examine the physical laws
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2265 Modern physics
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	See below
Course Type	Lecture with laboratory component course

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	3-hour written exam	60	CLO 1,2,3,4
Laboratory reports		10	CLO 5
Test		20	CLO 1,2,3,4

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator D. J. Griffiths: Introduction to Quantum Mechanics (Pearson Prentice Hall, 2004, 2nd ed.)
Course Website	http://moodle.hku.hk

PHYS3450 Electromagnetism (6 credits)		**Academic Year**	2015
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof X D Cui, Physics *(xdcui@hku.hk)*		
Teachers Involved	Prof X D Cui, Physics		
Course Objectives	Build on the foundation course PHYS2255, this course discusses electromagnetism in the advanced undergraduate level with vigorous mathematical treatment. It serves as a core course for physics major students as well as an elective core for those who are interested to gain a deep understanding of electromagnetism and to apply related techniques in their own majors. This is also an essential course for those who plan to pursue postgraduate studies in physics or related disciplines. Both conceptual ideas and mathematical treatment are emphasized.		
Course Contents & Topics	Topics include electric fields and potential, methods in electrostatics, conductors and dielectrics, magnetostatics and electromagnetic induction, magnetic properties of materials and Maxwell's equations.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 identify the fundamental physics in electrostatics and magnetism CLO 2 apply mathematical tools to describe electrostatics and magnetism CLO 3 use the Maxwell's equations to explain various electrostatic and magnetic phenomena		

	CLO 4	differentiate between electrostatics in vacuum and in dielectric materials
	CLO 5	differentiate between magnetism in vacuum and in magnetic materials
	CLO 6	apply essential skills of making measurements with appropriate instruments in physics. experiments; Interpret the experimental data and compare with the prediction of underlying physical principle

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2255 Introductory electricity and magnetism		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4,5,6
Examination	3-hour written exam	60	CLO 1,2,3,4,5
Laboratory reports		10	CLO 1,6
Test		20	CLO 1,2,3,4,5

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator D. J. Griffiths: Introduction to Electrodynamics, 3rd ed., (Prentice-Hall, 1999).
Course Website	http://moodle.hku.hk

PHYS3550 Statistical mechanics & thermodynamics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof M H Xie, Physics *(mhxie@hku.hk)*		
Teachers Involved	Prof M H Xie, Physics		
Course Objectives	Build on the foundation course PHYS2260, this course discusses statistical mechanics and thermodynamics in the advanced undergraduate level with vigorous mathematical treatment. It serves as a core course for physics major students as well as an elective core for those who are interested to gain a deep understanding of statistical mechanics and thermodynamics and to apply related techniques in their own majors. This is also an essential course for those who plan to pursue postgraduate studies in physics or related disciplines. Both conceptual ideas and mathematical treatment are emphasized.		
Course Contents & Topics	Topics include: Elements of Ensemble Theory, Boltzmann, Fermi and Bose-Einstein statistics. Partition function and the laws of Thermodynamics. Disorder and entropy; concept of temperature; the free energy. Density of states. Classical gas, electrons in metals, and black body radiation. Heat capacities. Thermal properties of magnetic systems.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	<table><tr><td>CLO 1</td><td>describe and explain the fundamental physical principles</td></tr><tr><td>CLO 2</td><td>apply these principles, together with logical and mathematical reasoning, to situations of the physical world</td></tr><tr><td>CLO 3</td><td>analyse and solve problems with the aids of mathematics</td></tr><tr><td>CLO 4</td><td>acquire and interpret experimental data to examine the physical laws</td></tr></table>
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2260 Heat and waves
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.</td></tr></table>
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Laboratory</td><td></td><td>6</td></tr><tr><td>Tutorials</td><td></td><td>8</td></tr><tr><td>Reading / Self study</td><td></td><td>80</td></tr></table>
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Required/recommended reading and online materials	Lecture notes provided by Course Coordinator F. Mandl: Statistical Physics, 2nd edition (John Wiley, 1988). C. Kittel: Elementary Statistical Physics (Robert E. Krieger, 1988). F.W. Sears & G.L. Salinger: Thermodynamics, Kinetic Theory and Statistical Thermodynamics (Addison-Wesley, 1986).
Course Website	http://moodle.hku.hk

PHYS3551 Introductory solid state physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof J Gao, Physics *(jugao@hku.hk)*		
Teachers Involved	Prof J Gao, Physics		
Course Objectives	To provides a broad introduction to modern theories of the behaviour and properties of the solid state of matter. It is designed as a self-contained course which at the same time will serve as a basis for more advanced courses and projects in solid state physics.		
Course Contents & Topics	Crystal structures and symmetry. The formation of crystals. The reciprocal lattice and X-ray diffraction in crystals. Lattice vibrations and thermal properties. Free-electron theory of metals. Energy bands; metals, semiconductors, and insulators. If time permits, special topics such as superconductor will be briefly mentioned.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>demonstrate knowledge for crystal structures and characterization</td></tr></table>		

	CLO 2 describe the behavior of solid matter and explain the underlying physical concepts CLO 3 apply physical principles and mathematical equations to discuss the physical properties of materials CLO 4 apply essential skills of making measurements with appropriate instruments in physics experiments CLO 5 interpret the experimental data and compare with the prediction of underlying physical principle
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2260 Heat and waves and PHYS2265 Modern physics
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,2,3,5
Examination	2-hour written exam	60	CLO 1,2,3
Laboratory reports		10	CLO 4,5
Test		15	CLO 1,2,3

Required/recommended reading and online materials: C. Kittel: Introduction to Solid State Physics (John Wiley, 1986, 6th ed.)

PHYS3650 Observational astronomy (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J J L Lim, Physics *(jjlim@hku.hk)*		
Teachers Involved	Dr J J L Lim, Physics		
Course Objectives	An introduction to tools of contemporary observation astronomy, with a focus on those used at optical wavelengths, as well as an introduction to observational aspects of stars and galaxies at optical wavelengths. An emphasis is placed on a hands-on approach for students to gain experience in doing astronomical observations and data reduction.		
Course Contents & Topics	Topics include: properties and configurations of optical telescopes; properties of light, atmospheric effects on observations; properties of astronomical detectors (PMT, CCD); astronomical imaging and magnitude system; astronomical spectroscopy; observations of stars and galaxies including blackbody radiation, color-magnitude system, emission and absorption spectrum, and astronomical redshifts.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe and explain the workings of astronomical telescopes and modern astronomical detectors at optical wavelengths		

	CLO 2 describe the effects of the properties of light and Earth's atmosphere on astronomical observations CLO 3 explain how the methods of astronomical photometry and spectroscopy are applied to the observations of stars, galaxies, and the universe CLO 4 operate a small optical telescope to conduct simple day and night sky observations		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2265 Modern physics)		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		4
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3
Examination	2-hour written exam	50	CLO 1,2,3
Laboratory reports		10	CLO 4
Test		10	CLO 1,2,3

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
Frederick R. Chromey: To Measure the Sky
B. W. Carroll & D. A. Ostlie: An Introduction to Modern Astrophysics (Addison-Wesley Publishing Company, 2007, 2nd edition)

PHYS3651 The physical universe (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr S C Y Ng, Physics *(ncy@bohr.physics.hku.hk)*		
Teachers Involved	Dr S C Y Ng, Physics		
Course Objectives	To introduce basic physical principles of astronomy and build a foundation in modern astrophysics.		
Course Contents & Topics	Topics include: the sky and celestial coordinates, spherical geometry, optics and telescopes, basic celestial mechanics, two-body problem, radiative transfer, and blackbody radiation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	calculate the transformation between different celestial coordinate systems
CLO 2	describe the formation of spectral lines and basic structures of telescopes
CLO 3	derive the orbits in two body problem from first principle
CLO 4	recall the radiative transfer equation

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2265 Modern physics)
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		12	CLO 1,2,3,4
Examination	2-hour written exam	60	CLO 1,2,3,4
Presentation		13	CLO 2,4
Test		15	CLO 1,2,3,4

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Bradley W. Carroll and Dale A. Ostlie, An Introduction to Modern Astrophysics, 2nd ed. (Pearson, 2007) George B. Rybicki and Alan P. Lightman, Radiative Processes in Astrophysics (Wiley-Interscience, 1985) Frank H. Shu, The Physical Universe: An Introduction to Astronomy (University Science Books, 1982) A. C. Phillips, The Physics of Stars (John Wiley & Sons, 1999) F. Mandl, Statistical Physics, 2nd ed. (John Wiley & Sons, 1988)
Course Website	http://www.physics.hku.hk/~phys3651/

PHYS3652 Principles of astronomy (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J J L Lim, Physics *(jjlim@hku.hk)*		
Teachers Involved	Dr J J L Lim, Physics		
Course Objectives	To introduce or review a number of basic physical principles, and explain how these principles are applied in astronomy to gain knowledge of the Universe.		
Course Contents & Topics	Topics include: special relativity, Doppler effect; interaction of light and matter, spectral lines; single-dish telescopes and interferometers; binary stars and stellar parameters, exoplanets; classification of stellar spectra.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe and explain the physical principles discussed
CLO 2	associate the correct physical principles with the observed properties of certain astronomical objects
CLO 3	apply their understanding of the physical principle discussed to explain or compute the observed properties of select astronomical objects

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2265 Modern physics)		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**		

	Demonstrate thorough mastery of the knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities, clear logical thinking, evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar, and unfamiliar situations using highly effective organizational and presentation skills.
B	Demonstrate substantial command of the knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities, reasoned logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities, logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		35	CLO 1,2,3
Examination	2-hour written exam	50	CLO 1,2,3
Test		15	CLO 2,3

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
B. W. Carroll & D. A. Ostlie: An Introduction to Modern Astrophysics (Addison-Wesley Publishing Company, 2007, 2nd edition)

PHYS3750 Laser and spectroscopy (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof S J Xu, Physics *(sjxu@hku.hk)*		
Teachers Involved	Prof S J Xu, Physics		
Course Objectives	The course aims at providing a broad introduction to major types of lasers and modern laser spectroscopy.		
Course Contents & Topics	Introduction to lasers and modern laser spectroscopy. Fundamentals of optical processes and spectroscopic techniques. Lasers as spectroscopic light sources. Components of spectroscopic instruments. Photoluminescence. Raman spectra.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	restate the properties of fundamental optical processes
CLO 2	describe fundamental operation principle of modern lasers
CLO 3	demonstrate solid knowledge of modern laser spectroscopic techniques
CLO 4	identify main components of modern optical spectroscopic instruments
CLO 5	employ laser photoluminescence setup to measure low-temperature photoluminescence spectra of solid samples
CLO 6	interpret the experimental data and compare with the prediction of underlying physical principle

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3551 Introductory solid state physics, or already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.

	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		10
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4,6
Examination	2-hour written exam	60	CLO 1,2,3,4
Laboratory reports		20	CLO 5,6

Required/recommended reading and online materials

Lecture Notes prepared by Course Coordinator
J. Garcia Sole, L. E. Bausa, and D. Jaque: An Introduction to the Optical Spectroscopy of Inorganic Solids (John Wiley & Sons, 2005)

PHYS3751 Physics of nanomaterials (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	TBC, Physics *()*		
Teachers Involved	TBC, Physics		
Course Objectives	This course is designed to let senior undergraduate students and fresh postgraduate students know fundamental concepts and physical properties of nanomaterials including two-dimensional quantum wells, one-dimensional quantum wires and zero-dimensional quantum dots.		
Course Contents & Topics	Introduction to nanomaterials and quantum size effect. Dimensionalities and density of states of various nanomaterials. Optical and transport properties of quantum wells, superlattices and two-dimensional electron gas. Physical properties of carbon nanotubes and semiconductor nanowires. Physical properties of quantum dots and nanocrystals. Fundamental principles of scanning tunneling microscopy and advanced thin-film growth techniques such as molecular beam epitaxy and metalorganic chemical vapor deposition.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	recall basic concepts and knowledge of dimensionality, density of states, quantum size effect
CLO 2	identify and compare optical and transport properties of quantum wells, superlattices and two-dimensional electron gas
CLO 3	recognise the fundamental principles of scanning tunneling microscopy and advanced thin-film growth techniques such as molecular beam epitaxy and metalorganic chemical vapor deposition
CLO 4	describe the basic physics of carbon nanotubes and semiconductor nanowires
CLO 5	explain physical properties of zero-dimensional quantum dots and nanocrystals

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3351 Quantum mechanics, and Pass in PHYS3551 Introductory solid state physics, or already enrolled in this course.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of the knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, reasoned logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations using effective organizational and presentation skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems using limited or barely effective organizational and presentational skills.

	Fail — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping**
Required/recommended reading and online materials	TBC

PHYS3850 Waves and optics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof S J Xu, Physics *(sjxu@hku.hk)*		
Teachers Involved	Prof S J Xu, Physics		
Course Objectives	To give a coherent introduction to the development of modern physical optics, with particular attention to the wave properties of light and optic application.		
Course Contents & Topics	Mathematical theory of wave motion and the electromagnetic theory of light; the propagation of light and the laws of reflection and refraction; superposition and Fourier analysis of waves; theories, experimental observation and applications of polarization, interference and diffraction, thick lenses.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2255 Introductory electricity and magnetism and PHYS2260 Heat and waves		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities			
Assessment Methods and Weighting			

Course Learning Outcomes:

CLO 1	explain and calculate the properties of waves including propagation, reflection, refraction, polarization, interference and diffraction by using the theory of waves
CLO 2	apply the theory of optics to calculate the geometrical parameters of thick lenses and design optical devices
CLO 3	apply essential theories to design anti-reflection and reflection-enhancement films

Grade Descriptors:

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of the knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, reasoned logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,2,3
Examination	2-hour written exam	60	CLO 1,2,3

	Laboratory reports		10	CLO 1
	Test		15	CLO 1,2,3
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Eugene Hecht: Optics, (Addison-Wesley, 2001, 4th ed.). R. Guenther: Modern Optics, (John Wiley, 1990).			
Course Website	http://moodle.hku.hk			

PHYS3851 Atomic and nuclear physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J H C Lee, Physics *(jleehc@hku.hk)*		
Teachers Involved	Dr J H C Lee, Physics		
Course Objectives	This course will introduce students to the fundamentals of atomic physics and rudimentary nuclear physics. It aims to provide a coherent and concise coverage of traditional atomic and nuclear physics. Emphasis will be put on practical application of quantum mechanics as well as conceptual framework of atomic and nuclear physics. If time permits, other topics of current interest will be also discussed, such as laser cooling and trapping.		
Course Contents & Topics	Topics include: Atomic structure of hydrogen and hydrogen-like atom, multi-electron atom, atom in electromagnetic field, spectroscopy; nuclear structure, shell model and nuclear reactions. Applications of the basic principles of atomic and nuclear physics will be mentioned when appropriate.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3351 Quantum mechanics		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

CLO 1	apply general considerations of quantum mechanics to atomic and nuclear system; make general orders of magnitude of estimation of physical effects
CLO 2	explain how light interacting with atom
CLO 3	recognize the general features of multi-electron atomic system
CLO 4	apply quantum mechanics to understand the basic features of simple nuclei, binding of deuteron et al

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Laboratory		6
Tutorials		8
Assessment		80

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		10	CLO 1,2,3,4
Examination		60	CLO 1,2,3,4
Laboratory reports		10	CLO 1

	Test | | 20 | CLO 1,2,3,4
Required/recommended reading and online materials	Lecture notes from the Course Coordinator W. Demtroder: Atoms, molecules and photons (Springer, 2011, 2nd ed.) K. Krane: Introductory nuclear physics (John Wiley & Sons, 1988)

PHYS3999 Directed studies in physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof J Wang, Physics *(jianwang@hku.hk)*		
Teachers Involved	Various teachers in the department, Physics		
Course Objectives	This capstone course is offered to students majoring in physics, math/physics or astronomy. It should be taken normally in their final year of study. It provides students with the opportunity to study a small problem by themselves, either theoretical, experimental or numerical, under the supervision of an academic staff using the subject materials the student has learn in all years of his/her major study. The available projects range from small scale research, critical literature review and comment, and to development of university-level physics or astronomy teaching tools.		
Course Contents & Topics	Students interested in taking this course should contact their prospective supervisors in May to determine the contents and the nature of their projects in the coming academic year. They must get the approval from both the prospective supervisor and the course coordinator to take this course. Students will receive training in research literature reading and reviewing, under the supervision of a staff member. For theoretical project, students may need to fill in mathematical gaps of some sophisticated derivations and the critically analyze the research methods used in the field. For numerical projects, students need to use computers to reproduce existing numerical or simulation results. For experimental projects, students have to understand the design of the experiment, carrying it out and analyze the sources of errors.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: review the knowledge of a physics or astronomy problem in depth through literature review of books and research journals based on what they have learnt in their majors CLO 2: criticize existing approaches for solving the selected physics or astronomy problem CLO 3: describe and explain connections between the physical principles and the study problem CLO 4: (for theoretical or computational projects) identify the key issues of the problem and solve them independently either by analytical or numerical means, and compare the results with predictions or existing solutions CLO 5: (for experimental projects) propose and execute physics experiments or astronomical observations, analyze results and sources of errors of the experiment or observation in comparison with predictions		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (3XXX level or above) disciplinary core/elective courses of the Physics Major, Mathematics/Physics Major or Astronomy Major curriculum. This capstone course is for Astronomy, Mathematics/Physics, and Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough grasp of the subject. Show evidence of strong logical and independent thinking. Insightful use and critical analysis/evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic. **B**: Demonstrate substantial grasp of the subject. Show evidence of logical and independent thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete grasp of the subject. Show some evidence of logical and independent thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Show limited evidence of logical and independent thinking. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Show little or no evidence of logical and independent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Project-based course		
Course Teaching & Learning Activities	**Activities** | **Details** | **No. of Hours** Meeting with supervisor | | 36 Reading / Self study | | 84		
Assessment Methods and Weighting	**Methods** | **Details** | |		

			Weighting in final course grade (%)	Assessment Methods to CLO Mapping
	Oral presentation	including supervisor's comments (10%)	30	CLO 1,3,4,5
	Research report		70	CLO 1,2,3,4,5
Required/recommended reading and online materials	To be provided by individual project supervisor			

PHYS4150 Computational physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof J Wang, Physics *(jianwang@hku.hk)*		
Teachers Involved	Prof J Wang, Physics		
Course Objectives	The aim of the course is show how the power of computers enables to computational approach to solving physics problems to be adopted, which is distinct from, and complimentary to, traditional experimental and theoretical approaches. The material covered will be found useful in any project or problem solving work that contains a strong computational or data analysis element. The course is designed such that a significant fraction of the student's time is spent actually programming specific physical problems rather than learning abstract techniques.		
Course Contents & Topics	The course will cover the following problems: Introductory computational physics and computer algebra, integration and differentiation, interpolation and extrapolation, ordinary differential equation such as those of classical mechanics, partial differential equations (such as the Maxwell's equation, the diffusion equation, and the Schrodinger equation), matrix methods (such as systems of equations and eigenvalue problems applied to Poisson's equation and electronic structure calculations), Monte Carlo (Metropolis algorithm) and other simulation methods (such as molecular dynamics), and several physics projects.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	demonstrate knowledge in essential methods and techniques for numerical computation in physics	
	CLO 2	apply Monte Carlo method and other simulation methods to solve deterministic as well as probabilistic physical problems	
	CLO 3	employ appropriate numerical method to interpolate and extrapolate data collected from physics experiments	
	CLO 4	use appropriate numerical method to solve the differential equations governing the dynamics of physical systems	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations); and Pass in any three of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics and thermodynamics		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.	
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Laboratory		12
	Tutorials		8

	Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination	2-hour written exam	40	CLO 1,3,4
Presentation		15	CLO 1
Project report		25	CLO 1,2,3,4

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
Samuel S.M. Wong: Computational Methods in Physics and Engineering (World Scientific)
N.J. Giordano and N. Nakanishi: Computational physics (Pearson Education Inc.).

PHYS4151 Data analysis and modeling in physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof H F Chau, Physics *(hfchau@hku.hk)*		
Teachers Involved	Prof H F Chau, Physics		
Course Objectives	This course covers general modeling and data analysis techniques used in physics and related subjects with special emphasis on their uses in complex systems, nonlinear systems and adaptive systems. The focus is on the basic principles and concepts rather than the use of computer packages. This course provides a solid foundation for students who intended to do computational physics and complex systems research. It also prepares students to work in related industries.		
Course Contents & Topics	Topics include basic data analysis techniques, linear and non-linear fittings, determining the goodness of the fit, basic hypothesis testing techniques, modeling physical and related systems via differential (ordinary and/or partial), difference equations as well as discrete models such as cellular automata, introduction to complex systems, complex adaptive systems and nonlinear dynamics, the use of computer package such as Matlab in modeling and data analysis. The emphasis is on the basic principles and concepts rather than a particular software package or physical model. Depending on the mutual interests of the coordinators and the students, illustrative examples will be drawn from conventional fields such as classical mechanics, electromagnetism and quantum mechanics as well as more recent fields like biophysics, econophysics and sociophysics.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe and explain state-of-the-art modeling methods used in physics
CLO 2	apply basic modeling techniques, together with logical and mathematical reasoning, to situations of the physical world
CLO 3	analyse and solve problems with the aid of computer packages such as Matlab
CLO 4	critically interpret experimental data from physics experiments

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations); and Pass in any one of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics & thermodynamics		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective computer modeling skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of the knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, reasoned logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations using effective organizational and presentation skills. Apply effective computer modeling skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective computer modeling skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective computer modeling skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective computer modeling skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36

	Laboratory		12
	Tutorials		8
	Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	50	CLO 1,2,4
Presentation		20	CLO 1,4
Project report		20	CLO 1,2,3,4

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
J. R. Taylor: An Introduction to Error Analysis (Univ. Sci. Books, 2rd ed., 1996)
B. Hahn and D. Valentine: Essential Matlab for Engineers and Scientists (Academic Press, 5th ed., 2013)
L. Lam: Nonlinear Physics for Beginners (World Sci., 1998)
N. Boccara: Modeling Complex Systems (Springer, 2nd ed., 2012)
A.-L. Barabasi and H. E. Stanley: Fractal Concepts in Surface Growth (CUP, 1995)

PHYS4350 Advanced classical mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof S Q Shen, Physics *(sshen@hku.hk)*		
Teachers Involved	Prof S Q Shen, Physics		
Course Objectives	Build on the advanced undergraduate level course PHYS3350, this course further discusses concepts and mathematical techniques in classical mechanics through special topics and applications. It serves as an elective course to better prepare students for their postgraduate studies in physics or other related disciplines.		
Course Contents & Topics	Topics include: Hamiltonian principles, Lagrangian formulation of dynamics, nonlinear problems, many-body systems, variational principle, generalized coordinates, simple application of Lagrangian equation.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	explain the difference between Newtonian mechanics and analytical mechanics
CLO 2	solve the mechanical problems using Lagrangian formalism
CLO 3	discuss the connection between classical mechanics and quantum mechanics from Hamiltonian formalism
CLO 4	apply the variational principle to real physical situations

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3350 Classical mechanics		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of the knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4

	Examination	3-hour written exam	60	CLO 1,2,3,4
	Test		20	CLO 1,2,3,4
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator H. Goldstein, C. Poole, and J. Safko, Classical Mechanics, (Pearson Education Inc, 2004)			
Course Website	http://moodle.hku.hk			

PHYS4351 Advanced quantum mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr W Yao, Physics *(wangyao@hku.hk)*		
Teachers Involved	Dr W Yao, Physics		
Course Objectives	Build on the advanced undergraduate level course PHYS3351, this course further discusses concepts and mathematical techniques in quantum mechanics through special topics and applications. It serves as an elective course to better prepare students for their postgraduate studies in physics or other related disciplines		
Course Contents & Topics	Identical particles. Pauli exclusion principle. Fermion and bosons. WKB approximation. Time-independent, non-degenerate and degenerate perturbation theory. Time dependent perturbation theory. Scattering, cross section, partial waves and Born approximation. Variational method.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 review the perturbation theory and some other approximation methods on various quantum systems CLO 2 apply physics principles to describe the physical properties of various quantum systems CLO 3 demonstrate knowledge and discuss the underlying physical concepts associated with the selected quantum systems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3351 Quantum mechanics		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		20	CLO 1,2,3
Examination	3-hour written exam	60	CLO 1,2,3
Test		20	CLO 1,2,3

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator D. J. Griffiths: Introduction to Quantum Mechanics (Pearson Prentice Hall, 2004, 2nd edition).
Course Website	http://www.physics.hku.hk/~phys4351/

PHYS4450 Advanced electromagnetism (6 credits)	**Academic Year**	**2015**

Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof X D Cui, Physics *(xdcui@hku.hk)*		
Teachers Involved	Prof X D Cui, Physics		
Course Objectives	Build on the advanced undergraduate level course PHYS3450, this course further discusses concepts and mathematical techniques in electromagnetism through special topics and applications. It serves as an elective course to better prepare students for their postgraduate studies in physics or other related disciplines.		
Course Contents & Topics	Topics include Maxwell's Equations, Poynting theorem, wave equations, reflection and transmission of waves, wave guides, retarded potentials, gauge transformations, dipole radiation, special theory of relativity.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 review and discuss the fundamental physics in classical electrodynamics CLO 2 apply Maxwell's equations to analyze complicated electrostatic and magnetic phenomena CLO 3 evaluate how special relativity is incorporated in the study of electromagnetism CLO 4 formulate and solve problems in electromagnetism using appropriate mathematical techniques		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3450 Electromagnetism		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 80		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Assignments / / 10 / CLO 1,2,3,4 Examination / 3-hour written exam / 60 / CLO 1,2,3,4 Test / / 30 / CLO 1,2,3,4		
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator D. J. Griffiths: Introduction to Electrodynamics, 3rd ed., (Prentice-Hall, 1999).		

PHYS4550 Advanced statistical mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr Y Tu, Physics *(yanjuntu@hku.hk)*		
Teachers Involved	Dr Y Tu, Physics		
Course Objectives	Build on the advanced undergraduate level course PHYS3550, this course further discusses concepts and mathematical techniques in statistical mechanics through special topics and applications. It serves as an elective course to better prepare students for their postgraduate studies in physics or other related disciplines.		
Course Contents & Topics	Topics include: Statistical ensembles for isolated and open systems. Equilibrium fluctuations. Order and disorder phase transition. Mean field and Landau theory. Classical ideal gas, quantum ideal gas. Quantum fluid.		
Course Learning Outcomes			

	On successful completion of this course, students should be able to: CLO 1 describe and explain the fundamental physical principles CLO 2 apply these principles, together with logical and mathematical reasoning, to situations of the physical world CLO 3 analyses and solve problems with the aids of mathematics
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3550 Statistical mechanics & thermodynamics
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3
Examination	3-hour written exam	60	CLO 1,2,3
Test		20	CLO 1,2,3

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
F. Mandl: Statistical Physics, 2nd edition (John Wiley, 1988)
C. Kittel: Elementary Statistical Physics (Robert E. Krieger, 1988)
F.W. Sears & G.L. Salinger: Thermodynamics, Kinetic Theory and Statistical Thermodynamics (Addison-Wesley, 1986)

PHYS4650 Stellar physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr S C Y Ng, Physics *(ncy@bohr.physics.hku.hk)*		
Teachers Involved	Dr S C Y Ng, Physics		
Course Objectives	To introduce the basic theory of stellar structure and evolution. It follows a vigorous mathematical treatment that stresses on the underlying physical processes. Knowledge in quantum mechanics and statistical mechanics will be advantageous.		
Course Contents & Topics	Topics include: Definition of stars. The H-R diagram. Stellar structure equations. Polytropic model. Elementary stellar radiation processes. Simple stellar nuclear processes. Saha equation. Stability of stars. Zero-age main sequence stars and their evolution. The solar neutrino problem. Late stage evolution of stars. Supernova explosion. If time permits, special topics selected from below will be briefly mentioned: star formation, brown dwarfs and planets, AGB stars and planetary nebulae, binary stars and their evolution, Cepheid variables and theory of stellar pulsation, and introduction to helioseismology.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe what is stars and to classify different types of stars CLO 2 analytically calculate and solve problems related to the structure and evolution of stars including the use of stellar structure equations and Saha equations CLO 3 critically examine the physical processes occurring in stars and how these processes affect the evolution of stars CLO 4 assess selected research papers in the field of stellar astrophysics		

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3651 The physical universe and PHYS3351 Quantum mechanics
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3,4
Examination	2-hour written exam	60	CLO 1,2,3
Project reports		10	CLO 1,2,3,4
Test		20	CLO 1,2,3

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Prialnik, D.: An introduction to the theory of stellar structure and evolution, 2nd ed. (CUP, 2010) A. C. Phillips, The Physics of Stars (John Wiley & Sons, 1999) Bowers, R. & Deeming, T.: Astrophysics I. Stars (Jones and Bartlett, 1984) Francis, LeBlanc, An Introduction to Stellar Astrophysics (Wiley, 2010)
Course Website	http://www.physics.hku.hk/~phys4650/

PHYS4651 Selected topics in astrophysics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof K S Cheng, Physics *(hrspksc@hku.hk)*		
Teachers Involved	Prof K S Cheng, Physics		
Course Objectives	To introduce students some current topics in astrophysics. It may be taken as a self-contained course or as background to research work in astrophysics.		
Course Contents & Topics	Topics include: Brief review of thermodynamical equilibrium, radiation mechanisms and general relativity. Physics of shock wave. Properties of Cosmic rays. Physics of compact stellar objects including black holes, white dwarfs, neutron stars and quark stars. Elements of cosmology: classical and relativistic dynamical theories, observational parameters.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: apply physics principles to describe the physical properties of various astrophysical systems CLO 2: explain the observed phenomena of some selected astrophysical objects CLO 3: demonstrate knowledge and discuss the underlying physical concepts associated with the astrophysical systems and their dynamic interactive processes		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3351 Quantum mechanics or PHYS3450 Electromagnetism or PHYS3550 Statistical mechanics & thermodynamics or PHYS3651 The physical universe		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original		

	thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		10	CLO 1,2,3
Examination	2-hour written exam	50	CLO 1,2,3
Presentation		15	CLO 1,2,3
Test		25	CLO 1,2,3

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
S. L. Shapiro and S. A. Teukolsky: Black Holes, White Dwarfs and Neutron Stars (John Wiley, 1983)
B. W. Carroll & D. A. Ostlie: An Introduction to Modern Astrophysics (Addison-Wesley Publishing Company, 2007, 2nd edition)

PHYS4652 Planetary science (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M H Lee, Physics *(mhlee@hku.hk)*		
Teachers Involved	Dr M H Lee, Physics		
Course Objectives	This course provides students with a modern advanced-level understanding of the properties of our Solar System and planetary systems around other stars and of the physical, chemical, and geological processes that govern them.		
Course Contents & Topics	Terrestrial planets, giant planets, moons and minor bodies in our Solar System; planetary dynamics; energy transport; planetary atmospheres, surfaces, and interiors; planet formation; extrasolar planets.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3651 The physical universe or (PHYS3350 Classical mechanics and PHYS3550 Statistical mechanics & thermodynamics)		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Course Learning Outcomes:

CLO 1	describe key aspects of our Solar System and extrasolar planetary systems acquired through observations and experiments
CLO 2	explain essential elements of the processes governing the properties of planetary bodies
CLO 3	apply physical principles to construct models for some basic aspects of the structure, formation and evolution of planetary bodies

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	

	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3
Essay		15	CLO 1,2,3
Examination	2-hour written exam	50	CLO 1,2,3
Test		15	CLO 1,2,3

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator I. de Pater and J. J. Lissauer: Planetary Sciences (Cambridge Univ. Press, 2010, 2nd Ed.) D. A. Rothery, N. McBride and I. Gilmour: An Introduction to the Solar System (Cambridge University Press, 2011, 2nd Ed.)
Course Website	http://moodle.hku.hk

PHYS4653 Cosmology (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof K S Cheng, Physics *(hrspksc@hku.hk)*		
Teachers Involved	Prof K S Cheng, Physics		
Course Objectives	The aim of the course is to offer an advanced introduction to cosmology, to familiarize students with the mathematical formulation used to model the evolution and dynamics of the universe, and to provide an up to date discussion of the big bang theory and structure and galaxy formation.		
Course Contents & Topics	Topics include: The visible universe. Empirical basis for cosmological theories. The metric of the universe. The big bang models. Thermodynamics of the early universe. Primordial nucleosynthesis. The very early universe. Inflationary models. The cosmological constant problem. Structure and galaxy formation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	apply physics principles to describe the observational/experimental aspects of cosmology
CLO 2	explain the observed phenomena of cosmology
CLO 3	demonstrate knowledge and discuss the underlying physical concepts associated with the cosmological evolution of the universe and with the dynamic interactive processes that take place in the universe

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3651 The physical universe or PHYS3652 Principles of astronomy		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td></td><td>10</td><td>CLO 1,2,3</td></tr><tr><td>Examination</td><td>2-hour written exam</td><td>50</td><td>CLO 1,2,3</td></tr><tr><td>Presentation</td><td></td><td>15</td><td>CLO 1,2,3</td></tr><tr><td>Test</td><td></td><td>25</td><td>CLO 1,2,3</td></tr></table>
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator M. Lachieze-Rey: Cosmology: A First Course (Cambridge University Press, Cambridge, 1995) M. Rowan-Robinson: Cosmology (Clarendon Press, Oxford, 1996) T. P. Cheng: Relativity, Gravitation & Cosmology - A Basic Introduction (Oxford, 2005)
Course Website	http://moodle.hku.hk

PHYS4654 General relativity (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee, Physics		
Course Objectives	To introduce students to the field of general relativity. To provide conceptual skills and analytical tools necessary for astrophysical and cosmological applications of the theory.		
Course Contents & Topics	The Principle of equivalence. Inertial observers in a curved space-time. Vectors and tensors. Parallel transport and covariant differentiation. The Riemann tensor. The matter tensor. The Einstein gravitational field equations. The Schwarzschild solution. Black holes. Interior equations for spherically symmetric stars. Gravitational waves.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>apply the mathematical and physical ideas of the theory of general relativity for the study of various systems in astrophysics and cosmology</td></tr><tr><td>CLO 2</td><td>explain the observational effects at the scale of the Solar System that cannot be described by Newtonian gravity from a general relativistic point of view</td></tr><tr><td>CLO 3</td><td>demonstrate knowledge and discuss the dynamic interactive physical processes in astrophysics by using a general relativistic approach</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2055 Introduction to relativity and PHYS3350 Classical mechanics		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr></table>		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>80</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td></td><td>20</td><td>CLO 1,2,3</td></tr><tr><td>Examination</td><td>2-hour written exam</td><td>60</td><td>CLO 1,2,3</td></tr><tr><td>Test</td><td></td><td>20</td><td>CLO 1,2,3</td></tr></table>		

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator R. M. Wald: General Relativity (University of Chicago Press, 1984) T. A. Moore: A General Relativity Workbook (Univ Science Books, 2012) J. B. Hartle: Gravity: An Introduction to Einstein's General Relativity (Addison-Wesley 2003) B. Schutz: A First Course in General Relativity (Cambridge University Press, 2009)
Course Website	http://moodle.hku.hk

PHYS4655 Interstellar medium (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M H Lee, Physics *(mhlee@hku.hk)*		
Teachers Involved	Dr M H Lee, Physics		
Course Objectives	This course provides students with an advanced-level understanding of the processes responsible for the absorption and emission of continuum and line radiation from gas and dust in stellar atmospheres and interstellar space, and their astrophysical applications and implications.		
Course Contents & Topics	Gas, dust, atoms, molecules, radiation; physical and radiative properties of hydrogen, helium and heavier elements; hydrogen clouds, molecular clouds; HII regions, nebulae, supernovae.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: express what exists between stars in spiral and elliptical galaxies CLO 2: apply physical principles to describe excitation/ionization and de-excitation/recombination of atoms and ions CLO 3: recognize which process or processes occur or dominate in which object or phase of the interstellar medium		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3651 The physical universe or (PHYS3351 Quantum mechanics and PHY3550 Statistical mechanics & thermodynamics)		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	see table below		
Assessment Methods and Weighting	see table below		
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator S. Kwok: Physics and Chemistry of the Interstellar Medium (University Sciences Book, 2007)		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3
Essay		15	CLO 1,2,3
Examination	2-hour written exam	50	CLO 1,2,3
Test		15	CLO 1,2,3

PHYS4750 Experimental physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	TBC, Physics *()*		

Teachers Involved	TBC, Physics		
Course Objectives	TBC		
Course Contents & Topics	TBC		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A** **B** **C** **D** **Fail**		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities** | **Details** | **No. of Hours**		
Assessment Methods and Weighting	**Methods** | **Details** | **Weighting in final course grade (%)** | **Assessment Methods to CLO Mapping**		
Required/recommended reading and online materials	TBC		

PHYS4966 Physics internship (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J C S Pun, Physics *(jcspun@hku.hk)*		
Teachers Involved	NIL, Physics		
Course Objectives	This capstone course is offered to students majoring in physics, math/physics or astronomy. It should be taken normally in the summer immediately before their final year of study. It provides students with the opportunity to gain working experience in the field of physics or astronomy through intern placement. Students are expected to use what they have learnt in their majors in this intern.		
Course Contents & Topics	Students will work as an intern for at least 160 hours within the University or outside the University in a company, government department or NGO. The work nature must be related to physics or astronomy. The internship should be arranged by the Department or obtained by students themselves. In the latter case, it must be approved before the commencement of the internship.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 apply physics or astronomy knowledge students have learnt in their majors to real working environment CLO 2 help to create, propose or design part of the project he/she is working on during the internship CLO 3 employ effective technical and inter-personal communication skills		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (3XXX level or above) disciplinary core/elective courses of the Physics Major, Mathematics/Physics Major or Astronomy Major curriculum. This capstone course is for Astronomy, Mathematics/Physics, and Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		
Grade Descriptors	**Pass** Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction". **Fail** Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.		
Course Type	Internship		
Course Teaching & Learning Activities	**Activities** | **Details** | **No. of Hours** Internship work | | 160		

	it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time)	

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Written report	written report, employer's feedback and oral presentation	100	CLO 1,2,3

Required/recommended reading and online materials	To be provided by individual project supervisor
Additional Course Information	Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

PHYS4999 Physics project (12 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof J Wang, Physics *(jianwang@hku.hk)*		
Teachers Involved	Various teachers in the department, Physics		
Course Objectives	This capstone course is offered to students majoring in physics, math/physics or astronomy. It is designed for those who are interested in tackling a research project in physics and/or astronomy. It should be taken normally in their final year of study. It provides students with the opportunity to study a specific problem by themselves, either theoretical, experimental or numerical, under the supervision of an academic staff using the knowledge the student gained in all years of his/her major study. The available projects are close to postgraduate level research in physics and/or astronomy.		
Course Contents & Topics	Students interested in taking this course should contact their prospective supervisors in May to determine the contents and the nature of their projects in the coming academic year. They must get the approval from both the prospective supervisor and the course coordinator to take this course. For theoretical and numerical projects: Students will receive training in research literature reading and reviewing, and make investigation which is close to research work in nature, under the supervision of a staff member. The student may need to perform some original calculations, to fill in mathematical gaps of some sophisticated derivations, or a combination of both. For numerical projects, students also need to use computers to find numerical or simulation results. For experimental projects: Students will carry out experiments in research labs under the supervision of a staff member. The student will receive a comprehensive training in advanced experimental techniques, including preparation of samples, determination of physical properties, measurement of small signals obscured by noise, laser, high-vacuum and low-temperature techniques and so on. Wide reading of the relevant scientific literature and originality in experimental design are expected.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	plan and execute a theoretical, numerical or experimental research project on a topic in physics or astronomy
CLO 2	review the knowledge of a physics or astronomy problem in depth through literature review of books and research journals based on what they have learnt in their majors
CLO 3	criticize existing approaches for solving the selected physics or astronomy problem
CLO 4	describe and explain connections between the physical principles and the study problem
CLO 5	identify the key issues of the problem and solve them independently either by analytical or numerical means, and compare the results with predictions or existing solutions (for theoretical or computational projects)
CLO 6	propose and execute physics experiments or astronomical observations, analyze results and sources of errors of the experiment or observation in comparison with predictions (for experimental projects)

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level (3XXX level or above) disciplinary core/elective courses of the Physics Major, Mathematics/Physics Major or Astronomy Major curriculum. This capstone course is for Astronomy, Mathematics/Physics, and Physics Majors students only. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis/evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.
B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different

		secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Meeting with supervisor		54
Reading / Self study		126

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	including supervisor's comments (10%)	30	CLO 2,4,5,6
Research report		70	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	To be provided by individual project supervisor

PHYS7350 Graduate classical mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	TBC, Physics *()*		
Teachers Involved	TBC, Physics		
Course Objectives	TBC		
Course Contents & Topics	TBC		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS4350 Advanced classical mechanics		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping

Required/recommended reading and online materials	TBC

PHYS7351 Graduate quantum mechanics (6 credits)	**Academic Year**	**2015**

Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof S Q Shen, Physics *(sshen@hku.hk)*		
Teachers Involved	Prof S Q Shen, Physics		
Course Objectives	This course introduces postgraduates and senior undergraduates to theory and advanced techniques in quantum mechanics, and their applications to select topics in condensed matter physics.		
Course Contents & Topics	The course will cover the following topics: Dirac notation, quantum dynamics, the second quantization, symmetry and conservation laws, permutation symmetry and identical particles, perturbation and scattering theory, introduction of relativistic quantum mechanics.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	formulate and solve problems in quantum mechanics using Dirac notation
CLO 2	examine and predict the properties of identical quantum particles
CLO 3	argue the importance of symmetry and conservation laws in quantum mechanics
CLO 4	explain physical phenomena in the modern language of quantum mechanics
CLO 5	analyse physical system in a quantum mechanical way
CLO 6	recognise the connection between relativity and quantum mechanics

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS4351 Advanced quantum mechanics		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of the knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,4,5,6
Examination	3-hour written exam	70	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator J. J. Sakurai: Modern Quantum Mechanics (Addison-Wesley, 1994) L. I. Schiff: Quantum Mechanics (McGraw-Hill, 1968)

PHYS7450 Graduate electromagnetism (6 credits)		**Academic Year**	2015
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof Z D Wang, Physics *(zwang@hku.hk)*		
Teachers Involved	Prof Z D Wang, Physics		
Course Objectives	The aim of this course is to provide students with the advanced level of comprehending on the theory of classic electromagnetic field, enabling them to master key analytical tools for solving real physics problems.		
Course Contents & Topics	This course will introduce and discuss the following topics: Boundary-value problems in electrostatics and Green Function method, Electrostatics of Media, Magnetostatics, Maxwell's equations and conservation laws, Gauge transformations, Electromagnetic waves and wave guides.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	analyse and solve various electrostatic and magnetostatic problems with Green's Function
	CLO 2	comprehend and explain many electromagnetic phenomena
	CLO 3	recognise and comprehend the important concepts of conservation laws and gauge transformations, which should be very helpful for doing research in future
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS4450 Advanced electromagnetism	
Offer in 2015 - 2016	Y 2nd sem	**Examination** May
Offer in 2016 - 2017	Y	
Course Grade	A+ to F	

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3
Examination	3-hour written exam	70	CLO 1,2,3

Required/recommended reading and online materials

J.D. Jackson: Classical Electrodynamics (John Wiley & Sons, 1999)
L.D. Landau and E.M. Lifshitz: Classical Theory of Fields (Pergamon, 1982)

PHYS7550 Graduate statistical mechanics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof J Wang, Physics *(jianwang@hku.hk)*		
Teachers Involved	Prof J Wang, Physics		
Course Objectives	This course intends to introduce some advanced topics in the field of equilibrium statistical physics.		
Course Contents & Topics	Ensemble theory: the micro-canonical ensemble, the canonical ensemble, and the grand canonical ensemble. Quantum mechanical ensemble theory. Theory of simple gases, ideal Bose systems, ideal Fermi systems. Statistical mechanics of interacting systems. Some topics in the theory of phase transition may be selected.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	discuss the various classical ensembles and quantum ensembles
CLO 2	solve the statistical mechanics problems using ensemble theory
CLO 3	explain the connection between classical statistical mechanics and quantum statistical mechanics
CLO 4	explain the concept of density matrix

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS4550 Advanced statistical mechanics		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.

	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,2,3,4
Examination	3-hour written exam	70	CLO 1,2,3,4
Test		15	CLO 1,2,3,4

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
R.K. Pathria: Statistical mechanics
M. Plischke and B. Bergersen: Equilibrium statistical physics

PHYS7551 Solid state physics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof J Wang, Physics *(jianwang@hku.hk)*		
Teachers Involved	Prof J Wang, Physics		
Course Objectives	To provide students with an understanding of more advanced topics in selected areas of solid state physics.		
Course Contents & Topics	Bloch theory. Nearly free electrons and tight binding model. Band structure calculations for realistic systems. The semi-classical model of electron dynamics. Ab initio total energy calculations and other advanced topics.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	discuss various methods to calculate the band structures and the major approximations that have been used
CLO 2	discuss various minimization methods
CLO 3	discuss the concepts of density functional theory
CLO 4	explain the concept of first principle calculation and various approximations used

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS3551 Introductory solid state physics and PHYS4351 Advanced quantum mechanics		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of the knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems using limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 80
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator C. Kittel: Introduction to Solid State Physics (John Wiley, 1996) N.W. Ashcroft and N.D. Mermin: Solid State Physics (Holt, Rinehart and Winston, 1987)

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		15	CLO 1,2,3,4
Examination	3-hour written exam	70	CLO 1,2,3,4
Test		15	CLO 1,2,3,4

PHYS7650 Stellar atmospheres (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	TBC, Physics *()*		
Teachers Involved	TBC, Physics		
Course Objectives	TBC		
Course Contents & Topics	TBC		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	see table below		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping**		
Required/recommended reading and online materials	TBC		

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of the knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, reasoned logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations using effective organizational and presentation skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems using limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

PHYS7750 Nanophysics (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof S J Xu, Physics *(sjxu@hku.hk)*		
Teachers Involved	Prof S J Xu, Physics		
Course Objectives	This course is designed to let fresh postgraduate students know fundamental concepts and principles of nano physics, such as two-dimensional electron gas, quantum Hall effects, one-dimensional electron system, quantum wires and nanotubes, zero-dimensional electron systems, single electron effects and quantum dots.		
Course Contents & Topics			

	Introduction to nano physics and quantum size effect. Dimensionalities and density of states. Optical and transport properties of two-dimensional electron gas formed at heterostructures and within novel graphene monolayers with external fields. Quantum Hall Effects. Physics of one-dimensional electron systems including carbon nanotubes and semiconductor nanowires. Fundamental physics of zero-dimensional electron systems. Single electron effects. Quantum dots and nanocrystals. Fundamental principles and applications of scanning tunneling microscopy in the study of nano physics. If time permits, the making and application aspects of nanomaterials will also be discussed.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: recall basic concepts and knowledge of dimensionality, density of states, quantum size effect CLO 2: identify and compare optical and transport properties of two-dimensional electron gas with external fields, especially quantum Hall effects CLO 3: recognize the fundamental principles and important applications of scanning tunneling microscopy in the study of nano physics CLO 4: describe the basic physics of one-dimensional electron systems including carbon nanotubes and semiconductor nanowires CLO 5: understand the central physics of zero-dimensional quantum dots and nanocrystals, single electron effects
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS4351 Advanced quantum mechanics and PHYS3551 Introductory solid state physics
Offer in 2015 - 2016	N — **Examination**: ---
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	Activities / Details / No. of Hours: Lectures — 36 Tutorials — 12 Reading / Self study — 80
Assessment Methods and Weighting	Methods / Details / Weighting in final course grade (%) / Assessment Methods to CLO Mapping: Assignments — 10 — CLO 1,2,3,4,5 Essay — 20 — CLO 1,2,3,4,5 Examination — 70 — CLO 1,2,3,4,5
Required/recommended reading and online materials	Lecture notes prepared by Course Coordinator

ENVS3006 Environmental radiation (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J K C Leung, Physics *(jkcleung@hku.hk)*		
Teachers Involved	Dr J K C Leung, Physics		
Course Objectives	In this course, students will learn about various kinds of radiations in the environment, the experimental techniques to detect them, the methods to trace them and to assess their hazard to the environment, and the ways to reduce the hazard in events of nuclear accidents or incidents.		
Course Contents & Topics	The course will cover naturally occurring radiation sources and man-made radiation sources including nuclear power plants; transport models for radionuclides in the environment; nuclear accidents and its impact to the environment; radiation risk assessment and emergency preparedness; techniques for measuring low level radioactivities; nuclear techniques in ecology; concept of radiation protection to human species and non-human species.		

Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	realise sources and transport of radionuclides in the environment
CLO 2	explain and assess the impact to the environment from the use of nuclear energies
CLO 3	detect and measure low level radioactivities in environmental samples
CLO 4	justify, optimize, and assess the risk of using radiation and nuclear technologies
CLO 5	compare and contrast the environmental impacts from nuclear energy and other forms of energy

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2265 Modern physics or CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		2
Field work		8
Tutorials		8
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,4,5
Examination	2-hour written exam	60	CLO 1,2,4,5
Laboratory reports		10	CLO 2,3
Presentation		10	CLO 2,4,5

Required/recommended reading and online materials	Merril Eisenbud and Thomas Gesell: Environmental Radioactivity: from Natural, Industrial, and Military Sources (Academic Press, 1997) Robert C. Morris: The Environmental Case for Nuclear Power (Paragon House, 2000) David Bodansky: Nuclear Energy - Principles, Practices and Prospects (American Institute of Physics Press, 1996)
Course Website	http://moodle.hku.hk

ENVS3010 Sustainable energy and environment (6 credits)		**Academic Year**	**2015**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof A B Djurisic, Physics *(dalek@hku.hk)*		
Teachers Involved	Prof A B Djurisic, Physics		
Course Objectives	In this course, the students will learn about sustainability and environmental impact of different energy technologies, including conventional energy sources as well as renewable and/or clean energy sources. The technological challenges, potential for future development, and environmental impacts (community, regional, and global) will be discussed.		
Course Contents & Topics	The course will cover energy production and use, environmental impact of energy use, fossil fuels and methods for making them more sustainable, clean fuels, electricity generation, renewable energy		

	technologies (with emphasis on biomass, wind and solar energy), hydrogen, energy storage, and energy conservation.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — define the concept of sustainable development CLO 2 — explain the challenges and potential for development of various energy technologies CLO 3 — compare the environmental impact of conventional and new energy technologies
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in PHYS2260 Heat and waves or CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Godfrey Boyle: Renewable Energy: Power for a Sustainable Future (Oxford University Press, 2003) G. Boyle, B. Everett, and J. Ramage: Energy Systems and Sustainability: Power for a Sustainable Future (The Open University, 2003) R. M. Dell and D. A. J. Rand: Clean Energy (The Royal Society of Chemistry, 2004)

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination	2-hour written exam	50	CLO 1,2,3
Presentation		50	CLO 2,3

SCNC1111 Scientific method and reasoning (6 credits)		Academic Year	2015
Offering Department	Faculty	**Quota**	---
Course Co-ordinator	Dr K F Lam, Statistics & Actuarial Science *(hrntlkf@hku.hk)*		
Teachers Involved	Dr K F Lam, Statistics & Actuarial Science Dr W M Y Cheung, Faculty of Science Dr R K W Lui, Faculty of Science Dr N K Tsing, Mathematics		
Course Objectives	The objectives are to give students a holistic view of the science discipline in terms of its nature, concepts and impact on civilization and society; to equip students with basic skills of logical and quantitative reasoning; and to introduce to students mathematical and statistical methods for science studies and research.		
Course Contents & Topics	Part I: The nature and methodology of science - Demarcation between science and non-science - Shared features of the sciences - Scientific method - The role of mathematics in the historical development of science Part II: Quantitative reasoning a. Mathematics with topics selected from - Foundation of mathematics, - Mathematics and advancement of science - an introduction, - Mathematical modelling - an introduction, - Guesstimation, - Difference equations, - Linear algebra and matrices, - Calculus and differential equations, and/or - Fractals and Chaos. b. Statistics - Probability rules - Probabilistic methods - Statistical inference - Confidence intervals estimation - Hypothesis testing - Decision making with statistics - Statistical modelling, and use and misuse of statistics		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe key aspects of scientific methodology CLO 2 describe the key elements of the foundation of mathematics and statistics CLO 3 identify the mathematics that underlies scientific problems CLO 4 apply logical and quantitative reasoning to re-formulate both real life and scientific problems in mathematical terms, and to interpret their solutions		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply knowledge to a wide range of familiar and unfamiliar situations. Carry out computations carefully and correctly. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Carry out computations mostly in a careful and correct way, but commit some minor computational errors. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Commit a number of minor computational errors. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Commit some substantial computational errors. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Commit serious computational errors. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities			

Activities	Details	No. of Hours
Lectures		36
Tutorials		12

	Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		20	CLO 1,2,3,4
Examination	2-hour examination	40	CLO 1,2,4
Project reports		20	CLO 1,3,4
Test		20	CLO 1,2

Required/recommended reading and online materials: TBC

SCNC1112 Fundamentals of modern science (6 credits)		**Academic Year**	**2015**
Offering Department	Faculty	**Quota**	---
Course Co-ordinator	Dr J C S Pun, Physics *(jcspun@hku.hk)*		
Teachers Involved	Dr J C S Pun (2nd sem), Physics Prof A S C Cheung (1st & 2nd sem), Chemistry Prof A S T Wong (1st sem), Biological Sciences Dr G W Porter (2nd sem), Faculty of Science Dr M H Lee (1st sem), Earth Sciences		
Course Objectives	This course aims to provide students an overview of the giant web of knowledge that makes up science. This course adopts an integrated approach and encompasses physics, astronomy, earth sciences, chemistry, and biology, and focuses on the general principles and unifying concepts of science used in various disciplines to describe the diverse phenomena and objects in the natural world. The fundamental laws of each discipline, the historical developments and the modern frontiers, and the interconnectedness of different science disciplines will be introduced and highlighted.		
Course Contents & Topics	(1) Universal principles and unifying concepts of science (2) Fundamental structure of matter - Structure of matter - The quantum world - Elementary particles and standard model (3) Atoms and molecules - Matters and atoms: The periodic table - Chemical bonds and chemical reactions - Important molecules: water, carbon, molecular cluster - Nanoscience and nanotechnology (4) DNA/Genetic - Molecules of life - Genomics and DNA; Genetics and inheritance (5) Cells and systems (6) Organism and environment - The origin and evolution of life - Ecology and environment (7) Earth and Beyond - Solid Earth, Earth's atmosphere and hydrosphere - Earth's motion in space - Planets, the Sun, and the solar system - Cosmology		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	acquire an understanding of the historical development of modern science, the essence and spirit of scientific inquiry methods, and the role of science in the advancement of civilization over time
CLO 2	understand and be familiar with the fundamental scientific principles and concepts
CLO 3	appreciate the diversity of different scientific disciplines and develop multidisciplinary and interdisciplinary perspectives on scientific issues
CLO 4	critically and creatively appraise received ideas and established knowledge
CLO 5	develop curiosity in science and an appreciation of sciences as related to different Science Majors and as a form of life-long learning

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions Apply highly effective organizational and presentational skills.

	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		94
Assessment	1 hour in-class quiz	1

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	tutorials and homework	20	CLO 1,2,3,4,5
Examination		50	CLO 1,2,3,4,5
Presentation	project presentation	20	CLO 1,2,3,4,5
Test		10	CLO 1,2,3,4,5

Required/recommended reading and online materials	Textbook: Sciences: An Integrated Approach by Trefil & Hazen 7th Edition (2013, Wiley) References: Integrated Science by Tillery, Enger, & Ross 5th Edition (2011, McGrawHill) Biology: Concepts and Connections by Campbell, Mitchell, & Reece 2nd Edition (1999, Benjamin/Cummings) Chemistry: An Atoms First Approach by Zumdahl & Zumdahl (2012 Cengage)

SCNC1113 The big history of our planet: a scientific perspective on everything that has ever happened (6 credits)		**Academic Year**	**2015**
Offering Department	Faculty	**Quota**	50
Course Co-ordinator	Dr W M Y Cheung, Faculty *(willmyc@hku.hk)*		
Teachers Involved	Dr C W Chan, Faculty of Science Dr W M Y Cheung, Faculty of Science Dr B C H Ng, Faculty of Science Prof Q A Parker, Physics		
Course Objectives	By exploring the Big History of our planet: from the Big Bang of the Universe, the synthesis of different chemical substances, through the evolution of various species on Earth, to the establishment of modern human society, the course aims to: (1) discuss the process of scientific discovery, and how our current body of knowledge about Nature was established; (2) develop students' appreciation of the multi-disciplinary nature of science; (3) develop students' appreciation of the importance of science and technology to our society, in formulating policies in the society, and solving the future problems of our planet; (4) increase scientific literacy.		
Course Contents & Topics	Part I: From the Cosmos to the Atom Main theme: How fundamental interactions between the building blocks of matter shape the Universe today as we know it; Topics include: Big bang, nucleosynthesis, cosmic expansion, cooling of the universe, star formation, and thermal equilibrium of our planet Earth. Part II: From the Atom to Life Main theme: How we understand the transition from non-living matter to the diversified biosphere on earth today; Topics include: Origin of life, evolution, natural selection and tree of life. Part III: From Life to Mind to Society Main theme: How our modern civilised society emerges through the development of intelligence and accumulation of knowledge; how science, technology, human society and environment influence one another; Topics include: Neural network and the emergence of intelligence, historical development of modern science, the role of science in human civilisation and the contemporary world. Part IV: Looking into the Future Main theme: Outlook on the future of science, technology, human society and environment; key challenges		

	to be faced by humankind that could be addressed by science and technology; Topics include: Students will attend one of several parallel modules on topics that suit their interests, such asnano-technology, climate change, energy crisis, bioethics and artificial intelligence.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 appreciate and elaborate on the significance of major events in the development and formation of our Universe, our Earth system and our modern society CLO 2 explain, with some level of depth and details, how a number of major theories allows us to understand the workings of the world CLO 3 understand how different science disciplines fit and emerge from one another as a collective effort of the humankind to understand Nature CLO 4 critically assess the mutual influence between science and human society, the role of science in our society as well as the making of science policy in our local region CLO 5 evaluate some of the major challenges faced by humankind, and discuss solutions from a multi-disciplinary perspective CLO 6 test claims and engage in historical analysis based on theories and practices from multiple disciplines
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 3 or above in at least one science subject at the pre-university level (HKDSE Physics, Chemistry, Biology, Combined/Integrated Science or equivalent) This course is not offered to students in the 6901 BSc or 6119 BEd&BSc programmes.
Offer in 2015 - 2016	Y 1st sem — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply knowledge to a wide range of familiar and unfamiliar situations. Carry out computations carefully and correctly. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Carry out computations mostly in a careful and correct way, but commit some minor computational errors. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Commit a number of minor computational errors. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Commit some substantial computational errors. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Commit serious computational errors. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	About 3 reading assignments will be given. Students will then be assessed in various forms such as drawing mind maps, short quizzes or reflective journals.	40	CLO 1,2,3,4,5,6
Presentation	Tutorial participation	10	CLO 1,2,3,4,5,6
Project reports		30	CLO 1,3,4,5,6
Test		20	CLO 1,2,3,4,6

Required/recommended reading and online materials

Steven Weinberg: The First Three Minutes: A Modern View of the Origin of the Universe (Basic Books)
Charles Darwin: The Origin of Species
Eric R. Kandel: In Search of Memory: The Emergence of a New Science of Mind (W. W. Norton & Company)
Fred Spier: Big history and the future of humanity (Wiley-Blackwell)
David Christian, Cynthia Brown and Craig Benjamin: Big History: Between Nothing and Everything (McGraw-Hill Humanities/Social Sciences/Languages)
The Big History Project website: https://www.bighistoryproject.com/

SCNC2121 Sustainable food production (6 credits)		**Academic Year**	2015
Offering Department	Faculty	**Quota**	32

<table>
<tr><td>Course Co-ordinator</td><td>Dr H S El-Nezami, Biological Sciences (elnezami@hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td>Dr H S El-Nezami, Biological Sciences
Dr DeLisa Lewis, UBC Faculty of Land and Food Systems</td></tr>
<tr><td>Course Objectives</td><td>This course is designed to provide students with the opportunity to experience the inner-workings of a sustainable, campus farming operation, and to make connections between the ecosystems that nourish the thriving, urban communities surrounding the farm. Students will participate in plenary sessions with course instructors and guest lecturers from the UBC Faculty of Land and Food Systems, in guided group discussions, field trips on and off-campus, and in a variety of seasonal, hands-on farming activities.</td></tr>
<tr><td>Course Contents & Topics</td><td>The MacMillan building, home of the UBC Faculty of Land and Food Systems, will be the site of the plenary sessions, guest speaker lectures, and morning group discussion sessions. The south campus farm in UBC is the site of the majority of farming activities, including afternoon group discussions, harvest Fridays and market Saturdays. Students will have a chance to explore the UBC campus sustainability hot-spots, including the LFS orchard garden, the world-class CIRS green building, Place Vanier, home of an innovative campus chef, Steve Golieb, and the wiggle worm project in the Student Union Building/SUB. Students will also venture off-campus to two the Vancouver Farmers' Market and to Granville Island Public Market to provide a comparative view of marketing systems and the regionally grounded food system context.

The main approach to learning with this course is student-centered learning and hands-on experience. To meet course learning objectives, students are expected to attend and participate in all sessions, to contribute to group discussions and the group oral presentation, and to complete a series of reflective journals on each of the four main course themes-soils, biodiversity, seeds, marketing.</td></tr>
<tr><td>Course Learning Outcomes</td><td>On successful completion of this course, students should be able to:
<table>
<tr><td>CLO 1</td><td>connect underlying agroecosystem concepts and soil science fundamentals with principles and practices of sustainable farming</td></tr>
<tr><td>CLO 2</td><td>observe and compare multiple models of agricultural food production in an urban and campus farm setting</td></tr>
<tr><td>CLO 3</td><td>identify multiple strategies for creating on-farm biodiversity</td></tr>
<tr><td>CLO 4</td><td>demonstrate a basic understanding of composting fundamentals</td></tr>
<tr><td>CLO 5</td><td>demonstrate the ability to perform a select set of basic crop maintenance, harvest, washing, and packing techniques in a sustainable campus farm setting</td></tr>
<tr><td>CLO 6</td><td>demonstrate best practices with post-harvest handling and food safety protocols</td></tr>
</table></td></tr>
<tr><td>Pre-requisites
(and Co-requisites and Impermissible combinations)</td><td>Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will also need to pass an interview in order to be enrolled in the course.</td></tr>
<tr><td>Offer in 2015 - 2016</td><td>Y Summer | Examination | No Exam</td></tr>
<tr><td>Offer in 2016 - 2017</td><td>Y</td></tr>
<tr><td>Course Grade</td><td>A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td>
<table>
<tr><td>A</td><td>Clear understanding of the basics from sustainable farming to marketing strategies used by sustainable farming operations. Ability to perform crop maintenance, harvest, washing, and packing in a sustainable campus farm setting. Ability to demonstrate solid team-based skills for performance of fieldwork, and distinct performance in different assessment components. Ability to synthesize the lessons learned during the course and articulate individual learning objectives for further studies in agriculture, food and human health.</td></tr>
<tr><td>B</td><td>Clear understanding of the basics from sustainable farming to marketing strategies used by sustainable farming operations. Ability to perform crop maintenance, harvest, washing, and packing in a sustainable campus farm setting. Ability to demonstrate solid team-based skills for performance of fieldwork, and distinct performance in different assessment components.</td></tr>
<tr><td>C</td><td>Understanding of the basics from sustainable farming to marketing strategies used by sustainable farming operations. Ability to perform crop maintenance, harvest, washing, and packing in a sustainable campus farm setting. Satisfactory demonstration of team-based skills for performance of fieldwork, and satisfactory performance in different assessment components.</td></tr>
<tr><td>D</td><td>Knowing some of the basics of sustainable farming. Active participation in team-based fieldwork, and satisfactory performance in different assessment components.</td></tr>
<tr><td>Fail</td><td>Fail to follow the basics of sustainable farming as demonstrated by unsatisfactory performance in assignments and/or fieldwork.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td>Field camps</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td>
<table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>20</td></tr>
<tr><td>Field work</td><td></td><td>50</td></tr>
<tr><td>Presentation</td><td>Group discussion / Project</td><td>10</td></tr>
<tr><td>Reading / Self study</td><td></td><td>50</td></tr>
<tr><td>Assessment</td><td>End of trip report</td><td>30</td></tr>
</table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td>
<table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr>
<tr><td>Assignments</td><td>To be announced by UBC Faculty of Land and Food Systems</td><td>40</td><td>CLO 1,2,4,5</td></tr>
<tr><td>Report</td><td>Students will divided into groups of 3-4. Each group will submit a</td><td>60</td><td>CLO 3,5,6</td></tr>
</table></td></tr>
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		7-10 pages report (not including the references). Please refer to Remarks for format requirements.		

Required/recommended reading and online materials	UBC Faculty of Land and Food Systems will give reading materials to students.
Course Website	http://www.scifac.hku.hk/news/bsc/ubc-summer-course
Additional Course Information	Please note: Students have to cover their own travel costs and course fees charged by the hosting institution (prices to be announced). This course will be offered subject to a minimum enrollment number and availability of teachers. Enrolment of this course is not conducted via the online course selection system. Students will be enrolled manually by the Faculty after approval has been obtained from the course coordinator. This course is taught by staff in UBC and the end of trip report is graded by Dr H S El-Nezami. Students will divided into groups of 3-4. Each group will submit a 7-10 pages report (not including the references). Please use Times New Roman (12 points), single space and 2 cm margins from all sid Remarks: Students will divided into groups of 3-4. Each group will submit a 7-10 pages report (not including the references). Please use Times New Roman (12 points), single space and 2 cm margins from all sides. The report should summarize the group HACCP plan, issues, problems and approaches and suggestions to address any farm related food safety issues. The marking criteria are the scientific quality and clear identification of the issues listed above. In addition each group will be presenting 12-15 minutes on the topic of their report.

SCNC2122 Marine life science: a North East Pacific perspective (6 credits)		**Academic Year**	**2015**
Offering Department	Faculty	**Quota**	32
Course Co-ordinator	Dr T Vengatesen, Biological Sciences *(rajan@hku.hk)*		
Teachers Involved	Dr T Vengatesen, Biological Sciences Prof S Kwok, Faculty of Science Prof G A Williams, Biological Sciences Prof R S S Wu, Biological Sciences		
Course Objectives	Marine Life Science is an integrated study of how the oceans influence large and small scale patterns of marine biology through biophysical interactions. By studying the temperate cold waters of the NE Pacific Ocean, students will learn marine habitats as habitable planet, to appreciate the dynamics of marine biodiversity, the complex interactions between the physical and biological components, fishery, and the services the coastal oceans provide to human. This course will provide an excellent opportunity for students to experience the diversity of marine life on the other side of the Pacific.		
Course Contents & Topics	Lectures from both HKU and UBC teachers will introduce 'marine life science'; with a focus on biodiversity, abundance and distribution of species, productivity, coastal pollution, fisheries, aquaculture and climate change. The course will also introduce the commercial aspects of marine life, i.e. eel-grass, aquaculture and climate change mitigation through management of coastal ecosystems. All these lectures will be discussed through a series of field observations, presentations from guest lecturers and group discussions. There will be an excellent opportunity to touch and learn about Canada's wonderful marine life diversity in the Vancouver Aquarium, and northern Vancouver Fish Hatchery. Students will be learning Canada's coastal plankton biodiversity through vising the Marina (Reed point marina) and the Sea-grass habitat. There will also be several opportunities to explore the intertidal zone, exposed and protected coastal habitats, sandy beaches and estuaries in the Vancouver Island. Marine biodiversity survey techniques and methods of studying marine life in the field will be emphasized. Students will be exposed to a different learning environment involving not only HKU teachers and students but also UBC teachers and students, bringing diverse range of expertise, cultures, and learning opportunities from both sides of the Pacific Ocean to focus on the diversity, dynamic interactions and threats to marine life.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the basics of marine life science and the marine habitable planet CLO 2 explain the major types, causes, and effects of marine threats such as pollution, overfishing, global warming and ocean acidification, and invasive species, as well as describe the consequences of these threats for marine communities and ecosystem services CLO 3 describe the difference between coastal marine biodiversity and harbors in Hong Kong and Canada CLO 4 discover the reasons why marine biodiversity and ecosystem services in Hong Kong are so different from the North Pacific coastal ecosystems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will need to pass an interview in order to be enrolled in the course.		
Offer in 2015 - 2016	Y Summer	**Examination**	Summer
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate through knowledge in basics of marine science and clearly understand why and how coastal biodiversity in sub-tropical Hong Kong is different from the North Pacific coastal areas. Ability to explain how marine organisms have adapted to their particular environments. Showing strong abilities, and logical thinking, with evidence of original thought, to examine reasons why the diversity of marine life and their habitats are so important to human society. Independent critique on how human induced threats such as climate change, pollution and habitat change will affect marine life, its diversity and their ecosystem services.		

	B	Clear understanding of the basics of marine science. Ability to explain how marine organisms have adapted to their particular environments. Knowing the common views on the reasons why the diversity of marine life and their habitats are so important to human society. Knowing the common views on how human induced threats such as climate change, pollution and habitat change will affect marine life, its diversity and their ecosystem services.
	C	Demonstrate partial and limited command of knowledge and understanding of the basics of marine science, biodiversity and coastal ecosystem services. Develop little ability to explain how marine organisms have adapted to their particular environments. Knowing the common views on the reasons why the diversity of marine life and their habitats are so important to human society. Knowing the common views on how human induced threats such as climate change, pollution and habitat change will affect marine life, its diversity and their ecosystem services.
	D	Knowing some of the basics of marine science. Developing ability to explain how marine organisms have adapted to their particular environments.
	Fail	Fail to follow the basics of marine science and/or how marine organisms have adapted to their particular environments.

Course Type	Field camps

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	10 sessions x 2.5 hours	25
Field work	Field observation and work: about 5 to 6 field study	36
Presentation	Group discussion / Project: 1 group project with presentation	10
Reading / Self study		70

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Group project work (30-mins presentation)	25	CLO 2
Report	2-hour written examination	50	CLO 1,4
Test	Field observation (group activities & reports)	25	CLO 3,4

Required/recommended reading and online materials	Reference reading materials will be put on Moodle.
Course Website	http://www.scifac.hku.hk/news/bsc/ubc-summer-course
Additional Course Information	Please note: Students have to cover their own travel costs and course fees charged by the hosting institution (prices to be announced). This course will be offered subject to a minimum enrollment number and availability of teachers. Enrolment of this course is not conducted via the online course selection system. Students will be enrolled manually by the Faculty after approval has been obtained from the course coordinator.

SCNC3111 Frontiers of science honours seminar course (6 credits)		**Academic Year**	2015
Offering Department	Faculty	**Quota**	30
Course Co-ordinator	Prof P Chiu, Chemistry *(pchiu@hku.hk)*		
Teachers Involved	Dr E K M Leung & Dr E J Pickett, Faculty of Science Dr R K W Lui, Faculty of Science Dr B C H Ng, Faculty of Science Dr G W Porter, Faculty of Science Dr T D Wotherspoon, Faculty of Science		
Course Objectives	To introduce the research being done by our Faculty's star professors To broaden and enrich students' scientific knowledge in and outside of their chosen major To foster intellectual discussions between our research professors and students in a small group setting To observe how research is done and note the thinking processes and paths that lead to scientific discoveries To enhance students' awareness of the importance of science to solve some of the problems facing the society To collaborate with and learn from peers from different academic backgrounds in a scientific setting To develop essential written and spoken communication skills To serve as a potential mentor-mentee matching platform for faculty members and students		
Course Contents & Topics	Five to six professors from different departments will be featured in the honours seminar course, and they will discuss their latest research with students. The topics will span the areas of Biological Sciences, Chemistry, Earth Sciences, Physics, as well as Mathematics/Statistics & Actuarial science. In addition, the following topics to prepare students for conducting and communicating research will also be introduced: Introduction to Different Search Engines for Scientific Journals and/or Decoding a Scientific Paper and/or Effective Communication for Scientists (Writing, Oral and Poster Presentations).		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	describe and discuss in an informed manner the fields of research of some of our research professors
CLO 2	identify how professors with different scientific training solve their research problems
CLO 3	apply literature search skills to identify and develop a research topic
CLO 4	practice and master scientific writing and presentation skills

	CLO 5	demonstrate interpersonal skills in collaborating with their peers in a scientific setting
	CLO 6	devise a research proposal and evaluate their peers' works

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in SCNC1111, SCNC1112 and a level 2 science course. Students who participated or will participate in ORF/SRF must take this course.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply knowledge to a wide range of familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	A series of writing and reflection assignments will be given	40	CLO 1,2,4
Presentation	Students will give a 30-minute group presentation during the last week of the instruction	40	CLO 3,4,5,6
Project reports	In-class formative assessment: activities for students to work in groups	20	CLO 1,2,4,5

Required/recommended reading and online materials	TBC (suggested by the professors)

STAT1600 Statistics: ideas and concepts (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	Dr K P Wat, Statistics & Actuarial Science Dr Y K Chung, Statistics & Actuarial Science Prof W K Li, Statistics & Actuarial Science		
Course Objectives	The course aims at providing a broad overview of statistics for students who aspire to major in Statistics or Risk Management. It focuses on the roles of statistics as a scientific tool with applications to a wide spectrum of disciplines, and as a science of reasoning which has revolutionized modern intellectual endeavours. It lays a panoramic foundation for a formal study of statistics at the university level.		
Course Contents & Topics	- Data collection: observational studies versus designed experiments - Data presentation: tables; graphs; frequency distributions; correlations; trends - Probability: randomness; probability models; distributions; measures of central tendency and dispersion - Inference: estimation; tests of significance and hypotheses; confidence intervals; regression; prediction - Further issues: controversies; misuse of statistics; ethics.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the role of statistics as a tool for scientific reasoning CLO 2 present data in a useful and informative way CLO 3 acquire basic concepts and perspectives of statistical modelling and inference CLO 4 distinguish between good and bad statistical practices CLO 5 pursue a major study in Statistics or Risk Management with a well-established conceptual foundation		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	see table below		
Assessment Methods and Weighting	see table below		
Required/recommended reading and online materials	Utts, J.M. (2014). Seeing Through Statistics (4th edition). Cengage Learning. Heckard, R.F. and Utts, J.M. (2012). Statistics (International edition, 4th edition). Cengage Learning. Albright, S. C., Winston, W. L. and Zappe, C. J. (2009). Data Analysis and Decision Making with Microsoft Excel. Cengage Learning. Moore, D. S. and Notz, W. I. (2006). Statistics: Concepts and Controversies. Freeman: New York.		
Course Website	moodle.hku.hk		

Course Teaching & Learning Activities:

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, class test(s) and project(s))	60	CLO 1,2,3,4,5
Examination	One 2-hour written examination	40	CLO 1,2,3,4,5

STAT1601 Elementary statistical methods (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Mrs G M Jing, Statistics & Actuarial Science *(gmjing@saas.hku.hk)*		

<table>
<tr><td>Teachers Involved</td><td colspan="3">Mrs G M Jing, Statistics & Actuarial Science</td></tr>
<tr><td>Course Objectives</td><td colspan="3">Research findings are usually supported by data. Data collected in an experiment/survey are often concerned with situations involving variability and uncertainty. They are used to estimate the true value of a certain quantity or to test the acceptability of a certain new hypothesis. Valid methods of analysing the data are thus essential to any successful investigation. The course aims to present the fundamentals of statistical methods widely used by researchers. Microsoft Excel might be used to carry out some statistical analysis. There is no demand of sophisticated technical mathematics.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">The course will introduce and study the following topics:
Presentation of data, Measures of Central Tendency, Measures of Variability and Uncertainty, Basic Probability Laws, Common Probability Distributions such as Uniform, Binomial, Poisson, Hyper-geometric, Geometric and Normal distributions, Random Sampling, Distribution of the Mean, Normal Sampling Theorem, Point Estimation, Confidence Intervals, Sample Size Determination, Hypothesis Testing, Inferences for Mean and Proportion, Chi-squared tests, Simple Regression and Correlation</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:
<table>
<tr><td>CLO 1</td><td>select and use appropriate statistical methods to analyze data</td></tr>
<tr><td>CLO 2</td><td>perform statistical analysis with calculator and Microsoft Excel</td></tr>
<tr><td>CLO 3</td><td>understand and apply basic concepts of probability</td></tr>
<tr><td>CLO 4</td><td>gain familiarity with the fundamental concepts of random variables</td></tr>
<tr><td>CLO 5</td><td>make inferences on a population based on sample data</td></tr>
<tr><td>CLO 6</td><td>determine the most appropriate statistical method to use for a given statistical problem</td></tr>
<tr><td>CLO 7</td><td>write appropriate conclusions based on the statistical results</td></tr>
<tr><td>CLO 8</td><td>understand the basic principles of simple linear regression and correlation and their applications to practical problems</td></tr>
</table></td></tr>
<tr><td>Pre-requisites
(and Co-requisites and
Impermissible combinations)</td><td colspan="3">Level 2 or above in HKDSE Mathematics or equivalent; and
Not for students with Level 2 or above in HKDSE Mathematics Extended Module 1 or 2; and
Not for students who have passed or already enrolled in any of the following courses: STAT2901 Probability and statistics: foundations of actuarial science, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, ECON1280 Analysis of economic data</td></tr>
<tr><td>Offer in 2015 - 2016</td><td>Y 2nd sem</td><td>Examination</td><td>May</td></tr>
<tr><td>Offer in 2016 - 2017</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3"><table>
<tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr>
<tr><td>B</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.</td></tr>
<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr>
<tr><td>D</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.</td></tr>
<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td colspan="3">Lecture-based course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3"><table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>36</td></tr>
<tr><td>Tutorials</td><td></td><td>12</td></tr>
<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
</table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td colspan="3"><table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr>
<tr><td>Assignments</td><td>Coursework (assignments, tutorials, and a class test)</td><td>25</td><td>CLO 1,2,3,4,5,6</td></tr>
<tr><td>Examination</td><td>One 2-hour written examination</td><td>75</td><td>CLO 1,2,3,4,5,6,7,8</td></tr>
</table></td></tr>
<tr><td>Required/recommended reading
and online materials</td><td colspan="3">Chiu W. K.: Basic Statistics (Pearson (Asia), 2007)
Larson, R. & Farber, B.: Elementary Statistics, Picturing the World (Prentice Hall, 2008, 4th ed.)
Berk, K.N. & Carey, P.: Data Analysis with Microsoft EXCEL (Duxbury press, Update Office 2007)
Freund, J. E. & Perles, B. M.: Statistics - A First Course (Prentice Hall, 2004, 8th ed.)</td></tr>
<tr><td>Course Website</td><td colspan="3">moodle.hku.hk</td></tr>
<tr><td>Additional Course Information</td><td colspan="3">Calculator: CASIO fx-50FH (This model has SD-MODE, REG-MODE, nCr and Normal Probability Function which is very suitable for this course.)</td></tr>
</table>

STAT1602 Business statistics (6 credits)		Academic Year	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr R W L Wong, Statistics & Actuarial Science *(rwong@hku.hk)*		
Teachers Involved	Dr R W L Wong, Statistics & Actuarial Science		
Course Objectives	The discipline of statistics is concerned with situations involving uncertainty and variability. Variability greatly affects the interpretation of data. Thus statistics forms an important descriptive and analytical tool. This elementary course, which is taught without much technical mathematics, presents many standard situations of data analysis and interpretation with emphases on business examples. The statistical tests of these situations are presented. Microsoft Excel might be used to carry out some statistical analysis.		
Course Contents & Topics	The course will introduce and discuss the following topics: Presentation of Data, Measures of Central Tendency, Measures of Variability and Uncertainty, Elementary Probability Rules and Basic Probability Distributions such as Binomial, Normal, Poisson, Hyper-geometric and Geometric, Random Sampling, the Normal Sampling Theorem, Point Estimation, Confidence Intervals and Sample Size Determination, Hypothesis Testing involving Inferences for Means and Proportions as well as the Chi-square tests, Simple Regression and Correlation, Elementary Time Series and Index Numbers		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the methods for describing sets of data
CLO 2	perform statistical analysis with calculator and Microsoft Excel, draw conclusions from data using numerical summaries
CLO 3	understand and apply basic concepts of probability
CLO 4	gain familiarity with the fundamental concepts of random variables
CLO 5	make inferences on a population based on sample data
CLO 6	determine the most appropriate statistical method to use for a given statistical problem
CLO 7	gain familiarity with the fundamental concepts of statistical inference as they apply to a variety of problems
CLO 8	understand the basic principles of simple linear regression and correlation and their applications to practical problems in today's society

Pre-requisites (and Co-requisites and Impermissible combinations)	NIL Not for students who have passed or already enrolled in any of the following courses: STAT1601 Elementary statistical methods, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science, ECON1280 Analysis of economic data (This course is exclusive for School of Business students.)		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
Examination	One 2-hour written examination	75	CLO 1,2,3,4,5,6,7,8

Gerald Keller: Managerial Statistics (Cengage Learning, 2009, 8th edition)
Freund, J. E. & Perles, B. M.: Modern Elementary Statistics (Prentice Hall, 2006, 12th ed.)

Required/recommended reading and online materials	Berk, K.N. & Carey, P.: Data Analysis with Microsoft EXCEL (Duxbury press, Update Office 2007) Bowerman, B.L. & O'Connell, E.S.: Business Statistics in Practice (McGraw-Hill International Edition, 2008, 5th ed.)
Course Website	moodle.hku.hk

STAT1603 Introductory statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E K F Lam, Statistics & Actuarial Science *(hrntlkf@hku.hk)*		
Teachers Involved	Dr E K F Lam, Statistics & Actuarial Science		
Course Objectives	The discipline of statistics is concerned with situations involving uncertainty and variability. The interpretation of data needs special techniques when variability plays a role, as it usually does. Thus statistics forms an important descriptive and analytical tool of many scientific disciplines. Candidates with a mathematical background will find this course suitable, because the language of mathematics allows the subject of statistics to be presented with economy and clarity.		
Course Contents & Topics	Presentation of data, Variability and Uncertainty, Measures of Central Tendency, Measures of Dispersion, Basic Probability Theory and Techniques, Random Variables and Probability Distributions, Random Samples, Point Estimation, Normal Sampling Theorem, Confidence Intervals, Hypotheses Testing, Simple Linear Regression and Correlation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: compute different measures of central tendency and dispersion CLO 2: make use of the basic probability theory and techniques to solve practical problem CLO 3: know how to construct confidence intervals and use hypotheses testing to carry out inference on the population CLO 4: use linear regression and correlation methods to solve problems in science and in social and business environment		
Pre-requisites (and Co-requisites and Impermissible combinations)	(Level 2 or above in HKDSE Mathematics Extended Module 1 or 2 or equivalent) or (Pass in MATH1011 University mathematics I, or already enrolled in this course); and Not for students who have passed or already enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Miller, I. and Miller, M.: John E. Freund's Mathematical Statistics with Applications (Prentice Hall, New Jersey, 2004, 7th edition) Larson, R. and Farber, B.: Elementary Statistics - Picturing the World (Prentice Hall, 2006, 3rd edition) Bluman, A. G.: Elementary Statistics - A Step by Step Approach (The McGraw-Hill Companies, Inc., 2004, 5th edition) Triola, M. F.: Elementary Statistics (Addiso Wesley Longman, Inc., 1998, 7th edition)
Course Website	moodle.hku.hk

Additional Course Information	Students who intend to major in "Risk Management" or "Statistics" should take STAT2601 instead of this course. Other references: Wonnacott, T. H. and Wonnacott, R. J.: Introductory Statistics (Wiley, New York, 1972, 2nd edition) Dixon, W. J. and Massey, Jr, F. J.: Introduction to Statistical Analysis (McGraw Hill, 1983, 4th edition)

STAT2601 Probability and statistics I (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr C W Kwan, Statistics & Actuarial Science *(cwkwan@hku.hk)*		
Teachers Involved	Dr C W Kwan, Statistics & Actuarial Science Dr K P Wat, Statistics & Actuarial Science		
Course Objectives	The discipline of statistics is concerned with situations in which uncertainty and variability play an essential role and forms an important descriptive and analytical tool in many practical problems. Against a background of motivating problems this course develops relevant probability models for the description of such uncertainty and variability.		
Course Contents & Topics	Sample spaces; Operations of events; Probability and probability laws; Conditional probability; Independence; Discrete random variables; Cumulative distribution function (cdf); Probability mass function (pmf); Bernoulli, binomial, geometric, and Poisson distributions; Continuous random variables; Cumulative distribution function (cdf); Probability density function (pdf); Exponential, Gamma, and normal distributions; Functions of a random variable; Joint distributions; Marginal distributions; Independent random variables; Functions of jointly distributed random variables; Expected value; Variance and standard deviation; Covariance and correlation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the basic concepts in probability theory CLO 2: gain some insights to statistics and inference CLO 3: solve real-world problem by using probability calculations CLO 4: pursue their further studies in statistics		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass or already enrolled in MATH2014 Multivariable calculus and linear algebra, or (MATH2101 Linear algebra I and MATH2211 Multivariable calculus), for students admitted in 2014 or thereafter; or Pass in MATH1013 University mathematics II, or already enrolled in this course, for students admitted in 2013 or before; or Pass in MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics, for students admitted in 2013 or before; and Not for students who have passed in STAT1603 Introductory statistics, or already enrolled in this course; Not for students who have passed in STAT2901 Probability and statistics: foundations of actuarial science, or already enrolled in this course; and Not for BSc(ActuarSc) students.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and class test(s))	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	DeGroot, M.H. and Schervish, M.J.: Probability and Statistics (Boston: Addison-Wesley, 2012, 4th ed.) Sheldon, R.: A First Course in Probability (Upper Saddle River: Prentice Hall, 2010, 8th ed.) Miller, I. and Miller, M.: John E. Freund's Mathematical Statistics with Applications (Upper Saddle River: Prentice Hall, 2004, 7th ed.) Hogg, R.V., McKean J.W., and Craig, A.T.: Introduction to Mathematical Statistics (Upper Saddle River: Prentice Hall, 2013, 7th ed.) Hogg, R. V. & Tanis E. A.: Probability and Statistical Inference (Upper Saddle River: Prentice Hall, 2010, 8th ed.)
Course Website	moodle.hku.hk

STAT2602 Probability and statistics II (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E K F Lam, Statistics & Actuarial Science *(hrntlkf@hku.hk)*		
Teachers Involved	Dr K S Chong, Statistics & Actuarial Science Dr E K F Lam, Statistics & Actuarial Science		
Course Objectives	This course builds on STAT2601, introducing further the concepts and methods of statistics. Emphasis is on the two major areas of statistical analysis: estimation and hypothesis testing. Through the disciplines of statistical modelling, inference and decision making, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of real-life data.		
Course Contents & Topics	1. Overview: random sample; sampling distributions of statistics; moment generating function; large-sample theory: laws of large numbers and Central Limit Theorem; likelihood; sufficiency; factorisation criterion; 2. Estimation: estimator; bias; mean squared error; standard error; consistency; Fisher information; Cramer-Rao Lower Bound; efficiency; method of moments; maximum likelihood estimator; 3. Hypothesis testing: types of hypotheses; test statistics; p-value; size; power; likelihood ratio test; Neyman-Pearson Lemma; generalized likelihood ratio test; Pearson chi-squared test; Wald tests; 4. Confidence interval: confidence level; confidence limits; equal-tailed interval; construction based on hypothesis tests.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: apprehend the objectives of statistics and its relation to probability theory CLO 2: relate a real-life problem to a formal framework for statistical inference CLO 3: conduct standard parametric statistical inference by means of estimation and hypothesis testing CLO 4: reckon the general applicability of statistics in a broad range of subject areas		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2601 Probability and statistics I; and Not for students who have passed in STAT3902 Statistical models, or already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Assignments / Coursework (assignments, tutorials and a class test) / 25 / CLO 1,2,3,4 Examination / One 2-hour written examination / 75 / CLO 1,2,3,4		
	Berry, D.A. & Lindgren, B.W. (1996). Statistics: Theory and Methods. Duxbury: Belmont. Bickel, P.J. & Doksum, K.A. (2001). Mathematical Statistics: Basic Ideas and Selected Topics. Prentice		

Required/recommended reading and online materials	Hall: Upper Saddle River, N.J. Hogg, R.V. & Craig, A.T. (1989). Introduction to Mathematical Statistics. Macmillan: New York. Miller, I. & Miller, M. (2004). John E. Freund's Mathematical Statistics with Applications. Pearson Prentice Hall: Upper Saddle River.
Course Website	moodle.hku.hk

STAT2603 Data management with SAS (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Dr C W Kwan, Statistics & Actuarial Science *(cwkwan@hku.hk)*		
Teachers Involved	Dr G C S Lui, Statistics & Actuarial Science Dr C W Kwan, Statistics & Actuarial Science		
Course Objectives	This course is designed for students who want to learn a statistical software (SAS) for data management and elementary data analysis. This course focuses on using SAS to manage data set input and output, work with different data types, manipulate and transform data, perform random sampling and descriptive data analysis, and create summary reports and graphics.		
Course Contents & Topics	Data management system for statistical projects. Data validation and cleaning techniques. SAS programming topics, including the following: Data set input and output. Working with different data types. Data manipulation. Data transformation. File manipulation. File management. Data reporting, summarization, presentation and graphics. Basic data analysis. Structured query language.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	access online help and document
CLO 2	use Data Step to create data files
CLO 3	summarize data by PROC MEANS, PROC FREQ, and PROC UNIVARIATE
CLO 4	work with numeric, character, and date variables and functions in Data Step
CLO 5	perform conditional processing in Data Step
CLO 6	perform iterative processing in Data Step including the following: work with arrays in Data step; restructure SAS data sets by Data Step and PROC TRANSPOSE; subset and merge data sets by Data Step and PROC APPEND; present data in a readable way by PROC TABULATE; produce high-resolution graphics by PROC SGPLOT, HTML output by ODS; procedure SQL for structured query language

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT1600 Statistics: ideas and concepts, or already enrolled in this course		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	40	CLO 1,2,3,4,5,6
Examination	One 2-hour written examination	60	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Cody, R.P.: Learning SAS by Example: A Programmer's Guide (North Carolina: SAS Institute Inc., 2007) SAS: SAS Certification Prep Guide: Base Programming for SAS 9. Third Edition. (SAS Institute Inc., 2011) Bailer, J.: Statistical Programming in SAS. North Carolina: (SAS Institute Inc., 2010)

	Delwiche, L. and Slaughter, S.: The Little SAS Book: A Primer. Fifth Edition. (SAS Institute Inc, 2012) Cody, R. P.: Cody's Data Cleaning Techniques Using SAS System (North Carolina: SAS Institute, 2008, 2nd edition) SAS: Step by Step Programming with Base SAS Software (North Carolina: SAS Publishing, 2001)
Course Website	moodle.hku.hk

STAT2605 Demographic and socio-economic statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Ms L M S Kwan, Statistics & Actuarial Science *(lucykwan@hku.hk)*		
Teachers Involved	Ms L M S Kwan, Statistics & Actuarial Science		
Course Objectives	The course covers the major methods for studying demographic and socio-economic statistics, which provide quantitative information on the essential aspects of the lives of citizens in a territory. The course aims to provide students with 1) basic knowledge including the underlying principles of the pertinent methods and statistical indicators; and 2) skills in the statistical descriptions of a territory and their interpretation and application to planning, policy-making and commercial endeavours.		
Course Contents & Topics	Population structure, fertility, mortality, migration, life tables, population projections; Social statistics on health, housing, labour, and social inequality; Economic statistics on GDP and green GDP, prices; Sources, theory and methods of official statistics; Examples would be especially drawn from Hong Kong, and Mainland China.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 describe and interpret major official & other publicly disseminated socio-economic statistics of a territory CLO 2 further appraise and analyse the socio-economic well-being of a territory with particular reference to Hong Kong and mainland China CLO 3 predict a future situation by assimilating and deriving from appropriate statistics CLO 4 critically assess statistics reporting		
Pre-requisites (and Co-requisites and Impermissible combinations)	(Level 2 or above in HKDSE Mathematics or Level 2 or above in HKDSE Mathematics Extended Module 1 or 2 or equivalent); and Pass in or already enrolled in any of these courses: BIOL2102 Biostatistics, ECON1280 Analysis of economic data, STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials and a test)	25	CLO 1,2,3,4
Examination	One 2-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Annual Digest of Statistics (Census & Statistics Department, Hong Kong SAR, latest issue) Pollard A. H., Yusuf F., & Pollard G. N.: Demographic Techniques (Pergamon Press, 1990, 3rd edition) Giovannini E.: Understanding Economic Statistics - an OECD Perspective (OECD, 2008)
Course Website	moodle.hku.hk

<table>
<tr><td colspan="2">STAT2901 Probability and statistics: foundations of actuarial science (6 credits)</td><td>Academic Year</td><td>2015</td></tr>
<tr><td>Offering Department</td><td>Statistics & Actuarial Science</td><td>Quota</td><td>---</td></tr>
<tr><td>Course Co-ordinator</td><td colspan="3">Prof J J F Yao, Statistics & Actuarial Science (jeffyao@hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td colspan="3">Prof J J F Yao, Statistics & Actuarial Science</td></tr>
<tr><td>Course Objectives</td><td colspan="3">The purpose of this course is to develop knowledge of the fundamental tools in probability and statistics for quantitatively assessing risk. Applications of these tools to actuarial science problems will be emphasized. Students will have a thorough command of probability topics and the supporting calculations.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">1. General Probability
- Basic elements of probability in set notation
- Mutually exclusive events
- Addition and multiplication rules
- Independence of events
- Combinatorial probability
- Conditional probability and expectations
- Bayes Theorem / Law of total probability
- Random variables
2. Univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, chi-square, beta, Pareto, lognormal, gamma, Weibull and normal) and bivariate normal distribution
- Probability functions and probability density functions
- Cumulative distribution functions
- Mode, median, percentiles and moments
- Variance and measures of dispersion
- Central Limit Theorem
3. Sampling distributions and introduction of estimation</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:
<table>
<tr><td>CLO 1</td><td>understand the mathematical theory underlying the modern practice of statistics</td></tr>
<tr><td>CLO 2</td><td>develop skills in probabilistic analysis for problems involving randomness</td></tr>
<tr><td>CLO 3</td><td>apply techniques in probability and statistics to solve actuarial science problems</td></tr>
</table></td></tr>
<tr><td>Pre-requisites
(and Co-requisites and Impermissible combinations)</td><td colspan="3">(Pass in MATH1821 Mathematical methods for actuarial science I (for BSc(ActuarSc) students) or already enrolled in this course) or (Pass in MATH1013 University mathematics II or already enrolled in this course (for students outside the BSc(ActuarSc) programme); and
Not for students who have passed or enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics</td></tr>
<tr><td>Offer in 2015 - 2016</td><td>Y 2nd sem</td><td>Examination</td><td>May</td></tr>
<tr><td>Offer in 2016 - 2017</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3">
<table>
<tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr>
<tr><td>B</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.</td></tr>
<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr>
<tr><td>D</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.</td></tr>
<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td colspan="3">Lecture-based course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3">
<table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>36</td></tr>
<tr><td>Tutorials</td><td>tutorials/example classes</td><td>12</td></tr>
<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
</table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td colspan="3">
<table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr>
<tr><td>Assignments</td><td>Coursework (assignments, tutorials, and a class test)</td><td>25</td><td>CLO 1,2,3</td></tr>
<tr><td>Examination</td><td>One 2-hour written examination</td><td>75</td><td>CLO 1,2,3</td></tr>
</table></td></tr>
<tr><td>Required/recommended reading
and online materials</td><td colspan="3">I. Miller & M. Miller: John E. Freund's Mathematical Statistics with applications (Pearson Education International, 2004, 7th edition)
M. A. Bean: Probability: The Science of Uncertainty with Applications to Investments, Insurance, and</td></tr>
</table>

	Engineering (Brooks/Cole, Thomas Learning) S. Ghahramani: Fundamentals of Probability, with Stochastic Processes (2005, 3rd edition) M. Hassett & D. Stewart: Probability for Risk Management (2006, 2nd edition) S.M. Ross: A First Course in Probability (2005, 7th edition) D. Wackerly, W. Mendenhall III & R. Scheaffer: Mathematical Statistics with Applications (2008, 7th edition)
Course Website	moodle.hku.hk

STAT2902 Financial mathematics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof K C Yuen, Statistics & Actuarial Science *(kcyuen@hku.hk)*		
Teachers Involved	Prof K C Yuen, Statistics & Actuarial Science		
Course Objectives	This course introduces the fundamental concepts of financial mathematics which plays an important role in the development of basic actuarial techniques. Practical applications of these concepts are also covered.		
Course Contents & Topics	Key topics include: measurement of interest, annuities certain; discounted cash flow analysis; yield rates; amortization schedules and sinking funds; bonds and related securities; practical applications such as real estate mortgage and short sales; stochastic approaches to interest; and key terms of financial analysis such as yield curves, spot rates, forward rates, duration, convexity, and immunization.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the fundamental concepts of financial mathematics CLO 2: learn standard actuarial notations for a variety of annuities CLO 3: do simple discounted cashflow analysis using basic annuities CLO 4: learn the operations of some commonly-encountered financial instruments such as bonds, mortgages, short sales, and so on CLO 5: quote interest in various modes and determine interest rate based on a series of financial transactions CLO 6: deal with Exam FM of the Society of Actuaries		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2901 Probability and statistics: foundations of actuarial science or already enrolled in this course; and Not for students who have passed in STAT3615 Practical mathematics for investment, or already enrolled in this course.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/example classes	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and class test(s))	25	CLO 1,2,3,4,5,6
Examination	One 3-hour written examination	75	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Kellison, S. G.: The Theory of Interest (Irwin: Illinois, 2008, 3rd edition) Broverman, S. A.: Mathematics of Investment and Credit (ACTEX Publications - Mad River Books: Connecticut, 2004, 3rd edition)
Course Website	moodle.hku.hk

STAT3600 Linear statistical analysis (6 credits)		Academic Year	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof S M S Lee, Statistics & Actuarial Science *(smslee@hku.hk)*		
Teachers Involved	Dr K Y Wu, Statistics & Actuarial Science Prof S M S Lee, Statistics & Actuarial Science		
Course Objectives	The analysis of variability is mainly concerned with locating the sources of the variability. Many statistical techniques investigate these sources through the use of 'linear' models. This course presents the theory and practice of these models.		
Course Contents & Topics	(1) Simple linear regression: least squares method, analysis of variance, coefficient of determination, hypothesis tests and confidence intervals for regression parameters, prediction. (2) Multiple linear regression: least squares method, analysis of variance, coefficient of determination, reduced vs full models, hypothesis tests and confidence intervals for regression parameters, prediction, polynomial regression. (3) One-way classification models: one-way ANOVA, analysis of treatment effects, contrasts. (4) Two-way classification models: interactions, two-way ANOVA for balanced data structures, analysis of treatment effects, contrasts, randomised complete block design. (5) Universal approach to linear modelling: dummy variables, 'multiple linear regression' representation of one-way and two-way (unbalanced) models, ANCOVA models, concomitant variables. (6) Regression diagnostics: leverage, residual plot, normal probability plot, outlier, studentized residual, influential observation, Cook's distance, multicollinearity, model transformation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand linear regression model with one or multiple independent variables
CLO 2	understand ANOVA models for one and two factors
CLO 3	understand general linear model with categorical and continuous independent variables

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
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Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials and a test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	Michael H Kutner, Christopher J. Nachtsheim, John Neter, William Li: Applied Linear Statistical Models (McGraw-Hill/Irwin; 5th edition) Berry, D. A. & Lindgren, B. W.: Statistics: Theory and Methods (Duxbury Belmont, 1996) Draper, N. R. & Smith, H.: Applied Regression Analysis (Wiley, New York, 1998) Krzanowski, W. J.: An Introduction to Statistical Modelling (Arnold, London, 1998) Montgomery, D. C. & Peck, E. A.: Introduction to Linear Regression Analysis (Wiley, New York, 1992)
Course Website	moodle.hku.hk

STAT3602 Statistical inference (6 credits)		Academic Year	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof S M S Lee, Statistics & Actuarial Science *(smslee@hku.hk)*		
Teachers Involved	Prof S M S Lee, Statistics & Actuarial Science		
Course Objectives	This course covers the advanced theory of point estimation, interval estimation and hypothesis testing. Using a mathematically-oriented approach, the course provides a solid and rigorous treatment of inferential problems, statistical methodologies and the underlying concepts and theory. It is suitable in particular for students intending to further their studies or to develop a career in statistical research.		
Course Contents & Topics	1. Paradigms of inference: frequentist, Bayesian, Fisherian. 2. Decision theory: loss function; risk; decision rule; admissibility; minimaxity; unbiasedness; Bayes' rule. 3. Estimation theory: exponential families; likelihood; sufficiency; minimal sufficiency; ancillarity; completeness; UMVU estimators; information inequality; large-sample theory of maximum likelihood estimation. 4. Hypothesis testing: uniformly most powerful test; monotone likelihood ratio; unbiasedness; UMP unbiased test; maximal invariants; most powerful invariant test; large-sample theory of likelihood ratio.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — form a panoramic view of classical developments in mathematical statistics CLO 2 — gain thorough insight into the essentials of statistical inference CLO 3 — build a solid foundation for future research studies in statistics and related areas		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	(see table below)		
Assessment Methods and Weighting	(see table below)		
Required/recommended reading and online materials	Berry, D. A. & Lindgren, B. W.: Statistics: Theory and Methods (Duxbury, Belmont, 1996) Bickel, P. J. & Doksum, K. A.: Mathematical Statistics: Basic Ideas and Selected Topics, Vol. 1 (Prentice Hall, Upper Saddle River, N.J., 2001) Freund, J. E.: Mathematical Statistics (Prentice Hall, Englewood Cliffs, N.J., 1992) Hogg, R. V. & Craig, A. T.: Introduction to Mathematical Statistics (Macmillan, New York, 1989) Pace, L. & Salvan, A.: Principles of Statistical Inference: from a neo-Fisherian perspective (World Scientific: Singapore, 1997). Young, G.A. & Smith, R.L.: Essentials of Statistical Inference (Cambridge University Press: Cambridge, 2005).		
Course Website	moodle.hku.hk		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

STAT3603 Probability modelling (6 credits)		Academic Year	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J Song, Statistics & Actuarial Science *(txjsong@hku.hk)*		

Teachers Involved	Dr J Song, Statistics & Actuarial Science
Course Objectives	This is an introductory course in probability modelling. A range of important topics in stochastic processes will be discussed.
Course Contents & Topics	Introduction to probability theory, conditional probability and expectation, Markov chains, random walk models, classification of states in a Markov chain, calculation of limiting probabilities and mean time spent in transient states, Poisson process, distribution of interarrival time and waiting time, conditional distribution of the arrival time, Brownian Motion, hitting time and maximum variable, geometric Brownian motion, the Black-Scholes option pricing formula, Gaussian bridge, and stationary processes. Birth-and-death process, branching process and renewal process may also be covered (if time permits).
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 apply the conditioning method to calculate the mean and probability CLO 2 understand the essentials of Markov chains, the Poisson process, and Brownian motion CLO 3 understand how stochastic models can be applied to the study of real-life phenomena
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2601 Probability and statistics I; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3903 Stochastic models, or have already enrolled in this course.
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	S. M. Ross: Introduction to Probability Models (9th edition)
Course Website	moodle.hku.hk

STAT3604 Design and analysis of experiments (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Li, Statistics & Actuarial Science *(csglui@hku.hk)*		
Teachers Involved	Dr G Li, Statistics & Actuarial Science		
Course Objectives	Scientific research often requires proper design and analysis of experiments. This course aims to introduce the basic principles of experimental design; to explain the concepts and to develop the statistical skills in model-based analysis of experiment.		
Course Contents & Topics	Basic principles and guidelines for designing experiments. Analysis for experiments with a single factor, randomised block, crossed and nested factorial structure. Balanced incomplete factorial experiments. Latin squares and related designs. Fixed/random effects models.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 develop a conceptual understanding of experimental design		

	CLO 2 acquire the fundamental statistical tools of experimental design and the understanding to use them appropriately CLO 3 select appropriate experimental designs for different problems CLO 4 select appropriate statistical model and to know how to validate the model
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3611 Computer-aided data analysis
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
Examination	One 2-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials

D. C. Montgomery: Design and Analysis of Experiments (Wiley, 1997, 4th edition)
D. R. Cox: Planning of Experiments (Wiley, 1958)
A. L. Edwards: Experimental Design in Psychological Research (Harper & Row, 1985, 5th edition)
G. A. Ferguson & Y. Takane: Statistical Analysis in Psychology and Education (McGraw Hill, 1989, 6th edition)
C. R. Hicks & K. V. Turner Jr.: Fundamental Concepts in the Design of Experiments (Oxford, 1999, 5th edition)
P. W. M. John: Statistical Design and Analysis of Experiments (Macmillan, 1971)
R. L. Moson, R. F. Gungst, & J. L. Hess: Statistical Design and Analysis of Experiments (Wiley, 1989)

Course Website: moodle.hku.hk

STAT3605 Quality control and management (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E A L Li, Statistics & Actuarial Science *(ericli11@hku.hk)*		
Teachers Involved	Dr E A L Li, Statistics & Actuarial Science		
Course Objectives	The successful control of quality in production is a matter of primary importance to a company's prosperity. This course provides an overview of quality compromise which involves both the producer and the consumer. It presents a variety of statistical solutions including control charts, acceptance and sequential sampling plans, reliability, and life-testing. Contemporary quality management systems such as total quality control, zero defects, six-sigma, and ISO-9000 will be introduced. The student is brought to the frontier of today's quality control and management ideas.		
Course Contents & Topics	Probability distributions and their applications, process variability, sampling and statistical inference. Process control, variables and attributes control charts. Operating characteristic curves. Single, double and sequential sampling plans. MIL-STD-105D and Dodge-Romig schemes. Variables sampling. Reliability and life-testing. Elementary experimental designs. Management of quality control, total quality control, zero defects, six-sigma, and ISO 9000.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 appreciate the practicality of statistical concepts and methods in general CLO 2 understand how certain specific statistical methods can benefit various production situations CLO 3 know the traditional and modern systems of quality management		

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3902 Statistical models		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	see table below		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials

A. J. Duncan: Quality Control and Industrial Statistics (Irwin, Homewoor, 1986, 5th edition)
D. C. Montgomery: Statistical Quality Control (New York: Wiley, 1996, 3rd edition)
J. Banks: Principles of Quality Control (New York: Wiley, 1989)
E. L. Grant & R. S. Leavenworth: Statistical Quality Control (New York: McGraw-Hill, 1988, 6th edition)
I. D. Hill: An Introduction to Sampling Inspection (The Institute of Engineering Inspection Monograph, London, 1961)
G. B. Wetherill: Sampling Inspection and Quality Control (London: Methuen, 1977, 2nd edition)
A. V. Feigenbaum: Total Quality Control (New York: McGraw-Hill, 1983, 3rd edition)

Course Website: moodle.hku.hk

STAT3606 Business logistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Ms O T K Choi, Statistics & Actuarial Science *(ochoi@saas.hku.hk)*		
Teachers Involved	Ms O T K Choi, Statistics & Actuarial Science		
Course Objectives	Modern business corporations are increasingly using logistics as a management tool, for example, in capital budgeting problems, production planning, scheduling, transportations and deciding location for a new factory. This course addresses the business applications of logistics.		
Course Contents & Topics	In this course, students will apply the analytical skills with aid of computer techniques in solving the business logistic problems. Topics include optimization techniques applied in allocation of resources, financial planning, transportation, assignment, inventory control and queuing problems.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 solve linear programming with Graphical approach, Simplex method and hands-on Excel Solving function CLO 2 set-up and solve network flow problems using least-cost approach, MODI method and Vogel's approximation. CLO 3 understand decision theory and its applications CLO 4 evaluate the cost and effectiveness of service systems		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science; and		

	Not for students who have passed MATH3901 Operations research I, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials and a test)	25	CLO 1,2,3,4
Examination	One 2-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials

B. Render, R. Stair, M. Hanna: Quantitative Analysis for Management, 10th edition, Pearson
Wayne L. Winston: Operations Research, 4th edition, Thomson Learning
H. Taha: An Introduction to Operations Research, 8th edition, Pearson International Edition
F.S. Hillier and G, J. Lieberman: An Introduction to Operations Research
Robert F.V. Anderson, Holt, Rinehart and Winston: Introduction to Linear Algebra

Course Website: moodle.hku.hk

STAT3607 Statistics in clinical medicine and bio-medical research (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof G Yin, Statistics & Actuarial Science *(gyin@hku.hk)*		
Teachers Involved	Prof G Yin, Statistics & Actuarial Science		
Course Objectives	In clinical research, medical data are often observed which motivates the application of statistical methodology to the clinical observational and decision-making process. Also, statistical problems often arise from clinical trial designs. It involves phase I, II, III and IV clinical trial designs, both Bayesian and frequentist approaches, sample size and power calculation. No knowledge in biology or medicine is assumed; the course provides the necessary biomedical background when the statistical problems are introduced.		
Course Contents & Topics	The contents of the course include contingency tables, regression models, survival analysis, categorical data analysis, Bayesian designs, dose-finding methods, sample size and power calculation, phase I, II and III trial designs, hypothesis testing, adaptive designs.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the basic concepts in medical statistics
CLO 2	design clinical trials and compute sample sizes
CLO 3	conduct statistical inference and apply regression models
CLO 4	solve medical problems by using various statistical tests

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original

	<table><tr><td></td><td>thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr></table>
Course Type	Lecture-based course
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Assignments</td><td>Coursework (assignments, tutorials, and a class test)</td><td>25</td><td>CLO 1,2,3,4</td></tr><tr><td>Examination</td><td>One 2-hour written examination</td><td>75</td><td>CLO 1,2,3,4</td></tr></table>
Required/recommended reading and online materials	J. Aitchison, J. W. Kay & I. J. Lauder: Statistical Concepts and Applications in Clinical Medicine (Chapman & Hall/CRC, 2004) J. Aitchison & J. Dunsmore: Statistical Prediction Analysis (Cambridge University Press, 1976) P. Armitage: Statistical Methods in Medical Research (Oxford: Blackwell, 1971) P. Armitage: Sequential Medical Trials (Oxford: Blackwell, 1975, 2nd edition) D. Altman: Practical Statistics for Medical Research (London: Chapman & Hall, 1991) N. E. Breslow & N. E. Day: Statistical Methods in Cancer Research Volume 1 - The analysis of case-control studies (Lyon: IARC, 1980) D. R. Cox & E. J. Snell: The Analysis of Binary Data (London: Chapman and Hall, 1989, 2nd edition) D. R. Cox & D. V. Hinkley: Theoretical Statistics (London: Chapman and Hall, 1974)
Course Website	moodle.hku.hk
Additional Course Information	Other references: E. K. Harris & A. Albert: Survivorship Analysis for Clinical Studies (New York: Marcel Dekker, 1991) B. Jones & M. G. Kenward: Design and Analysis of Cross-Over Trials (London: Chapman and Hall, 1990) B. J. T. Morgan: Analysis of Quantal Response Data (London: Chapman and Hall, 1992) S. J. Pocock: Clinical Trials. A Practical Approach (Chickestes: John Wiley & Sons, 1991) P. McCullagh & J. A. Nelder: Generalised Linear Models (London: Chapman and Hall, 1989, 2nd edition)

STAT3608 Statistical genetics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof T W K Fung, Statistics & Actuarial Science *(wingfung@hku.hk)*		
Teachers Involved	Prof T W K Fung, Statistics & Actuarial Science		
Course Objectives	This course aims to provide students with a fundamental knowledge of DNA profiling in human identification and genetic epidemiology in gene mapping and to understand how statistical theory and methods are applied to solve forensic DNA and genetic problems.		
Course Contents & Topics	This course will cover the following topics: background of genetics; Mendelian inheritance; Hardy-Weinberg equilibrium; linkage equilibrium; chi-square test; likelihood ratio test; exact test; match probability; paternity testing and kinship analysis; DNA mixed stain; relatedness; population structure; gene mapping; parametric linkage analysis; non-parametric linkage analysis; linkage disequilibrium; association designs; case-control analysis; family-based association study; quantitative traits.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>understand the fundamental principles in statistical DNA forensics and genetic epidemiology</td></tr><tr><td>CLO 2</td><td>know the usefulness and possible limitations of statistical methodology in human identification and gene mapping</td></tr><tr><td>CLO 3</td><td>provide statistical solutions to specific problems in the field</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td></td></tr></table>		

		Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials

Klug, W. S. and Cummings, M. R.: Essentials of Genetics (Prentice Hall, 2002)
Ott, J.: Analysis of Human Genetic Linkage (The Johns Hopkins University Press, 1999, 3rd ed.)
Ziegler, A. and Konig, I.R.: A Statistical Approach to Genetic Epidemiology (Wiley-VCH, 2006)
Evett, I. W. and Weir, B. S.: Interpreting DNA Evidence (Sinauer Associates, Inc. Publishers, 1998)
Fung, W. K. and Hu, Y. Q.: Statistical DNA Forensics: Theory, Methods and Computation (Wiley, Sussex, 2008)

Course Website	moodle.hku.hk

STAT3609 The statistics of investment risk (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	Dr K P Wat, Statistics & Actuarial Science		
Course Objectives	Most investments involve some risk. The decision to invest or not is usually made against a background of uncertainty. Whilst prediction of the future is difficult, there are statistical modelling techniques which provide a rational framework for investment decisions, particularly those relating to stock markets and the markets for interest rates, commodities and currencies. Building upon research, both in Hong Kong and abroad, this course presents the prevailing statistical theories for prices and price-change in these vital markets.		
Course Contents & Topics	Concept of market efficiency, mean-variance portfolio theory, capital asset pricing model, arbitrage pricing theory, portfolio performance and management, behavioural finance.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	measure risk and return of portfolios
CLO 2	apply different approaches in constructing optimal investment portfolios
CLO 3	explain and apply asset pricing models and evaluate investment performance
CLO 4	explain the concepts of market efficiency and apply appropriate testing procedures to assess different forms of market efficiency

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3611 Computer-aided data analysis or STAT3614 Business forecasting; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course; and Not for BSc(Actuarial Science) students		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.

	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials and class test(s))	30	CLO 1,2,3,4
Examination	One 2-hour written examination	70	CLO 1,2,3,4

Required/recommended reading and online materials

Bodie, Z., Kane, A., and Marcus, A. J. (2011). Investments and Portfolio Management (9th Edition). McGraw-Hill.
Elton, E. J., Gruber, M. J., Brown, S. J., and Goetzmann, W. N. (2011). Modern Portfolio Theory and Investment Analysis (8th Edition). John Wiley.
Luenberger, D. G. (2009). Investment Science (International Edition). Oxford University Press.
Defusco, R. A., McLeavey, D. W., Pinto, J. E., and Runkle D. E. (2007). Quantitative Investment Analysis, CFA Institute Investment Series (2nd Edition). New Jersey: Wiley.
Fabozzi, F. J., Focardi, S. M., and Kolm, P. N. (2006). Financial Modelling of the Equity Market: From CAPM to Cointegration. New Jersey: Wiley.
Ruppert, D. (2004). Statistics and Finance: An Introduction. New York: Springer.
Young, L. S. F. and Chiang, R. C. P. (1997). The Hong Kong Securities Industry (3rd Edition). The Stock Exchange of Hong Kong.

Course Website	moodle.hku.hk

STAT3610 Risk management and insurance (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr R W L Wong, Statistics & Actuarial Science *(rwong@hku.hk)*		
Teachers Involved	Dr R W L Wong, Statistics & Actuarial Science		
Course Objectives	To provide knowledge on basic risk and its management, as well as basic financial planning though insurance products, to students. To allow students to understand the statistical, financial and legal principles underlying the techniques for managing the insurable risks faced by organisations and individuals. Aiming at students who have minimal background in quantitative methods, it involves very minimal quantitative calculations and is not available to students majoring in Actuarial Science.		
Course Contents & Topics	The course introduces and explains: - risk in our society, - insurance and risk, - introduction to risk management, - fundamental legal principles, and analysis of insurance contracts, - life insurance, their contractual provisions, - individual health insurance coverages.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand the general risks faced by organisations and individuals and the generic risk management principle
CLO 2	demonstrate knowledge and understanding of the underlying financial and legal principles of the insurance industry
CLO 3	understand how risk can be managed through insurance
CLO 4	compare and contrast different types of commercial and personal insurance products
CLO 5	plan for and arrange their own personal insurance needs

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science. (Not available to Actuarial Science students)		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,3
Examination	One 2-hour written examination	75	CLO 1,2,3,4,5

Required/recommended reading and online materials	Rejda, G. E.: Principles of Risk Management and Insurance (Pearson Addison Wesley, 10th edition) Trieschmann, J., Hoyt, R. E. and Sommer, D.: Risk Management and Insurance (South-Western, 2005, 12th edition)
Course Website	moodle.hku.hk

STAT3611 Computer-aided data analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E K F Lam, Statistics & Actuarial Science *(hrntlkf@hku.hk)*		
Teachers Involved	Dr E K F Lam, Statistics & Actuarial Science Dr K Y Wu, Statistics & Actuarial Science Ms O T K Choi, Statistics & Actuarial Science		
Course Objectives	A wide range of statistical analyses and methods are presented using data sets from social sciences research and scientific studies. Measuring uncertainty, describing patterns of variability and the inter-relationship between several variables are essential aspects of scientific investigations that require good understanding of statistics. This computer-oriented but non-mathematical course develops the important concepts and methods of statistics. The course makes extensive use of computers through the user friendly statistical software JMP. No knowledge of a programming language is required.		
Course Contents & Topics	Data exploration, formulation of testable hypotheses, the evaluation of evidence and forecasting on the basis of past experience.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 summarize and describe the quantitative and qualitative data using some simple statistical measures CLO 2 describe the patterns of variability and the inter-relationship between several continuous or discrete variables CLO 3 carry out simple statistical analyses based on some real life data, formulate testable hypotheses, make appropriate statistical inferences and make interpretations on the findings		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or (STAT1603 Introductory statistics and any University level 2 course); and Not for students who have passed in or have already enrolled in any of these courses: STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science, STAT3616 Advanced SAS programming		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**		

		Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, practical work, and a term test)	40	CLO 1,2,3
Examination	One 2-hour written examination	60	CLO 1,2,3

Required/recommended reading and online materials	G. C. Canavos & D. M. Miller: An Introduction to Modern Business Statistics (Duxbury Press, 1999, 2nd edition) E. R. Babbie: The Practice of Social Research (Wadsworth Pub. Co., Belmont, 7th edition) J. E. Freund & G. A. Simon: Statistics - A First Course (Prentice Hall, 7th edition) R. Hooke: How to tell the liars from the Statisticians (Marcel Dekker) D. G. Kleinbaum, L. L. Kupper, & K. E. Muller: Applied Regression Analysis and Other Multivariable Methods (Duxbury Press, 1988, 2nd edition) D. M. Levine, M. L. Berenson, & D. Stephan: Statistics for Managers - Using Microsoft Excel (Prentice Hall, 2nd edition)
Course Website	moodle.hku.hk
Additional Course Information	CogSc or CompSc students having taken STAT1301 should obtain approval from the dept. Other reference: J. T. McClave & F. H. Dietrich II: Statistics (Maxwell Macmillian, 5th ed.) M. R. Middleton: Data Analysis Using Microsoft EXCEL 5.0 (Duxbury) J. Neter, W. Wasserman, & G. A. Whitmore: Applied Statistics (Allyn and Bacon) P. Newbold: Statistics for Business and Economics (Prentice-Hall, International Editions, 3rd ed.) I. Olkin, L. J. Gleser, & C. Derman: Probability Models and Applications (Prentice-Hall, 2nd ed.) J. G. Peatman: Introduction to Applied Statistics (Harper)

STAT3612 Data mining (6 credits)		**Academic Year**	2015
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Dr G C S Lui, Statistics & Actuarial Science *(csglui@hku.hk)*		
Teachers Involved	Dr G C S Lui, Statistics & Actuarial Science		
Course Objectives	With an explosion in information technology in the past decade, vast amounts of data appear in a variety of fields such as finance, customer relations management and medicine. The challenge of understanding these data with the aim of creating new knowledge and finding new relationships among data attributes has led to the innovative usage of statistical methodologies and development of new ones. In this process, a new area called data mining is spawned. This course provides a comprehensive and practical coverage of essential data mining concepts and statistical models for data mining.		
Course Contents & Topics	Data pre-processing, classification and regression trees, credit scoring, kNN classifier, cluster analysis and neural networks.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	implement data mining process summarized in the acronym SEMMA which stands for sampling, exploring, modifying, modeling, and assessing data
CLO 2	understand and apply a wide range of data mining techniques, and recognize their characteristics, strengths and weaknesses
CLO 3	be proficient with the leading data mining software---SAS Enterprise Miner
CLO 4	identify and use appropriate data mining techniques for a data mining project, taking into account both the nature of the data to be mined and the goals of the user of the discovered knowledge
CLO 5	evaluate the quality of discovered knowledge, taking into account the requirements of the data mining task being solved and the goals of the user

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3902 Statistical models Co-requisites: STAT3600 Linear statistical analysis

Offer in 2015 - 2016	Y 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** – Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** – Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** – Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** – Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** – Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	see table below		

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments		30	CLO 1,2,3,5
Project reports		30	CLO 1,2,3,4,5
Test		40	CLO 2,3

Required/recommended reading and online materials	Tan, P. N., Steinback, M. and Kumar, V.: Introduction to Data Mining (Addison Wesley, 2014, 3rd edition) T. Hastie, R. Tibshirani, & J. Friedeman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (Springer, New York, 2008, 2nd edition) M. Kantardzic: Data Mining: Concepts, Models, Methods, and Algorithms (Wiley, 2003) A. Webb: Statistical Pattern Recognition (Wiley, 2011, 2nd edition) Shmueli, G., Patel, N.R. & Bruce, P.C.: Data Mining for Business intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner (Wiley, 2010, 2nd edition) J. Han & M. Kamber: Data Mining: Concepts and Techniques (Morgan Kaufmann, 2011, 3rd edition) Larose, D. T.: Discovering Knowledge in Data: An Introduction to Data Mining (Wiley, 2005)
Course Website	moodle.hku.hk
Additional Course Information	Other references: M. J. A. Berry & G. S. Linoff: Data Mining Techniques: For Marketing, Sales and Customer Relationship Management (Wiley, 2011, 3rd edition) Larose, D. T.: Data Mining: Methods and Models (Wiley, 2005)

STAT3613 Marketing engineering (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Dr C W Kwan, Statistics & Actuarial Science *(cwkwan@hku.hk)*		
Teachers Involved	Dr C W Kwan, Statistics & Actuarial Science		
Course Objectives	This course is designed to provide an overview and practical application of trends, technology and methodology used in the marketing survey process including problem formulation, survey design, data collection and analysis, and report writing. Special emphasis will be put on statistical techniques particularly for analysing marketing data including market segmentation, market response models, consumer preference analysis and conjoint analysis. Students will analyse a variety of marketing case studies.		
Course Contents & Topics	Marketing decision models, Market response models, Survey research, Statistical methods for segmentation, Statistical methods for positioning, Statistical methods for new product design		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 – develop hands-on skills of curve fitting and analyzing data with SAS procedures or R packages CLO 2 – understand marketing decision models CLO 3 – understand cluster analysis, factor analysis, multidimensional scaling, correspondence analysis, conjoint analysis, choice models, confirmatory factor analysis, and discriminant analysis in market segmentation, positioning and new product design		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science		

Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, a class test and a group project)	50	CLO 1,2,3
Examination	One 2-hour written examination	50	CLO 1,2,3

Required/recommended reading and online materials

Lattin J., Carroll J.D. and Green P.E.: Analysing multivariate data (Thomson)
Malhotra, Naresh: Marketing Research: An Applied Orientation (Pearson, 2010, 6th ed.)
Johnson R., Wichern D.: Applied Multivariate Statistical Analysis (Prentice Hall, 5th ed.)
Lilien G.L. and Rangaswamy A.: Marketing Engineering (Prentice Hall, 2003, 2nd ed.)

Course Website: moodle.hku.hk

STAT3614 Business forecasting (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr R W L Wong, Statistics & Actuarial Science *(rwong@hku.hk)*		
Teachers Involved	Dr R W L Wong, Statistics & Actuarial Science		
Course Objectives	In daily business operations, forecasts are routinely required on different aspects of the economy, the market and individual companies. Numerous statistical techniques have been developed in the past decades to provide forecasts for the business decision-maker. This course considers a wide range of such techniques that have proven useful to practitioners. The course will involve the use of computer software, EXCEL, in the teaching process.		
Course Contents & Topics	Review of basic statistical concepts; autocorrelation analysis; evaluation and combination of forecasts; moving averages and smoothing methods; simple linear regression; multiple regression; growth curves; time series regression; the handling of seasonal cycles; decomposition methods.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand data patterns and choose a suitable forecasting techniques
CLO 2	understand forecasting methods: moving averages and smoothing methods, decomposition and winter's methods, simple and multiple linear regression
CLO 3	develop hands-on skills of analyzing business data with computer software, EXCEL, and its add-ins functions

Pre-requisites (and Co-requisites and Impermissible combinations)

Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or (STAT1603 Introductory statistics and any University level 2 course); and
Not for students who have passed or already enrolled in any of these courses: STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science, STAT3907 Linear models and forecasting, STAT4601 Time-series analysis, ECON2280 Introductory econometrics.

Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original

		thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	40	CLO 1
Examination	One 2-hour written examination	60	CLO 1,2,3

Required/recommended reading and online materials	J. E. Hanke, D. W. Wichern, & A. G. Reitsch: Business Forecasting (Prentice Hall, 2009, 9th ed.) P. E. Gaynor & R. C. Kirkpatrick: Introduction to Time-series Modelling and Forecasting in Business and Economics (McGraw-Hill, 1994) P. Newbold & T. Bos: Introductory Business & Economic Forecasting (ITP, 1994)
Course Website	moodle.hku.hk
Additional Course Information	Also available to CompSc students having taken STAT1301. Students should obtain approval from the course coordinator before choosing this course.

STAT3615 Practical mathematics for investment (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E C K Cheung, Statistics & Actuarial Science *(eckc@hku.hk)*		
Teachers Involved	Dr E C K Cheung, Statistics & Actuarial Science		
Course Objectives	The main focus of this course is built on the concepts on financial mathematics. Practical applications of these concepts are also considered.		
Course Contents & Topics	This course covers: simple and compound interest; annuities certain; discounted cash flow analysis; amortization schedules and sinking funds; yield rates; bonds and related securities; practical applications such as real estate mortgage, short sales and term structure of interest rates.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	solve practical problems relating to annuities certain, simple and compound interest
CLO 2	carry out discounted cash flow analysis
CLO 3	apply amortization schedules and sinking funds to the practical problems such as real estate mortgage

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in STAT2902 Financial mathematics, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	

		Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 3-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	Kellison, S. G.: The Theory of Interest (Irwin: Illinois, 2008, 3rd edition) Broverman, S. A.: Mathematics of Investment and Credit (ACTEX Publications - Mad River Books: Connecticut, 2004, 3rd edition)
Course Website	moodle.hku.hk

STAT3616 Advanced SAS programming (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof K W Ng, Statistics & Actuarial Science *(kaing@hku.hk)*		
Teachers Involved	Prof K W Ng, Statistics & Actuarial Science		
Course Objectives	This course aims to equip students, who have taken STAT2603, with a high level of proficiency in SAS programming for automation of procedures and data processing in solving complex problems more efficiently.		
Course Contents & Topics	Overview of SAS underlying parts. Macro programming. Advanced programming techniques including data simulation, advanced data look-up techniques, modifying transaction datasets and controlling I/O processing and memory.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	Understand the system of SAS and basic programming
CLO 2	Use the BY statement for parallel processing to aid automation
CLO 3	Use the output dataset without printing to OUTPUT windows for piping idea in automation
CLO 4	Use SAS MACRO to develop customized and automated applications
CLO 5	Use advanced SAS programming statements and techniques to solve complex problems

Pre-requisites (and Co-requisites and Impermissible combinations)	STAT2601 Probability and statistics I or STAT2901 Probability and statistics: foundations of actuarial science (Students are strongly recommended to take STAT2603 Data management with SAS prior to taking this course.)		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36

Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	50	CLO 1,2,3,4,5
Examination	One 2-hour written examination	50	CLO 1,2,3,4,5

Required/recommended reading and online materials	SAS Certification Prep Guide: Advanced Programming for SAS 9, Third Edition. Carpenter, A.: Carpenters Complete Guide to the SAS Macro Language. Second Edition. (North Carolina: SAS Institute Inc., 2004)
Course Website	moodle.hku.hk

STAT3617 Sample survey methods (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Ms O T K Choi, Statistics & Actuarial Science *(ochoi@hku.hk)*		
Teachers Involved	Ms O T K Choi, Statistics & Actuarial Science Prof F W H Ho, Statistics & Actuarial Science		
Course Objectives	This course will cover design and implementation of sample surveys and analysis of statistical data thus obtained. Survey design includes overall survey design, design of sampling schemes and questionnaires, etc. Sampling methods include sample size determination, sampling and non-sampling errors and biases, methods of estimation of parameters from survey data, imputation for missing data etc.		
Course Contents & Topics	Topics may include: survey design and planning; survey quality and ethics; implementation matters like management of survey staff, respondent relationship and logistical issues ; and sampling methods like simple random sampling, systematic sampling, stratified sampling, cluster sampling, multi-stage sampling, sample size determination, post-stratification, ratio and regression estimation methods, non-sampling errors and biases, non-responses and missing data. Case studies of major applications of sample survey methods in the public and private sectors, with some examples on the analysis and application of the statistical data thus produced, will be discussed.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	demonstrate knowledge and understanding of the various steps to be taken in the planning and implementation of sample surveys
CLO 2	design different sample schemes and select the most efficient and suitable one for adoption for a particular survey - make statistical inference on parameters based on a sample
CLO 3	judge whether the statistics presented by other survey takers are trustworthy

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass or already enrolled in: BIOL2102 Biostatistics, or (ECON1280 Analysis of economic data and any University level 2 course), or (STAT1601 Elementary statistical methods and any University level 2 course), or (STAT1602 Business statistics and any University level 2 course), or STAT2601 Probability and statistics I, or (STAT1603 Introductory statistics and any University level 2 course), or STAT2901 Probability and statistics: foundations of actuarial science.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping

	Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
	Examination	One 2-hour written examination	75	CLO 1,2,3
Required/recommended reading and online materials	S. L. Lohr: Sampling: Design and Analysis, 2nd edition (Duxbury Press, 2010) R. L. Scheaffer, W. Mendenhall, & R. L. Ott: Elementary Survey Sampling (Duxbury Press, 2011, 7th edition) W. G. Cochran: Sampling Techniques (John Wiley & Sons Ltd., 1997) R. M. Groves, F. J. Fowler, M. P. Couper, J. M. Lepkowski, E. Singer, R. Tourangeau: Survey Methodology (John Wiley & Sons Ltd., 2009, 2nd edition) L. Kish: Survey Sampling (John Wiley & Sons, Inc., 1995) P. Salant & D. A. Dillman: How to Conduct Your Own Survey (John Wiley & Sons, Inc., 1994)			
Course Website	moodle.hku.hk			

STAT3618 Derivatives and risk management (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr R W L Wong, Statistics & Actuarial Science *(rwong@hku.hk)*		
Teachers Involved	Dr R W L Wong, Statistics & Actuarial Science		
Course Objectives	Nowadays all risk managers must be well versed in the use and valuation of derivatives. The two basic types of derivatives are forwards (having a linear payoff) and options (having a non-linear payoff). All other derivatives can be decomposed to these underlying payoffs or alternatively they are variations on these basic ideas. This course aims at demonstrating the practical use of financial derivative in risk management. Emphases are on pricing and hedging strategies, and the concept of no-arbitrage.		
Course Contents & Topics	Review of futures, forwards and options and the concept of no arbitrage; hedging strategies using futures; pricing of forward and futures; interest rate futures and swaps; trading strategies using options; put-call parity; valuation of European and American options using the binomial-tree model; valuation of European and American options using the Black-Scholes option pricing model; the Greeks: their calculation and interpretation; implied volatility; delta hedging and the role of market-makers; exotic options: Asian options, barrier options, compound options, gap options and exchange options.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: use future, forwards, options and swaps to formulate financial strategies CLO 2: determine the payoff and the value of various derivative products using binomial tree and Black-Sholes formula CLO 3: explain how derivative products can be used as tools to manage financial risk CLO 4: recognize how to decompose complicated derivatives into a profolio of standard derivations		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3615 Practical mathematics for investment; and Not for BSc(Actuarial Science) students; and Not for students who have passed in STAT3910 Financial economics I, or have already enrolled in this course; and Not for students who have passed in STAT3905 Introduction to financial derivatives, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping**		

	Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,3
	Examination	One 2-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Hull, J. C.: Options, Futures, and Other Derivatives (Prentice Hall, 2009, 7th edition), Chapters 3, 5-7, 9-11, 13, 17-18, 24. McDonald, R. L.: Derivatives Markets (Addison Wesley, 2006, 2nd edition), Chapters 1-2, 4-5, 7-14, 23. Hull, J.C.: Risk Management and Financial Institutions (Pearson Higher Education, 2010, 2nd edition)
Course Website	moodle.hku.hk

STAT3620 Modern nonparametric statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr P L H Yu, Statistics & Actuarial Science *(plhyu@hku.hk)*		
Teachers Involved	Dr P L H Yu, Department of Statistics and Actuarial Science		
Course Objectives	The course aims to acquaint students with the fundamentals, basic properties and use of classical and modern nonparametric statistical methods for data analysis.		
Course Contents & Topics	Topics may include: order-statistics; goodness-of-fit tests; rank tests for single-sample and two-independent samples; tests for designed experiments; permutation tests; tests for trends and association; jackknife and bootstrapping methods; nonparametric regression.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	identify appropriate nonparametric methods for analyzing data
	CLO 2	perform a variety of nonparametric statistical analyses
	CLO 3	gain a working proficiency in the use of statistical software for data management and performing basic nonparametric statistical analyses
	CLO 4	effectively communicate findings and conclusions

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework (assignments, tutorials and a class test)	25	CLO 1,2,3,4
	Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	Higgins, James: Introduction to Modern Nonparametric Statistics (Duxbury Press, 2004) Hollander, M. and Wolfe, D.A.: Nonparametric Statistical Methods, 2nd edition (Wiley, 1999) Gibbons, J.D. and Chakraborti, S.: Nonparametric Statistical Inference, 5th edition (CRC press, 2010) Kvam, P.H. and Vidakovic, B.: Nonparametric Statistics with Applications to Science and Engineering. (Wiley, 2007)
Course Website	moodle.hku.hk

STAT3621 Statistical data analysis (6 credits)		Academic Year	2015
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Dr G Tian, Statistics & Actuarial Science *(gltian@hku.hk)*		
Teachers Involved	Dr G Tian, Statistics & Actuarial Science		
Course Objectives	Building on prior coursework in statistical methods and modeling, students will get a deeper understanding of the entire process of data analysis. The course aims to develop skills of model selection and hypotheses formulation so that questions of interest can be properly formulated and answered. An important element deals with model review and improvement, when one's first attempt does not adequately fit the data. Students will learn how to explore the data, to build reliable models, and to communicate the results of data analysis to a variety of audiences.		
Course Contents & Topics	Descriptive statistics, presentation and visualization of data; Simple statistical analyses for the one-sample and two-sample case using parametric and nonparametric methods; Regression analyses: model fitting; variable selection and model diagnostic checking; Analysis of Variance (ANOVA): 1-way, two-way and higher-way ANOVA; Covariance analysis; Categorical and count data: binary logistic regression, Poisson regression. Real data sets will be presented for modelling and analysis using statistical software for gaining hands-on experience.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: make good sense of the problem and identify what to measure for the question of interest CLO 2: summarize and describe the quantitative and qualitative data using some simple appropriate statistical measures CLO 3: identify the association among several continuous or discrete variables CLO 4: carry out appropriate and comprehensive statistical analyses based on real life data including model selection, perform model diagnostics, formulate testable hypotheses, make appropriate statistical inferences, make interpretations on the findings and report writing		
Pre-requisites (and Co-requisites and Impermissible combinations)	STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting (Students are strongly recommended to take STAT2603 Data management with SAS prior to taking this course.)		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Assignments / Coursework (assignments and a class test) / 50 / CLO 1,2,3,4 Examination / One 3-hour written examination / 50 / CLO 1,2,3,4		
Required/recommended reading and online materials	Ramsey, F. and Schafer, D. (2012). The Statistical Sleuth: A Course in Methods of Data Analysis, 3rd edition, Cengage Learning. Cody, R. (2011). SAS Statistics by Example. SAS Institute. Cody, R.P. & Smith, J.K. (2005). Applied Statistics and the SAS Programming Language, 5th edition, Pearson. Elliott, R.J. (2009). Learning SAS in the Computer Lab, 3rd edition, Cengage Learning. Kleinbaum, D.G., Kupper, L.L., Nizam, A. and Muller, K.E. (2007). Applied Regression Analysis and Other Multivariable Methods. 4th edition, Cengage Learning.		

Course Website	moodle.hku.hk

STAT3622 Data visualization (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr P L H Yu, Statistics & Actuarial Science *(plhyu@hku.hk)*		
Teachers Involved	Dr P L H Yu, Statistics & Actuarial Science		
Course Objectives	This course will focus on how to work with statistical graphics, graphics that display statistical data, to communicate and analyze data. Students will learn a set of tools such as R to create these graphics and critically evaluate them.		
Course Contents & Topics	Grammar of graphics, visualizing patterns over time, visualizing relationship, visualizing spatial relationships, visualizing texts.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: choose the best chart that fits the data CLO 2: create a compelling visualization using computer software CLO 3: communicate effectively using statistical graphics CLO 4: critically evaluate graphics and suggest improvements		
Pre-requisites (and Co-requisites and Impermissible combinations)	STAT2602 Probability and statistics II		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Presentation	oral presentation and in-class discussion	40	CLO 1,2,3,4
Project reports	written report	60	CLO 1,2,3,4

Required/recommended reading and online materials	Yau, Nathan (2011). Visualize This: The FlowingData Guide to Design, Visualization, and Statistics. Wiley. Tufle, Edwards R. (2001). The Visual Display of Quantitative Information. 2nd edition, Graphics Press. Chang, Winston (2013). R Graphics Cookbook. O Reilly Media. Murray, Dan (2013). Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software. Wiley. King, Ritchie, S. (2014). Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript. Addison-Wesley.
Course Website	moodle.hku.hk

STAT3799 Directed studies in statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	30
Course Co-ordinator	Prof S M S Lee, Statistics & Actuarial Science *(smslee@hku.hk)*		
Teachers Involved	Various teachers as the assessors of oral presentations and written reports, Statistics & Actuarial Science		
Course Objectives	To enhance students' knowledge of a particular topic and students' self-directed learning and critical thinking skills.		

Course Contents & Topics	The student undertakes a self-managed study on a topic in statistics under the supervision of a staff member. The topic is preferably one not sufficiently covered in the regular curriculum. The directed study can be a critical review or a synthesis of published work on the subject, or a laboratory or field study that would enhance students' understanding of the subject. The project may not require an element of originality.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 gain first-hand experience in solving a research or applied problem in statistics or related areas CLO 2 develop skills in important technical tools, including the use of computer software or programs, for typical statistical research and data analyses CLO 3 write succinct reports on the findings of a research study CLO 4 make concise oral presentation of the findings of a research study
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in the Major in Risk Management/Statistics/Decision Analytics; and Not for students who have already enrolled in STAT4799 Statistics project in this academic year. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors only; and subject to the consent of course coordinator. This course is mutually exclusive with STAT4710. The earliest that a student is allowed to take this capstone course is their year 3 study.
Offer in 2015 - 2016	Y 1st sem 2nd sem — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.] **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	discussion & meetings to be arranged by the student & the supervisor	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	oral presentation & in-class discussion	40	CLO 1,2,4
Research report	written report	60	CLO 1,2,3

Course Website	moodle.hku.hk

STAT3901 Life contingencies (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof K C Yuen, Statistics & Actuarial Science *(kcyuen@hku.hk)*		
Teachers Involved	Prof K C Yuen, Statistics & Actuarial Science		
Course Objectives	The major objectives of this course are to integrate life contingencies into a full probabilistic framework. The time-until-death random variable is the basic building block by which models for life insurances, designed to reduce the financial impact of the random event of untimely death, are developed. This course introduces the concepts of life contingencies and the basic mathematical skills for modelling life insurance products.		
Course Contents & Topics	Key topics include: survival distributions; life table functions; select and ultimate tables; life insurance models; life annuity models; benefit premiums; benefit reserves.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 calculate the expected values, variances, probabilities, and percentiles for survival-time random variables CLO 2		

		define the continuous survival-time random variable that arises from the discrete survival-time random variable using some assumptions for fractional ages
	CLO 3	define present-value-of-benefit random variables defined on survival-time random variables
	CLO 4	define and calculate the expected values, variances and probabilities for present-value-of-benefit random variables, present-value-of-loss-at-issue random variables, and present-value-of-loss random variables
	CLO 5	calculate benefit premiums for life insurances and annuities
	CLO 6	calculate benefit reserves for life insurances and annuities
	CLO 7	cover part of Exam MLC of the Society of Actuaries

Pre-requisites (and Co-requisites and Impermissible combinations)	(Pass in STAT2602 Probability and statistics II and STAT3615 Practical mathematics for investment) or (Pass in STAT2902 Financial mathematics and (Pass in STAT3902 Statistical models, or already enrolled in this course)) or (Pass in STAT2602 Probability and statistics II and STAT2902 Financial mathematics)
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Course Type	Lecture-based course

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5,6,7
Examination	One 3-hour written examination	75	CLO 1,2,3,4,5,6,7

Required/recommended reading and online materials	Bowers. N.L., Gerber, H.U., Hickman, J.C., Jones, D.A. & Nesbitt, C.J.: Actuarial Mathematics (1997, 2nd edition), Itasca, Illinois: The Society of Actuaries Dickson, C.M.D., Hardy, M.R., and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge: Cambridge University Press, 2009)
Course Website	moodle.hku.hk

STAT3902 Statistical models (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Tian, Statistics & Actuarial Science *(gltian@hku.hk)*		
Teachers Involved	Dr G Tian, Statistics & Actuarial Science		
Course Objectives	This course is on the basis of 'STAT2901 Probability and Statistics: Foundation of Actuarial Science'. It will further study the concepts and methods of statistics. The course will lay emphasis on the estimation and hypothesis testing, the two major areas of statistical inference. Through the study of this course, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of data.		
Course Contents & Topics	Distribution and density of function of random variables; Order statistics, central limit theorem, Maximum likelihood estimator (MLE), moment estimator, Bayesian estimator, properties of estimators, limiting properties of MLE; Confidence interval estimations for normal mean, the difference of two normal means, normal variance, the ratio of two normal variances, and large-sample confidence intervals; Power function, Neyman-Pearson Lemma, likelihood ratio test, and goodness of fit test.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the importance of sufficient statistic(s) in data reduction and statistical inferences such as point estimation, confidence interval estimation, and testing hypothesis

	CLO 2 derive maximum likelihood estimators of parameters to calculate maximum likelihood estimates CLO 3 locate pivotal quantity to construct confidence intervals of parameters CLO 4 find testing statistic to test hypotheses associated with one-sample and/or two-sample normal distributions with small sample sizes and non-normal distributions with large sample sizes
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in STAT2602 Probability and Statistics II, or already enrolled in this course; and For BSc(Actuarial Science) students only.
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
Examination	One 3-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials

Miller I. & Miller M.: John E. Freund's Mathematical Statistics with Applications (Pearson Education International, 2004, 7th edition)
Hogg R. V., McKean J. W. & Craig A. T.: Introduction to Mathematical Statistics (Pearson Prentice Hall, 2005, 6th edition)
Arnold S. F.: Mathematical Statistics (Prentice-Hall, 1990)
Larsen R. J. and Marx M. L.: An Introduction to Mathematical Statistics and Its Appications (Pearson International Edition, 4th edition)

Course Website: moodle.hku.hk

STAT3903 Stochastic models (6 credits)		**Academic Year**	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr Y K Chung, Statistics & Actuarial Science *(yukchung@hku.hk)*		
Teachers Involved	Dr Y K Chung, Statistics & Actuarial Science		
Course Objectives	This is an introductory course in probability modelling. A range of important topics in stochastic processes will be discussed.		
Course Contents & Topics	Introduction to probability theory, Conditional probability and expectation, Markov chains, random walk models, classification of states in a Markov chain, calculation of limiting probabilities and mean time spent in transient states, Poisson process, distribution of interarrival time and waiting time, conditional distribution of the arrival time, Brownian Motion, hitting time and maxium variable, geometric Brownian motion, the Black-Scholes option pricing formula, Gaussian bridge, and stationary processes. Birth-and-death process, branching process and renewal process may also be covered (if time permits).		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 apply the conditioning method to calculate the mean and probability CLO 2 understand the essentials of Markov chains, the Poisson process, and Brownian motion CLO 3 understand how stochastic models can be applied to the study of real-life phenomena		
Pre-requisites (and Co-requisites and Impermissible combinations)	For BSc(Actuarial Science) students only; and Pass in STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course;		

	and Not for students who have passed in STAT3603 Probability modelling, or have already enrolled in this course.
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 3-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	S. M. Ross: Introduction to Probability Models (9th edition)
Course Website	moodle.hku.hk

STAT3904 Corporate finance for actuarial science (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J K Woo, Statistics & Actuarial Science *(jkwoo@hku.hk)*		
Teachers Involved	Dr J K Woo, Statistics & Actuarial Science		
Course Objectives	This course is designed for actuarial science students to receive VEE-Corporate Finance from Society of Actuaries. The objective of this course is to introduce students to the fundamental principles of corporate finance. The course will provide students with a systematic framework within which to evaluate investment and financing decisions for corporations.		
Course Contents & Topics	The first part of the course will give an introduction to corporate finance and provide an overview of some topics covered in STAT2902 and STAT3615. These include: financial markets and companies; present value and net present value, financial instruments and dividends derivatives market, no-arbitrage pricing theory, binomial model and Black-Scholes option pricing formula. The main part of the course will focus on some important topics of corporate finance including: capital structure and dividend policy, financial leverage and firm value, market efficiency, risk and return, investment decision using Markowitz mean variance analysis, CAPM, long term financing, measures and performance assessment of financial performance using various measures.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the factors to be considered by a company when deciding on its capital structure and dividend policy, and also the impact of financial leverage and long/short term financing policies on capital structure
CLO 2	calculate the value of bonds and stocks
CLO 3	assess financial performance using various measures
CLO 4	understand the mean-variance portfolio theory

Pre-requisites (and Co-requisites and Impermissible combinations)	[(Pass in ACCT1101 Introduction to accounting and STAT2902 Financial mathematics) or (Pass in STAT3610 Risk management and insurance and STAT3615 Practical mathematics for investment)]; and Not for students who have passed in FINA1310 Corporate finance, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		

Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see below

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
Examination	One 3-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Brealey R. A., Myers S. C. and Allen, F.: Principles of Corporate Finance (2006, 8th edition) Ross, S. A., Westerfield, R. W. and Jaffe, J.: Corporate Finance (2005, 7th edition) Luenberger, D. G.: Investment Science (1998)
Course Website	moodle.hku.hk

STAT3905 Introduction to financial derivatives (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E C K Cheung, Statistics & Actuarial Science *(eckc@hku.hk)*		
Teachers Involved	Dr E C K Cheung, Statistics & Actuarial Science		
Course Objectives	This course aims at providing an understanding of the fundamental concepts of financial derivatives. Emphases are on basic trading and hedging strategies, and the concept of no-arbitrage.		
Course Contents & Topics	Derivatives; short-selling; forward contracts; call options; put options; equity-linked CD; spreads and collars; hedging; financial forwards and futures; commodity swaps; interest rate swaps; put-call parity.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 define and recognize the definitions of terms commonly used in derivatives markets CLO 2 evaluate the payoff and profit of basic derivative contracts, including forwards, futures, options, and swaps CLO 3 explain how derivative securities can be used as tools to manage financial risk		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2902 Financial mathematics; and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.		

	Fail — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**
	Lectures / / 36
	Tutorials / / 12
	Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping**
	Assignments / Coursework (assignments, tutorials, and a class test) / 25 / CLO 1,2,3
	Examination / One 2-hour written examination / 75 / CLO 1,2,3
Required/recommended reading and online materials	McDonald, R. L.: Derivatives Markets (Addison Wesley, 2006, 2nd edition), Chapters 1-5, 8.
Course Website	moodle.hku.hk

STAT3906 Risk theory I (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K C Cheung, Statistics & Actuarial Science *(kccg@hku.hk)*		
Teachers Involved	Dr K C Cheung, Statistics & Actuarial Science		
Course Objectives	Risk theory is one of the main topics in actuarial science. Risk theory is the applications of statistical models and stochastic processes to insurance problems such as the premium calculation, ruin probability, etc.		
Course Contents & Topics	Severity models; frequency models; collective risk models;coverage modifications; ruin theory; risk measures; simulation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the individual risk model and the collective risk model, evaluate the distribution and expectation of the total claim amounts CLO 2 estimate the premium of a policyholder and the total claim amounts using the information of the claim amounts made in previous years CLO 3 calculate some commonly used risk measures and explain their use and limitation CLO 4 apply simulation methods within the context of actuarial models		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3903 Stochastic models, or already enrolled in this course; or Pass in STAT3603 Probability modelling or MATH3603 Probability theory		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 100		
	Methods / **Details**		

Assessment Methods and Weighting			**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
	Examination	One 3-hour written examination	75	CLO 1,2,3,4
Required/recommended reading and online materials	Klugman S. A., Panjer H. H., & Willmot G. E.: Loss Models: From Data to Decisions (John Wiley & Sons, Inc., 2012, 4th edition)			
Course Website	moodle.hku.hk			

STAT3907 Linear models and forecasting (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G C S Lui, Statistics & Actuarial Science *(csglui@hku.hk)*		
Teachers Involved	Dr G C S Lui, Statistics & Actuarial Science		
Course Objectives	This course deals with applied statistical methods of linear models and investigates various forecasting procedures through using linear models and time series analysis.		
Course Contents & Topics	Regression and multiple linear regression; predicting; generalised linear model; time series models including autoregressive, moving average, autoregressive-moving average and integrated models; forecasting.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — fit a simple or multiple linear regression model to real data CLO 2 — do ANOVA analysis CLO 3 — fit a generalized linear model to the real data CLO 4 — identify and fit a suitable AR, MA or ARMA model to real data CLO 5 — perform residual analysis CLO 6 — Do forecasting with these fitted models		
Pre-requisites (and Co-requisites and Impermissible combinations)	(Pass in STAT2602 Probability and statistics II; or Pass in STAT3902 Statistical models, or already enrolled in this course); and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT3600 Linear statistical analysis, or have already enrolled in this course; and Not for students who have passed in STAT4601 Time-series analysis, or have already enrolled in this course; and Not for students who have passed in ECON2280 Introductory econometrics, or have already enrolled in this course.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5,6
Examination	One 3-hour written examination	75	CLO 1,2,4,5,6

Required/recommended reading and online materials	R. S. Pindyck & D. L. Rubinfeld: Econometric Models and Economic Forecasts (McGraw-Hill, 1998, 4th edition) Abraham & J. Ledolter: Statistical Methods for Forecasting (John Wiley & Sons, 2005, 2nd edition) G. E. P. Box, G. M. Jenkins & G. Reinsel: Time Series Analysis: Forecasting and Control (Prentice Hall, 1994, 3rd edition)
Course Website	moodle.hku.hk

STAT3908 Credibility theory and loss distributions (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K C Cheung, Statistics & Actuarial Science *(kccg@hku.hk)*		
Teachers Involved	Dr K C Cheung, Statistics & Actuarial Science		
Course Objectives	Credibility is an example of a statistical estimate. The idea of credibility is very useful in premium calculation. Insurance loss varies according to the business nature, what distribution should be used to fit a particular loss is both of theoretical interest and practical importance. This course covers important actuarial and statistical methods.		
Course Contents & Topics	Limited fluctuation approach; Buhlman's approach; Bayesian approach; empirical Bayes parameter estimations; construction and selection of parametric models; properties and estimation of failure time and loss distributions, determination of the acceptability of a fitted model; comparison of fitted models; simulation of both discrete and continuous random variables.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: apply limited fluctuation (classical) credibility including criteria for both full and partial credibility CLO 2: perform Bayesian analysis using both discrete and continuous models CLO 3: apply Buhlmann and Buhlmann-Straub models and understand the relationship of these to the Bayesian model CLO 4: apply conjugate priors in Bayesian analysis and in particular the Poisson-gamma model CLO 5: apply empirical Bayesian methods in the nonparametric and semiparametric cases CLO 6: construct and select empirical models CLO 7: determine the acceptability of a fitted model and/or compare models		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3906 Risk theory I		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	Activities / Details / No. of Hours: Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	Methods / Details / Weighting in final course grade (%) / Assessment Methods to CLO Mapping: Assignments / Coursework (assignments, tutorials, and a class test) / 25 / CLO 1,2,3,4,5,6,7 Examination / One 3-hour written examination / 75 / CLO 1,2,3,4,5,6,7		
Required/recommended reading and online materials	Klugman S. A., Panjer H. H., & Willmot G. E.: Loss Models: From Data to Decisions (John Wiley & Sons, 2010, 4th edition).		

Course Website	moodle.hku.hk

STAT3909 Advanced life contingencies (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof H L Yang, Statistics & Actuarial Science *(hlyang@hku.hk)*		
Teachers Involved	Prof H L Yang, Statistics & Actuarial Science		
Course Objectives	The objective of the course is to prepare students for the Non-traditional Life Insurance parts of the Models for Life Contingencies (MLC) course of the Society of Actuaries. Emphasis will be placed on applications of more advanced theories of life contingencies.		
Course Contents & Topics	This course is a continuation of the materials covered in STAT3901. We shall discuss the following topics: Loss-at-issue random variable, Benefit premium, Future loss random variable, Benefit reserves, Cash flow projection, Present value of cash flows, Expenses and asset shares.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	incorporate expenses in gross premium and calculate policy value based on the gross premium for life insurances and annuities	
	CLO 2	understand multiple decrement models and calculate the life insurances and annuities in models with multi decrements	
	CLO 3	understand the multiple state model and the Kolmogorov forward equations	
	CLO 4	understand multiple life models and calculate the life insurances and annuities in multi-life models	
	CLO 5	understand the interest risk and calculate the life insurances and annuities when the interest rate is not a constant, and understand profit testing	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3901 Life contingencies, or already enrolled in this course; and For BSc(Actuarial Science) students only.		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5
Examination	One 3-hour written examination	75	CLO 1,2,3,4,5

Required/recommended reading and online materials	Bowers, N. L. et al.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd ed) Dickson, C.M.D., Hardy, M.R. and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge University Press, 2009)
Course Website	moodle.hku.hk

STAT3910 Financial economics I (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof H L Yang, Statistics & Actuarial Science *(hlyang@hku.hk)*		
Teachers Involved			

	Prof H L Yang, Statistics & Actuarial Science Dr J K Woo, Statistics & Actuarial Science
Course Objectives	This course is a basic course on the derivative market. The course covers discrete-time models, volatility estimation, and Black-Scholes formula and its variations. The course also includes some basic risk management ideas and methods. This course and STAT3911 will cover all the concepts, principles and techniques needed for SoA Exam MFE.
Course Contents & Topics	Option market; European and American options; conditional expectation and discrete-time martingale, discrete-time option-pricing theory; binomial model and its Greeks; true probabilities vs. risk-neutral probabilities; estimating volatility; the Black-Scholes formula; implied volatility; Greeks again; market-making and hedging; exotic options.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: calculate option price using binomial tree CLO 2: understand the risk neutral probability CLO 3: understand basic probability theory, include probability space, random variable, conditional probability, conditional expectation and discrete time martingale CLO 4: understand the Black-Scholes formula and its assumptions, the option Greeks, option elasticity, and implied volatility CLO 5: understand the hedging strategies and portfolio, market-maker risk, self-financing portfolio CLO 6: understand exotic options
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.
Offer in 2015 - 2016	Y 1st sem — **Examination**: Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	Lectures: 36 hours Tutorials: 12 hours Reading / Self study: 100 hours
Assessment Methods and Weighting	Assignments — Coursework (assignments, tutorials, and a class test) — 25% — CLO 1,2,3,4,5,6 Examination — One 3-hour written examination — 75% — CLO 1,2,3,4,5,6
Required/recommended reading and online materials	Robert L. McDonald: Derivatives Markets (2nd edition), Chapters 10-14 Lecture notes on conditional expectations and martingale John Hull: Options, Futures and other Derivatives (2008, 7th edition)
Course Website	moodle.hku.hk

STAT3911 Financial economics II (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof H L Yang, Statistics & Actuarial Science *(hlyang@hku.hk)*		
Teachers Involved	Prof H L Yang, Statistics & Actuarial Science		
Course Objectives	This course is an advanced course on the option pricing theory. The course covers Black-Scholes equation and stochastic calculus, and interest models. This course and STAT3910 will cover all the concepts, principles and techniques needed for SoA Exam MFE.		

Course Contents & Topics	Brownian motion; introduction to stochastic calculus; arithmetic and geometric Brownian motion; Ito formula; Sharpe ratio and risk premium; Black-Scholes equation; risk-neutral stock-price process and option pricing; option's elasticity and volatility; Vasicek, Cox-Ingersoll-Ross, and Black-Derman-Toy models; delta-hedging for bonds and the Sharpe-ratio equality constraint; Black's model; options on zero-coupon bonds; interest-rate caps and caplets.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand Brownian motion and its properties CLO 2: understand the Ito calculus and Ito formula CLO 3: understand the Black-Scholes model and option pricing theory CLO 4: understand the delta hedging and some basic risk management methods CLO 5: understand some basic interest rate models
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH3603 Probability theory or STAT3603 Probability modelling or STAT3903 Stochastic models or STAT3910 Financial economics I
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5
Examination	One 3-hour written examination	75	CLO 1,2,3,4,5

Required/recommended reading and online materials	Robert L. McDonald: Derivatives Markets (2nd edition), Chapters 20, 21 and 24. John Hull: Options, Futures and Other Derivatives (2008, 7th edition) Alison Etheridge: A Course in Financial Calculus (2002) Steven Shreve: Stochastic Calculus for Finance II Continuous-Time Models (2008)
Course Website	moodle.hku.hk

STAT3951 Advanced contingencies (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E C K Cheung, Statistics & Actuarial Science *(eckc@hku.hk)*		
Teachers Involved	Dr E C K Cheung, Statistics & Actuarial Science		
Course Objectives	This course serves as a continuation of STAT3909 and extends the coverage to include statistical models and actuarial techniques used in the field of life and non-life insurance. [Students are reminded that this course is a part of the requirement for the exemption from the Subject CT5 Contingencies of the Faculty and Institute of Actuaries, U.K.]		
Course Contents & Topics	Topic covers further analysis of the multiple state model; unit-linked contracts; cost of guarantees and options; applications of actuarial techniques to a wide range of insurance problems. Equity linked insurance products and valuation of these products. Simple dividend-ruin models for non-life insurance portfolio.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: value the cashflow contingent upon more than one risk		

	CLO 2	understand how to use multiple decrement tables to evaluate expected cashflows dependent upon more than one decrement
	CLO 3	understand the equity linked insurance products, and the method and idea of valuing the equity linked insurance products
	CLO 4	understand the Esscher transform and its application to option pricing
	CLO 5	value equity-linked death benefits
	CLO 6	evaluate ruin probabilities and expected discounted dividends in some simple dividend-ruin models for non-life insurance

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3909 Advanced life contingencies; and Pass in STAT3910 Financial economics I or already enrolled in this course; and For BSc(Actuarial Science) students only.
Offer in 2015 - 2016	Y 1st sem — **Examination** Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5,6
Examination	One 3-hour written examination	75	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Bowers, N. L. et al.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd ed.) Dickson, D. et al.: Actuarial Mathematics for Life Contingent Risks (Cambridge, 2010) CT5 Contingencies Core Technical Core Reading (Institute of Actuaries, 2010) Lecture notes on equity linked insurance products and simple dividend-ruin models.
Course Website	moodle.hku.hk

STAT3952 Investment and asset management (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	TBC, Statistics & Actuarial Science *()*		
Teachers Involved	TBC, Statistics & Actuarial Science		
Course Objectives	The main objective of this course is to introduce students to some of the methods and procedures commonly used in the management of an investment portfolio. Emphasis will be placed on methods to tackle problems faced by insurance industry such as investment strategy formulation and interest rate risk management.		
Course Contents & Topics	This course provides an overview on the problems faced by actuaries when applying fundamental actuarial concepts to investment practice. This course will cover the following topics: Investment Management Process, Asset Allocation, Managing Fixed Income Portfolios and Performance Measurement.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	explain how an investment policy and an investment strategy can help manage risk
CLO 2	identify the obligations of a fiduciary in managing investment portfolios
CLO 3	describe how to select an investment strategy for an individual and the particular issues influencing investment strategies for institutional investors
CLO 4	explain principles of risk-based capital management

CLO 5	describe asset allocation strategies that can be used to construct an asset portfolio
CLO 6	identify and describe financial and non-financial risks faced by an entity
CLO 7	define risk metrics to quantify major types of risk exposure, apply ALM principles to the establishment of investment policy and strategy
CLO 8	select or build a benchmark for a given portfolio or portfolio management style, describe and assess performance measurement methodologies for investment portfolios

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3901 Life contingencies; and For BSc(Actuarial Science) students only; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Assignments, tutorials/example classes, group discussions, project and presentation	50	CLO 1,2,3,4,5,6,7,8
Examination	One 2-hour written examination	50	CLO 1,2,3,4,5,6,7,8

Required/recommended reading and online materials	D. Babbel & F. J. Fabozzi: Investment Management for Insurers (Frank J. Fabozzi & Assoc., 1999) Z. Bodie, A. Kane, & A. Marcus: Investments (McGraw-Hill, 2005, 7th edition) Crouhy, Galai, & Mark: Risk Management (2001) F. J. Fabozzi: Handbook of Fixed Income Securities (McGraw-Hill, 2005, 7th edition) Litterman: Modern Investment Management: An Equilibrium Approach (2003)
Course Website	moodle.hku.hk
Additional Course Information	Other references: J. L. Maginn, D.L. Tuttle, J.E. Pinto & D.W. McLeavey: Managing Investment Portfolios, A Dynamic Process (Wiley, 2007, 3rd edition) Tilman: Asset / Liability Management of Financial Institutions (2003)

STAT3953 Fundamentals of actuarial practice (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr L F K Ng, Statistics & Actuarial Science *(flouisng@hku.hk)*		
Teachers Involved	Dr L F K Ng, Statistics & Actuarial Science		
Course Objectives	This course teaches students about the business environment and exposes them to practical real-world situations using the actuarial control cycle as a framework.		
Course Contents & Topics	This course provides an overview on selected materials relating to the following topics: Role of the Professional Actuary, External Forces, Risk in Actuarial Problems, Design and Pricing of Actuarial Solutions. Emphasis will be placed on applications to various financial security programmes including individual life insurance, group insurance, social security plans, retirement plans, investment funds and property & casualty insurance.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	provide introductory description of financial security systems, common actuarial techniques and practical experiences
CLO 2	

	| | | |---|---| | | describe actuarial practices, principles, approaches, methods, commonalities, problems and solutions | | CLO 3 | explain actuarial practices across the traditional areas of practice | | CLO 4 | explain actuarial practices as applied directly on behalf of financial security system providers or as a consultant to those providers | | CLO 5 | apply actuarial skills in nontraditional and emerging areas of practice | | CLO 6 | provide context for the specific mathematical and technical skills developed in the basic actuarial courses | | CLO 7 | prepare for the professional role as an Associate of the Society of Actuaries |
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3909 Advanced life contingencies; and For BSc(Actuarial Science) students only.
Offer in 2015 - 2016	Y 1st sem — **Examination**: No Exam
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Project work		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Presentation	oral presentation	25	CLO 4,5,6
Project reports	written report	50	CLO 4,5,6,7
Test	in-class quizzes	25	CLO 1,2,3,4,5,6,7

Required/recommended reading and online materials	Klugman, S.: Understanding Actuarial Practice (Society of Actuaries, 2012) Bellis, C., Klugman, S., Shepherd, J., and Lyon, R.: Understanding Actuarial Management: The Actuarial Control Cycle (Institute of Actuaries of Australia, 2010, 2nd ed.) Brown, R.L. and Gottlieb, L.R.: Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance (ACTEX Publications, Inc., 2007, 3rd ed.) Segal, S.: Corporate Value of Enterprise Risk Management: The Next Step in Business Management (Wiley, 2011)
Course Website	moodle.hku.hk

STAT3954 Current topics in actuarial science (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof W K Li, Statistics & Actuarial Science *(hrntlwk@hku.hk)*		
Teachers Involved	Mr Simon Lam, Mr Fred Choi & Mr Henry Cheung, Statistics & Actuarial Science		
Course Objectives	This course aims at providing practical elements for actuarial students including daily life actuarial practice and the basic capability to understand, research in and handle the laws as and when situations would arise, which will benefit students in their coming future career.		
Course Contents & Topics	This course covers a full range of topics related to both areas including 1) Practical Actuarial Practice and 2) Actuaries' Legal Thinking. For Practical Actuarial Practice: It covers the major practical topics in both Life and Casualty areas. For Life Insurance, it covers the full picture of actuarial control cycle including Product Pricing, Valuation, Financial Reporting and Experience Analysis. For General Insurance, it covers the backbone areas including Product Pricing and Valuation. For Actuaries' Legal Thinking: This is the 7th year of the course and the full start of a new course structure		

	echoing changes in the market for basic legal and general insurance skills for actuaries. Intellectually stimulating recent legal materials with heavy involvement of actuarial and other general insurance expertise would dominate the course, alongside with basic legal research skills and fundamental legal thinking. Sharing of experience from guests from the General Insurance Industry would also infiltrate the course.
Course Learning Outcomes	On successful completion of this course, students should be able to:

CLO 1	have a basic understanding regarding Actuarial Control Cycle from A to Z for Life Insurance and General Insurance
CLO 2	possess some experience regarding fundamental actuarial practice through practical project
CLO 3	possess basic understanding of the legal system in Hong Kong
CLO 4	possess fundamental knowledge in certain core legal aspects such as the law of contract and the law of tort
CLO 5	possess fundamental knowledge of the law of insurance
CLO 6	conduct elementary legal researches when facing with legal problems
CLO 7	understand the basic elements of a routine judgment, the matrix of the facts and the law involved

Pre-requisites (and Co-requisites and Impermissible combinations)	(Pass in STAT3901 Life contingencies, or already enrolled in this course; or Pass in STAT3909 Advanced life contingencies, or already enrolled in this course); and For BSc(Actuarial Science) students only.		
Offer in 2015 - 2016	N	**Examination**	---
Offer in 2016 - 2017	N		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, practical project & class test(s))	100	CLO 1,2,3,4,5,6,7

Course Website	moodle.hku.hk

STAT3955 Survival analysis (6 credits)		**Academic Year**	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J F Xu, Statistics & Actuarial Science *(saas@hku.hk)*		
Teachers Involved	Dr J F Xu, Statistics & Actuarial Science		
Course Objectives	This course is concerned with how models which predict the survival pattern of humans or other entities are established. This exercise is sometimes referred to as survival-model construction.		
Course Contents & Topics	The nature and properties of parametric and nonparametric survival models will be studied. Topics to be covered include: the introduction of some important basic quantities like the hazard function and survival function; some commonly used parametric survival models; concepts of censoring and/or truncation; parametric estimation of the survival distribution by maximum likelihood estimation method; nonparametric estimation of the survival functions from possibly censored samples by means of the Kaplan-Meier estimator, the Nelson-Aalen estimator; and the kernel density estimator or the Ramlau-Hansen estimator and comparisons of k independent survival functions by means of the generalized log-rank test; parametric regression models; Cox's semiparametric proportional hazards regression model; and multivariate survival analysis.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	acquire a clear understanding of the nature of failure time data or survival data, a generalization of the concept of death and life
CLO 2	perform estimation for some commonly used survival models under different types of censoring mechanisms
CLO 3	analyze survival data using the Cox's semiparametric proportional hazards model
CLO 4	extend the Cox's model to a multivariate setup to accommodate multivariate survival data

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3902 Statistical models, or already enrolled in this course; or Pass in STAT3600 Linear statistical analysis or STAT3901 Life contingencies		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
Examination	One 3-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Cox, D. R. and Oakes, D.: Analysis of Survival Data (Chapman and Hall, 1984) Hosmer, D. W. and Lemeshow, S.: Applied Survival Analysis: Regression Modeling of Time to Event Data (Wiley, 1999) Klein, J. P. and Moeschberger, M. L.: Survival Analysis: Techniques for Censored and Truncated Data (Springer Verlag, New York, 2005, 2nd ed.)
Course Website	moodle.hku.hk

STAT3956 Pension funds and pension mathematics (6 credits)		**Academic Year**	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof G Ma, Statistics & Actuarial Science *(gma328@hku.hk)*		
Teachers Involved	Prof G Ma, Statistics & Actuarial Science		
Course Objectives	This course covers the basics of pension plan design and pension fund management, as well as the fundamentals of pension plan valuations using different actuarial cost methods. The students will be introduced to the application of actuarial valuation techniques to the funding and accounting of pension plans.		
Course Contents & Topics	The following topics will be covered: Fundamentals of private pension plans; pricing and valuation of pension obligations; actuarial cost methods and their effects on cost patterns; selection of actuarial assumptions; principles of asset and liability management.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	calculate the pension benefits in accordance with the provisions of a pension plan
CLO 2	calculate the normal cost and actuarial liabilities using different actuarial cost methods
CLO 3	perform gain and loss analyses for pension valuations
CLO 4	select appropriate assumptions and methods for funding or accounting purposes
CLO 5	interpret the valuation results presented in actuarial valuation reports
CLO 6	understand the principles of asset and liability modeling as related to pension plans

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3909 Advanced life contingencies		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5,6
Examination	One 3-hour written examination	75	CLO 1,2,3,4,6

Required/recommended reading and online materials

Arthur W. Anderson: Pension Mathematics for Actuaries (2006, 3rd edition).
McGill, D.M., Brown, K.N. , Haley, J.J., Schieber, S.J.: Fundamentals of Private Pensions (2010, 9th Edition)
William H. Aitken: Problem-Solving Approach to Pension Funding and Valuation, (2nd edition).
Morneau Sobeco: Handbook of Canadian Pension & Benefit Plans (2008, 14th Edition)
Actuarial Standard of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations
Actuarial Standard of Practice No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations
Actuarial Standard of Practice No. 44, Selection and Use of Asset Valuation Methods for Pension Valuations
David Farber, ASA, EA, MSPA, William Farrimond, FSPA, Duane Mayer, MSPA, George Matray, FSPA: Actuarial Cost Methods-A Review, 3rd Edition, 1999, ACTEX Publications
2001 Supplement to Actuarial Cost Methods-A Review, ACTEX Publications
Ma C M George: Fundamentals of Pension Funds and Pension Mathematics. Peking University Press (2015)

Course Website: moodle.hku.hk

STAT4601 Time-series analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Li, Statistics & Actuarial Science *(gdli@hku.hk)*		
Teachers Involved	Dr G Li, Statistics & Actuarial Science		
Course Objectives	A time series consists of a set of observations on a random variable taken over time. Time series arise naturally in climatology, economics, environment studies, finance and many other disciplines. The observations in a time series are usually correlated; the course establishes a framework to discuss this. This course distinguishes different type of time series, investigates various representations for the processes and studies the relative merits of different forecasting procedures. Students will analyse real time-series data on the computer.		
Course Contents & Topics	Stationarity and the autocorrelation functions; linear stationary models; linear non-stationary modes; model identification; estimation and diagnostic checking; seasonal models and forecasting methods for time series.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	recognize a stationary vs non-stationary time series
CLO 2	understand some basic properties of commonly used time series models such as AR (autoregressive), MA (moving average) and ARMA models
CLO 3	transform non-stationary time series into stationary ones

	CLO 4	identify different time series models based on autocorrelation functions
	CLO 5	fit a suitable AR, MA or ARMA model to real data using SAS (after transforming to stationarity if necessary)
	CLO 6	perform goodness of fit tests for such models
	CLO 7	do forecasting with these fitted time series models
Pre-requisites (and Co-requisites and Impermissible combinations)		Pass in STAT3600 Linear statistical analysis; and Not for students who have passed in STAT3614 Business forecasting, or have already enrolled in this course; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.
Offer in 2015 - 2016		Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2016 - 2017		Y
Course Grade		A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	40	CLO 1,2,3,4,5,6,7
Examination	One 2-hour written examination	60	CLO 1,2,3,4,6,7

Required/recommended reading and online materials

J. D. Cryer & K.S. Chan: Time Series Analysis with Applications in R (Springer, 2008, 2nd edition)
Bovas Abraham & Johannes Ledolter: Statistical Methods for Forecasting (John Wiley & Sons, 2005, 2nd edition)
W. W .S. Wei: Time Series Analysis: Univariate and Multivariate Methods (Addison-Wesley, 2006, 2nd edition)
W. K. Li: Diagnostic Checks in Time Series (Chapman & Hall/CRC, 2004)
Howell Tong: Non-linear Time Series: A Dynamical System Approach (Oxford University Press, 1990)

Course Website: moodle.hku.hk

STAT4602 Multivariate data analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof T W K Fung, Statistics & Actuarial Science *(wingfung@hku.hk)*		
Teachers Involved	Prof T W K Fung, Statistics & Actuarial Science		
Course Objectives	In many designed experiments or observational studies, the researchers are dealing with multivariate data, where each observation is a set of measurements taken on the same individual. These measurements are often correlated. The correlation prevents the use of univariate statistics to draw inferences. This course develops the statistical methods for analysing multivariate data through examples in various fields of application and hands-on experience with the statistical software SAS.		
Course Contents & Topics	Problems with multivariate data. Multivariate normality and transforms. Mean structure for one sample. Tests of covariance matrix. Correlations: Simple, partial, multiple and canonical. Multivariate regression. Principal components analysis. Factor analysis. Problems for means of several samples. Multivariate analysis of variance. Discriminant analysis. Classification. Multivariate linear model.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	

	CLO 1 (cont.): analyze multivariate data with main SAS procedures, such as PROC IML, PROC REG, PROC CORR, PROC CANCORR, PROC PRINCOMP, PROC FACTOR, PROC DISCRIM, PROC CANDISC and etc CLO 2: compare the mean structure of multiple measurements for one or more than one population(s) by multivariate MANOVA and profile analysis CLO 3: investigate the linear associations among one/two group(s) of variables by multiple, partial and canonical correlation and multivariate regression CLO 4: explore the latent linear structure of a data set with multiple measurements by principal components analysis and factor analysis CLO 5: classify observations of a population with one or more than one measurements by discriminant analysis
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
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Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	50	CLO 1,2,3,4,5
Examination	One 3-hour written examination	50	CLO 1,2,3,4,5

Required/recommended reading and online materials

Johnson, R. A. & Wichern, D. W.: Applied Multivariate Statistical Analysis (Prentice-Hall, 2007, 6th edition)
Mardia K. V., Kent J. T., and Bibby J. M.: Multivariate Analysis (Academic Press, 1979)
Seber G. A. F.: Multivariate Observations (John Wiley & Sons, 1984)
Morrison D. F.: Multivariate Statistical Methods (McGraw-Hill, 1990, 3rd ed.)
Hair J. F., Anderson R. E., Tatham R. L., & Black W. C.: Multivariate Data Analysis (Prentice-Hall, 2006, 6th edition)
Srivastava M. S.: Methods of Multivariate Statistics (John Wiley and Sons, 2002)
SAS Manuals on-line: Use the HELP button.

Course Website: moodle.hku.hk

STAT4603 Current topics in risk management (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	TBC, Statistics & Actuarial Science *()*		
Teachers Involved			
Course Objectives	This course is to broaden the students knowledge of risk management by considering current topics in risk management. These topics will build on the theory and methods covered in the core courses. The topics offered each year depend on staff availability.		
Course Contents & Topics	Liquidity risk; BASEL III and beyond; Operational risk; Model risk; Cutting edge risk analytics and innovations in risk management.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	gain insights into current advances in risk management
CLO 2	understand current risk management pitfalls and development

	CLO 3 — make effective use of models and techniques for managing various kinds of risk
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT4601 Time-series analysis
Offer in 2015 - 2016	N — **Examination** ---
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	see table below

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials and class test(s))	60	CLO 1,2,3
Examination	One 3-hour written examination	40	CLO 1,2,3

Required/recommended reading and online materials	Dowd, K: Measuring Market Risk. 2nd Edition (Wiley, 2005). (Chapters 14, 16) Fiedler, R.: Liquidity Modelling. (Risk Books, 2011) Franzetti, C.: Operational Risk Modeling and Management. (Chapman & Hall/CRC Finance Series, 2010) Basel Committee on Banking Supervision:Basel III: International Framework for liquidity risk measurement, standards and monitoring (BIS, 2010) Basel Committee on Banking Supervision:Basel III: A global regulatory framework for more resilient banks and banking systems (BIS, 2010)
Course Website	moodle.hku.hk

STAT4606 Risk management and Basel Accords in banking and finance (6 credits)	**Academic Year** 2015
Offering Department	Statistics & Actuarial Science — **Quota** ---
Course Co-ordinator	Mr P K Y Pang, Statistics & Actuarial Science *(the_pang@yahoo.com)*
Teachers Involved	Mr P K Y Pang, Statistics & Actuarial Science
Course Objectives	To provide comprehensive knowledge and in-depth understanding of risk management in the banking and finance industry to students. The focus is on management with basic measurement fundamentals only forming a part of the course. Accordingly, minimal background in quantitative methods will be required and involved. However, basic financial product (eg: bonds, swaps, options) knowledge will be required.
Course Contents & Topics	The course introduces and explains: - the importance of risk management, - risk nature and types, - design and establishment of a risk management framework, - the importance of people and corporate culture, - the complete risk management cycle, - measurement and management of credit, market and operational risks, - Basel accords and the capital treatments for credit, market and operational risks, - key developments (eg: Know-Your-Customers, Anti-Money laundering, Sarbanes-Oxley) and critical issues, - the importance of business continuity, - design and implementation of a business continuity plan.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 — understand the importance, nature and classification of various risks, and the risk management principle and cycle CLO 2 — design and establish a risk management framework CLO 3 —

		demonstrate knowledge and understanding of the measurements of credit, market and operational risks
	CLO 4	explain and describe Basel accords and its capital treatments for credit, market and operational risks
	CLO 5	appreciate the importance of, design and implement a business continuity plan

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3910 Financial economics I or STAT3905 Introduction to financial derivatives or STAT3618 Derivatives and risk management or (FINA2322 Derivatives and any University level 3 course).		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	40	CLO 1,2,3,4
Examination	One 2-hour written examination	60	CLO 1,2,3,4,5

Required/recommended reading and online materials	Crouhy, M., Galai, D. and Mark, R.: The Essentials of Risk Management (McGraw-Hill, 2006) Jorion, P.: Financial Risk Manager Handbook + Test Bank: FRM part I/Part II (Wiley, 2010, 6th edition) Hull, J. C.: Risk Management and Financial Institutions (Pearson Higher Education, 2010, 2nd edition) Gallati, R.: Risk Management and Capital Adequacy (McGrawHill, 2003)
Course Website	moodle.hku.hk
Additional Course Information	This course is previously called STAT2320 as the prerequisite changed to STAT3303.

STAT4607 Credit risk analysis (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	Dr K P Wat, Statistics & Actuarial Science		
Course Objectives	For a commercial bank, credit risk has always been the most significant. It is the risk of default on debt, swap, or other counterparty instruments. Credit risk may also result from a change in the value of an asset resulting from a change in the counterparty's creditworthiness. This course will introduce students to quantitative models for measuring and managing credit risk. It also aims to provide students with an understanding of the credit risk methodology used in the financial industry and the regulatory framework in which the credit risk models operate.		
Course Contents & Topics	Probabilities of default, recovery rates and loss given default; Default and credit migration; credit scoring and internal rating models; Credit portfolio models such as CreditMetrics, CreditPortfolioView, KMV and actuarial approach; Credit derivatives.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand the Basel requirements for credit risk
CLO 2	estimate credit scores using the logit model
CLO 3	understand and estimate default probabilities using various approaches such as Moody's, the KMV and the mortality method
CLO 4	understand the concept of credit value-at-risk and the CreditMetrics approach
CLO 5	estimate default correlations

	CLO 6 — assess rating systems
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass or already enrolled in STAT3910 Financial economics I or STAT3618 Derivatives and risk management or STAT3905 Introduction to financial derivatives or (FINA2322 Derivatives and any University level 3 course)
Offer in 2015 - 2016	Y 2nd sem — **Examination** May
Offer in 2016 - 2017	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and class test(s))	40	CLO 1,2,3,4,5,6
Examination	One 2-hour written examination	60	CLO 1,2,3,4,5,6

Required/recommended reading and online materials

Resti, A. and Sironi, A. (2007). Risk Management and Shareholders' Value in Banking: From Risk Measurement Models to Capital Allocation Policies. Wiley.
Saunders, A. and Allen, L. (2010). Credit Risk Measurement In and Out of the Financial Crisis: New Approaches to Value at Risk and Other Paradigms (3rd Edition). Wiley.
Loffler, G. and Posch, P. N. (2010). Credit Risk Modeling using Excel and VBA (2nd Edition). Wiley.
Jorion, P. (2011). Financial Risk Manager Handbook (6th Edition). Wiley.
Crouhy, M., Galai, D., and Mark, R. (2001). Risk Management. McGraw-Hill.
Hull, J. C. (2012). Risk Management and Financial Institutions (3rd Edition). Wiley.
Hull, J. C. (2012). Options, Futures, and Other Derivatives (8th Edition). Prentice Hall.
Gujarati, D. N. and Porter, D. C. (2009). Basic Econometrics (5th Edition). McGraw-Hill.
Bohn, J. R. and Stein, R. M. (2009). Active Credit Portfolio Management in Practice. Wiley.
Smithson, C. W. (2003). Credit Portfolio Management. Wiley.

Course Website: moodle.hku.hk

STAT4608 Market risk analysis (6 credits)	**Academic Year** 2015
Offering Department	Statistics & Actuarial Science — **Quota** ---
Course Co-ordinator	Dr Z Zhang, Statistics & Actuarial Science *(zhangz08@hku.hk)*
Teachers Involved	Dr Z Zhang, Statistics & Actuarial Science
Course Objectives	Financial risk management has experienced a revolution in the last decade thanks to the introduction of new methods for measuring risk, particularly Value-at-Risk (VaR). This course introduces modern risk management techniques covering the measurement of market risk using VaR models and financial time series models, and stress testing.
Course Contents & Topics	Risk Measures; Value-at-Risk (VaR) models (parametric, Monte Carlo simulation and Historical simulation); Risk factor mapping; Advanced VaR models (GARCH-type models, extreme-value theory and normal-mixture); Principal Component Analysis and VaR; Backtesting and stress testing.

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	understand VaR and expected shortfall as risk measures
CLO 2	compute VaR and expected shortfall
CLO 3	model volatility using GARCH-type models
CLO 4	understand extreme-value theory
CLO 5	understand backtesting and stress testing

Pre-requisites (and Co-requisites and Impermissible combinations)	(Pass in STAT3907 Linear models and forecasting and STAT3910 Financial economics I); or [Pass in STAT4601 Time-series analysis and (FINA2320 Investments and portfolio analysis or STAT3609 The statistics of investment risk)]		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and a class test)	40	CLO 1,2,3,4,5
Examination	One 2-hour written examination	60	CLO 1,2,3,4,5

Required/recommended reading and online materials	Jorion, P.: Value-at-Risk: The New Benchmark for Managing Financial Risk (McGraw-Hill, 2007, 3rd edition) Alexander, C.: Market Models: A Guide to Financial Data Analysis (Wiley, 2001) Alexander, C.: Market Risk Analysis: Practical Financial Econometrics (Wiley, 2008) Alexander, C.: Market Risk Analysis: Value-at-Risk Models (Wiley, 2009) Tsay, R. S.: Analysis of Financial Time Series (Wiley, 2005, 2nd edition)
Course Website	moodle.hku.hk

STAT4609 Big data analytics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G C S Lui, Statistics & Actuarial Science *(csglui@hku.hk)*		
Teachers Involved	Dr G C S Lui, Statistics & Actuarial Science		
Course Objectives	In the past decade, huge volume of data with highly complicated structure has appeared in every aspect, such as social web logs, e-mails, video, speech recordings, photographs, tweets and others. The efficient extraction of valuable information from these data sources becomes a challenging task. This course focuses on the practical knowledge and skills of some advanced analytics and statistical modeling for solving big data problems.		
Course Contents & Topics	Web analytics, text analytics, sentiment analytics, link analysis, social network analysis, recommender systems (collaborative filtering), and parallel computing for big data analytics		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand and apply a wide range of data analytic techniques, and recognize their characteristics, strengths and weaknesses
CLO 2	obtain hands-on experience of computer software for data analytics
CLO 3	identify and use appropriate data analytic techniques for data extraction, taking into account both the structure of the data and the goals of the user of the discovered knowledge
CLO 4	evaluate the quality of discovered knowledge, taking into account the requirements of the data analytic task being performed and the goals of the user

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3612 Data mining		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		

Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	See table below
Assessment Methods and Weighting	See table below
Required/recommended reading and online materials	Tan, P.N., Steinback, M. and Kumar, V.: Introduction to Data Mining (Addison Wesley, 2014, 2nd edition) Hastie, T., Tibshirani R. and Friedeman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (Springer, New York, 2009, 2nd edition) Liu, B.: Web Data Mining: Exploring Hyperlinks, Contents and Usage Data (Springer, 2013, 2nd edition) Webb, A.: Statistical Pattern Recognition (Wiley, 2011, 3rd edition)
Course Website	moodle.hku.hk

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and class test(s))	50	CLO 1,2,3,4
Examination	One 2-hour written examination	50	CLO 1,3,4

STAT4710 Capstone experience for statistics undergraduates (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof W K Li, Statistics & Actuarial Science *(saas@hku.hk)*		
Teachers Involved	Prof W K Li, Statistics & Actuarial Science		
Course Objectives	This project-based course aims to provide students with capstone experience to formulate and investigate real life problems in the area of statistics, risk management, finance, climate, social science, medicine and scientific research by integrating and applying the statistical theories and quantitative techniques learnt in their junior university years.		
Course Contents & Topics	No formal teaching. Students are expected to devote 120-140 hours working on this project. Students will work in groups of four or five under the supervision of a teacher. Students are required to give a presentation on their work two to three weeks before the end of the semester, and submit their final report at the end of the semester. It aims to help the students to establish a good and solid foundation of life-long learning skills, and to enable students to equip with hands-on experience in solving real life problems starting from identification of the key variable(s) of interest, literature search, model formulation, data analysis or simulation, technical report writing and presentation of the results. Students will need to find an interesting topic of their own, conduct literature search regarding the most recent research related to the problem, make suggestions to improve the current situations or even solve the problem identified in their project.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	Students are expected to have satisfactorily completed at least 24 credits of advanced level (STAT3XXX, STAT4XXX or STAT6XXX) disciplinary core/elective courses in Decision Analytics, Risk Management, and Statistics Majors. Students who are interested in taking the course should submit their applications to the		

Course Learning Outcomes:

CLO 1	formulate a problem using statistical or risk management ideas for a particular issue we are facing with and determine ways in which statistics/risk management can be used to solve the problems or to make predictions
CLO 2	integrate theory and practice, and to understand limitations of their current knowledge
CLO 3	work in a team and to collaborate with people with different background
CLO 4	express ideas effectively in both written and oral forms
CLO 5	develop further logical, critical thinking, creativity, technical report writing, communication and consultation skills
CLO 6	advocate to others the appreciation of statistics/risk management as to its relevance to our daily life

	Department. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors students only, and is mutually exclusive with STAT3799, STAT4799 and STAT4766. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Project-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Reading / Self study / Tutorials, group work/project, reading/self-study / 120		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Oral presentation / oral presentation and attendance / 45 / CLO 1,2,3,4,5,6 Research report / written report / 55 / CLO 1,2,3,4,5,6		
Required/recommended reading and online materials	No specific list of textbooks and references. Students are encouraged to obtain information via various channels (main library, e-journals, internet, and discussions with classmates and teachers, etc.).		
Course Website	moodle.hku.hk		

STAT4711 Capstone experience for actuarial science undergraduates (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof W K Li, Statistics & Actuarial Science *(saas@hku.hk)*		
Teachers Involved	Prof W K Li, Statistics & Actuarial Science		
Course Objectives	This project-based course aims to provide students with capstone experience to formulate and investigate practical problems in actuarial science by integrating and applying actuarial theories and techniques learnt in their university years. It aims to help the students to establish a good and solid foundation of self-learning skills, and to enable students to equip with hands-on experience in solving practical problems including definition of the problem, designing the solution, and presentation of the results.		
Course Contents & Topics	No formal teaching will be given for this course. Students are expected to devote 120-140 hours working on this project. Students will work in groups of four or five under the supervision of a teacher and/or an industry supervisor. Students are required to give a presentation on their work two to three weeks before the end of the semester, and submit their final report at the end of the semester. Topics acceptable for projects in this course can be related to any of the traditional actuarial areas of practice such as life insurance, pension, finance, investment, enterprise risk management and general insurance. Students are also encouraged to suggest topics in non-traditional actuarial areas provided they can find a suitable teacher and/or industry supervisor. All topics for this course will be subject to final approval by the Department to ensure relevance to actuarial science. Students will need to decide on the topic for a practical project, conduct market research regarding industry activities related to the topic, and make suggestion on a solution of the problem identified in their project.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 define a practical problem, discuss the issues faced by different stakeholders, and design workable solutions for the problems CLO 2 integrate theoretical results and practical approaches, and to specify limitations of current developments CLO 3 work in a team and to collaborate with members with different background CLO 4 deliver actuarial results effectively in a written report and in oral presentations CLO 5 develop further logical, critical thinking, creativity, technical report writing, communication and consultation skills		

	CLO 6	explain to a non-actuarial audience the approaches of actuarial science as applied to problems in a financial security system

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in BSc(Actuarial Science) programme including (STAT3901 Life contingencies, or already enrolled in this course; or Pass in STAT3909 Advanced life contingencies, or already enrolled in this course); and This capstone course is for BSc(Actuarial Science) students only, and is mutually exclusive with STAT4798 and STAT4767. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Project-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Reading / Self study	Tutorials, group work/project, reading/self-study	120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	oral presentation and attendance	45	CLO 1,2,3,4,5,6
Research report	written report	55	CLO 1,2,3,4,5

Course Website	moodle.hku.hk

STAT4766 Statistics internship (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	Various teachers as the assessors of oral presentations and written reports, Statistics & Actuarial Science		
Course Objectives	This course is offered to students majoring in Statistics or Risk Management who take on a minimum of 160 hours of internship work related to his major disciplines. It provides students with first-hand experience in the applications of academic knowledge in a real-life work environment.		
Course Contents & Topics	Upon completion of the internship, each student is required to submit a written report and to give a presentation on his/her internship experience. The report should emphasize important working/educational experiences encountered by the student during his/her internship. In many situations, this would mean a report of the project(s) that the student has been involved in during his/her internship.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	gain first-hand work experience in an industry related to statistics and risk management
CLO 2	apply knowledge in statistics and risk management to solve practical problems in the work place
CLO 3	understand contexts for specific quantitative skills developed in basic statistics and risk management courses
CLO 4	communicate specialist knowledge in statistics and risk management to non-experts in a work environment

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in the Decision Analytics, Risk Management, and Statistics Majors. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors students only; and is mutually exclusive with STAT4710. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem Summer	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		
Grade Descriptors			

Pass	Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction".
Fail	Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.

Course Type: Internship

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Internship work	it is expected that students are to work at least 160 hours (or the equivalent of 4 weeks full-time)	160

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Oral presentation	oral presentation and in-class discussion	40	CLO 1,2,3,4
Written report	written report	60	CLO 1,2,3,4

Required/recommended reading and online materials: Upon completion of the internship, each student is required to submit a written reort and to give an oral presentation on their internship experience. Supervisors will assess the students based on their performance during the internship period (in the case of internships outside the university, the internal supervisor will assess the student based on the feedback by the external supervisor).

Course Website: moodle.hku.hk

Additional Course Information: Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval.
Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

STAT4767 Actuarial science internship (6 credits)

Academic Year	2015		
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr L F K Ng, Statistics & Actuarial Science *(flouisng@hku.hk)*		
Teachers Involved	Various teachers as the assessors of oral presentations and written reports, Statistics & Actuarial Science		
Course Objectives	This course is offered to actuarial science students who take on an 6-month full time or similar internships. The objective is for a student to complete this course as a project based on his/her internship.		
Course Contents & Topics	This course will include a written report which should emphasize important working/ educational experiences encountered by the student during his/her internship. In many situations, this would mean a report of the project(s) that the student has been involved in during his/her internship.		

Course Learning Outcomes: On successful completion of this course, students should be able to:

CLO 1	gain practical experiences during internship
CLO 2	describe basic actuarial practices learned during the internship
CLO 3	explain how actuarial theories learned in University can be applied in practice
CLO 4	provide context for specific technical skills developed in basic actuarial courses

Pre-requisites (and Co-requisites and Impermissible combinations): Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in BSc(Actuarial Science) programme including STAT3901 Life contingencies; and
This capstone course is for BSc(Actuarial Science) students only; and is mutually exclusive with STAT4711.
The earliest that a student is allowed to take this capstone course is their year 3 study.

Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	Pass/Fail		

Grade Descriptors

Pass	Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction".
Fail	Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.

Course Type: Internship

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Internship work	it is expected that students are to work at least 6 months or 120 working days	960

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Oral presentation</td><td>oral presentation and in-class discussion</td><td>40</td><td>CLO 2,3,4</td></tr><tr><td>Written report</td><td>written report</td><td>60</td><td>CLO 2,3,4</td></tr></table>
Course Website	moodle.hku.hk
Additional Course Information	Despite no weighting for this assessment component, the completion of the employer's evaluation form by the employer/direct supervisor is required for passing the course. Satisfactory completion of this course can be counted towards the Capstone requirement. Details of internship will be recorded on the student's transcript. This course will be assessed on "Pass/Fail" basis. Students who are interested to enrol in this course should contact the Department to obtain the approval. Enrolment of this course is not conducted via the online course selection system and should be made through the relevant Department/School office after approval has been obtained from the course coordinator.

STAT4798 Statistics and actuarial science project (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof S M S Lee, Statistics & Actuarial Science *(smslee@hku.hk)*		
Teachers Involved	Various teachers as the assessors of oral presentations and written reports, Statistics & Actuarial Science		
Course Objectives	Each year a few projects suitable for Actuarial Science students will be offered to provide students with practical experience in approaching a real problem, in report writing and in oral presentation.		
Course Contents & Topics	These projects, under the supervision of individual staff members, involve the applications of statistics and/or probability in a wide range of problems of practical and/or academic interests.		
Course Learning Outcomes	On successful completion of this course, students should be able to: <table><tr><td>CLO 1</td><td>formulate meaningful research problems</td></tr><tr><td>CLO 2</td><td>learn and apply advanced techniques in probability and/or statistics to solve real life problems</td></tr><tr><td>CLO 3</td><td>summarize and present research findings in a professional manner</td></tr></table>		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in BSc(Actuarial Science) programme including STAT3902 Statistical models and STAT3907 Linear models and forecasting; and Pass or already enrolled in at least one of the following courses: STAT3616 Advanced SAS programming, STAT3911 Financial economics II, STAT4601 Time-series analysis, STAT4602 Multivariate data analysis; and This capstone course is for BSc(Actuarial Science) students only; and subject to the consent of course coordinator. This course is mutually exclusive with STAT4711. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y 1st sem 2nd sem	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.]</td></tr><tr><td>**B**</td><td>Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.</td></tr><tr><td>**Fail**</td><td>Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.</td></tr></table>		
Course Type	Project-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Reading / Self study</td><td></td><td>120</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th><th>Assessment Methods to CLO Mapping</th></tr><tr><td>Oral presentation</td><td>oral presentation & in-class discussion</td><td>40</td><td>CLO 1,2,3</td></tr><tr><td>Research report</td><td>written report</td><td>60</td><td>CLO 1,2,3</td></tr></table>		
Course Website	moodle.hku.hk		

Additional Course Information	Approval is subject to past academic performance.

STAT4799 Statistics project (12 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	30
Course Co-ordinator	Prof S M S Lee, Statistics & Actuarial Science *(smslee@hku.hk)*		
Teachers Involved	Various teachers as the assessors of oral presentations and written reports, Statistics & Actuarial Science		
Course Objectives	Each year a few projects suitable for Statistics or Risk Management major students will be offered to provide students with practical experience in approaching a real problem, in report writing and in oral presentation.		
Course Contents & Topics	These projects, under the supervision of individual staff members, involve the applications of statistics and/or probability in a wide range of problems of practical and/or academic interests.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: gain first-hand experience in solving a research or applied problem in statistics or related areas CLO 2: develop skills in important technical tools, including the use of computer software or programs, for typical statistical research and data analyses CLO 3: write succinct reports on the findings of a research study CLO 4: make concise oral presentation of the findings of a research study		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in at least 24 credits of advanced level disciplinary core/elective courses (STAT3XXX, STAT4XXX or STAT6XXX) in the Major in Risk Management / Statistics / Decision Analytics including STAT3600 Linear statistical analysis; and Pass or already enrolled in at least one of the following courses: STAT3616 Advanced SAS programming, STAT3911 Financial economics II, STAT4601 Time-series analysis, STAT4602 Multivariate data analysis; and Not for students who have already enrolled in STAT3799 Directed studies in statistics in this academic year. This capstone course is for Decision Analytics, Risk Management, and Statistics Majors students only; and subject to the consent of course coordinator. This course is mutually exclusive with STAT4710. The earliest that a student is allowed to take this capstone course is their year 3 study.		
Offer in 2015 - 2016	Y Year long	**Examination**	No Exam
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.] **B**: Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Project-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Reading / Self study / the student is expected to meet & discuss with a supervisor regularly in the course of the project / 240		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Dissertation / written report / 60 / CLO 1,2,3 Oral presentation / oral presentation & in-class discussion / 40 / CLO 1,2,4		
Course Website	moodle.hku.hk		
Additional Course Information	Approval is subject to past academic performance.		

STAT4901 Risk theory II (6 credits)		**Academic Year**	**2015**

Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J K Woo, Statistics & Actuarial Science *(jkwoo@hku.hk)*		
Teachers Involved	Dr J K Woo, Statistics & Actuarial Science		
Course Objectives	This course is an advanced course in risk theory which extends various topics discussed in STAT3906. It discusses utility theory, ruin theory, aggregate claims process, and related topics.		
Course Contents & Topics	Utility theory; discrete ruin model; compound Poisson risk model; ruin probability; reinsurance; adjustment coefficient; Lundbergs inequality; Tijms approximation; non-homogeneous birth process; contagion model; mixed Poisson process; inflation model; IBNR (Incurred But Not Reported) claims; mixed Erlang distributions; stop-loss moments; equilibrium distributions.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	understand utility theory including some commonly used utility functions, Jensens inequality, risk aversion and utility maximization
CLO 2	define discrete and continuous ruin models
CLO 3	calculate the adjustment coefficient, Lundbergs inequality and Tijms approximation in ruin theory
CLO 4	understand the effect of reinsurance and change of parameters on ruin probability
CLO 5	understand non-homogeneous birth process and its applications as contagion models for claim frequencies
CLO 6	understand mixed Poisson process and its applications including the inflation model and the IBNR model
CLO 7	derive the relationship between stop-loss moments and equilibrium distributions

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3906 Risk theory I		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4,5,6
Examination	One 3-hour written examination	75	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Klugman S.A., Panjer H.H., & Willmot G.E.: Loss Models: From Data to Decisions (John Wiley & Sons, 2007, 3rd edition). Kaas R., Goovaerts M., Dhaene J., & Denuit M.: Modern Actuarial Risk Theory (Springer, 2004, 1st edition). Bowers N.L., Gerber H.U., Hickman J.C. & Jones D.A.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd edition). Willmot G.E. & Lin X.S.: Lundberg Approximations for Compound Distributions with Insurance Applications (Springer, 2000, 1st edition).
Course Website	moodle.hku.hk

STAT4902 Selected topics in actuarial science (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---

Course Co-ordinator	TBC, Statistics & Actuarial Science *()*
Teachers Involved	TBC, Statistics & Actuarial Science
Course Objectives	This course is an advanced course in actuarial science which discusses selected topics which potential graduate students will find useful. It focuses on tools that are in the frontier of actuarial science with examples on applications.
Course Contents & Topics	The contents will be chosen from the following topics: Coherent risk measures; Premium calculation principles; Copulas; Extreme value theory; Stochastic dominance; Ordering of risks; Renewal equations with insurance applications; Reliability properties; Generalized linear models; Comonotonicity; Measures of dependency; Phase-type distributions; Applications to enterprise risk analysis; Other topics as determined by the instructor.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand the mathematical tools useful for further research and applications CLO 2 apply the tools to solve potentially unseen problems
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3906 Risk theory I
Offer in 2015 - 2016	N — **Examination** ---
Offer in 2016 - 2017	N
Course Grade	A+ to F
Grade Descriptors	see below

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	see below

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials and class test(s))	40	CLO 1,2
Examination		60	CLO 1,2

Required/recommended reading and online materials	- Kaas R., Goovaerts M., Dhaene J., & Denuit M.: Modern Actuarial Risk Theory (Springer, 2004, 1st edition). - Denuit M., Dhaene J., Goovaerts M., & Kaas R.: Actuarial Theory for Dependent Risks (Wiley, 2005, 1st edition). - Willmot G.E. & Lin X.S.: Lundberg Approximations for Compound Distributions with Insurance Applications (Springer, 2000, 1st edition). - McNeil A.J., Frey R. & Embrechts, P.: Quantitative Risk Management: Concepts, Techniques, and Tools (Princeton University Press, 2005, 1st edition).
Course Website	moodle.hku.hk

STAT4903 Actuarial techniques for general insurance (6 credits)		**Academic Year**	2015
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr L F K Ng, Statistics & Actuarial Science *(flouisng@hku.hk)*		
Teachers Involved	Dr L F K Ng, Statistics and Actuarial Science		
Course Objectives	The purpose of this course is to develop knowledge of the basic techniques for ratemaking and estimating claim liabilities for general insurance. Application of the actuarial techniques to resolve general insurance problems will be emphasized. The course also provides general knowledge on the general insurance markets in Hong Kong and China. Students will acquire the fundamental concept on general insurance actuarial science together with the supporting calculations.		
Course Contents & Topics	1. General Insurance Markets in Hong Kong, Taiwan and PRC - Introduction of general insurance markets		

	- Regulations on general insurance 2. Basic techniques for ratemaking - How to read and use manual rate pages - Ratemaking related to exposures - Ratemaking related to premiums - Ratemaking related to loss and loss adjustment expenses - Calculate the underwriting expense provisions - Pure premium methods - Loss Ratio methods - Rating differential and relativities - Considerations when selecting the final rates 3. Estimating claim liabilities - Data requirement - Build and analyze claim development triangles - Reserving techniques - Considerations when estimating the claim liabilities - Estimate recoveries and unpaid claim adjustment expenses - Appraise and validation of the estimated results 4. Concurrent topics Applications using predictive modeling in General Insurance - e.g. predictive modeling, Enterprise Risk Management, etc
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 – understand the feature and underlying risk of general insurance products CLO 2 – calculate the premium rate for basic general insurance products CLO 3 – estimate the claims liabilities for general insurance products
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3906 Risk theory I
Offer in 2015 - 2016	Y 2nd sem — **Examination**: May
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures – 36 Tutorials – 12 Reading / Self study – 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Assignments – Coursework (assignments, tutorials, and a class test) – 25 – CLO 1,2,3 Examination – One 3-hour written examination – 75 – CLO 2,3
Required/recommended reading and online materials	Friedland, J.F., Estimating Unpaid Claims Using Basic Techniques, Casualty Actuarial Society, Third Version, July 2010 Werner, G, and Modlin, C., Basic Ratemaking, Casualty Actuarial Society, Fourth Edition, October 2010
Course Website	moodle.hku.hk
Additional Course Information	References: Actuarial Standard Board of the American Academy of Actuaries, Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking American Academy of Actuaries Committee on Risk Classification, Risk Classification Statement of Principles, June 1980 Casualty Actuarial Society Committee on Ratemaking Principles, Statement of Principles Regarding Property and Casualty Insurance Ratemaking, Casualty Actuarial Society, May 1988 Feldblum, S., Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty

	Insurance, PCAS LXXXIII, 1996, pp. 190-256 (excluding Secions 7-9) Insurance Services Office, Inc., Personal Automobile Manual (Effective 6-98), General Rules 1-6 only.

STAT7609 Research methods in statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J F Xu, Statistics & Actuarial Science *(saas@hku.hk)*		
Teachers Involved	Dr J F Xu, Statistics & Actuarial Science		
Course Objectives	This course introduces some statistical concepts and methods which potential graduate students will find useful in preparing for work on a research degree in statistics. Focus is on applications of state-of-the-art statistical techniques and their underlying theory.		
Course Contents & Topics	Contents may be selected from: 1. Basic asymptotic methods: modes of convergence; stochastic orders; laws of large numbers; central limit theorems; delta method; Edgeworth expansions; saddlepoint approximations. 2. Parametric and nonparametric likelihood methods: high-order approximations; profile likelihood and its variants; signed likelihood ratio statistics; empirical likelihood. 3. Nonparametric statistical inference: sign and rank tests; Kolmogorov-Smirnov test; nonparametric regression; density estimation; kernel methods. 4. Computationally-intensive methods: cross-validation; bootstrap; permutation methods. 5. Robust methods: measures of robustness; M-estimator; L-estimator; R-estimator; estimating functions. 6. Sequential analysis: sequential probability ratio test; sequential estimation. 7. Model selection using information criteria. 8. Other topics as determined by the instructor.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: comprehend the language and technicalities found in statistical research literature CLO 2: understand the use of standard mathematical tools for conducting statistical research CLO 3: apply a variety of research tools to solve standard statistical problems CLO 4: acquire exposure to some developments in contemporary statistical research		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping** Assignments / Coursework (assignments, tutorials, and a class test) / 25 / CLO 1,2,3,4 Examination / One 2-hour written examination / 75 / CLO 1,2,3,4		
Required/recommended reading and online materials	DasGupta, A. (2008). Asymptotic Theory of Statistics and Probability. Springer:. Efron, B. and Tibshirani, R.J. (1993). An Introduction to the Bootstrap. Chapman & Hall: New York. Owen, A.B. (2001). Empirical Likelihood. Chapman & Hall: Boca Raton. Shao, J. (1999). Mathematical Statistics. Springer: New York. Wasserman, L. (2006). All of Nonparametric Statistics. Springer.		
Course Website	moodle.hku.hk		

STAT7610 Advanced probability (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof J J F Yao, Statistics & Actuarial Science *(jeffyao@hku.hk)*		
Teachers Involved	Prof J J F Yao, Statistics & Actuarial Science		
Course Objectives	This course provides an introduction to measure theory and probability. The course will focus on some basic concepts in theoretical probability which are important for students to do research in actuarial science, probability and statistics.		
Course Contents & Topics	sigma-algebra, measurable space, measure and probability, measure space and probability space, measurable functions, random variables, integration theory, characteristic functions, convergence of random variables, Hilbert spaces, conditional expectation, martingales.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the fundamental measure theory and probability theory CLO 2: learn the general concept of integration, understand the monotone convergence theorem, Fatou's lemma and dominated convergence theorem CLO 3: understand the concept of conditional expectation CLO 4: have some elementary knowledge of martingale		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3603 Probability modelling or STAT3903 Stochastic models		
Offer in 2015 - 2016	Y 1st sem	**Examination**	Dec
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	(see table below)		
Assessment Methods and Weighting	(see table below)		
Required/recommended reading and online materials	Jean Jacod and Philip Protter: Probability Essentials (Universitext, Springer-Verlag, New York, 2004, 2nd edition) Chung K. L.: A Course in Probability Theory (Academic Press, 2001, 3rd edition)		
Course Website	moodle.hku.hk		

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	50	CLO 1,2,3,4
Examination	One 2-hour written examination	50	CLO 1,2,3,4

STAT7611 Computational statistics (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Tian, Statistics & Actuarial Science *(gltian@hku.hk)*		
Teachers Involved	Dr G Tian, Statistics & Actuarial Science		
Course Objectives	This course aims to give undergraduate and postgraduate students in statistics a background in modern computationally-intensive methods in statistics. It emphasizes the role of computation as a fundamental tool of discovery in data analysis, of statistical inference, and for development of statistical theory and methods.		

Course Contents & Topics	Contents include: Numerical optimization and integration, EM algorithm and its variants, Simulation and Monte Carlo integration, Importance sampling and variance reduction techniques, Markov chain Monte Carlo methods, and Bootstrap methods.
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1: understand the importance of the technique for generating random variables in Bayesian statistics, Monte Carlo integration and bootstrapping methods CLO 2: realize the advantages and disadvantages of the Newton-Raphson algorithm and the Fisher scoring algorithm and apply them to fit generalized linear models CLO 3: understand the essence and basic principle of the EM-type algorithms and MM-type algorithms, realize their range of application, and apply them to solve practical problems CLO 4: apply EM-type algorithms to find the posterior mode and apply Markov chain Monte Carlo methods to generate posterior samples CLO 5: apply Bootstrap methods to obtain estimated standard errors of estimators and confidence intervals of parameters for both parametric and non-parametric cases
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting
Offer in 2015 - 2016	Y 1st sem — **Examination**: Dec
Offer in 2016 - 2017	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	Lectures (No. of Hours: 36); Tutorials (12); Reading / Self study (100)
Assessment Methods and Weighting	Assignments — Coursework (assignments, practical work, and a term test) — 50 — CLO 1,2,3,4,5 Examination — One 2-hour written examination — 50 — CLO 1,2,3,4,5
Required/recommended reading and online materials	Tan, M., Tian, G.L. and Ng, K.W: Bayesian Missing Data Problems: EM, Data Augmentation and Non-iterative Computation (Chapman & Hall/CRC, Boca Raton, 2010). Givens, G.H. and Hoeting, J.A.: Computational Statistics (Wiley, 2005) Robert, C.P. and Casella, G.: Monte Carlo Statistical Methods (Springer, 2005, 2nd edition)
Course Website	moodle.hku.hk

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, practical work, and a term test)	50	CLO 1,2,3,4,5
Examination	One 2-hour written examination	50	CLO 1,2,3,4,5

STAT7614 Advanced statistical modelling (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr Y K Chung, Statistics & Actuarial Science *(yukchung@hku.hk)*		
Teachers Involved	Dr Y K Chung, Statistics & Actuarial Science		
Course Objectives	This course introduces modern methods for constructing and evaluating statistical models and their implementation using popular computing software, such as SAS or R.		
Course Contents & Topics	It will cover both the underlying principles of each modelling approach and the statistical properties of the model estimation procedures. Topics from: (i) Generalized linear models; (ii) Random effects and mixed models; (iii) Nonparametric and semi-parametric methods: kernel and local polynomial regression; selection of smoothing parameters; (iv) Additive models; semi-parametric mixed models; generalized additive models; and (v) General issues of model selection: AIC, BIC and cross-validation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

	CLO 1	undersatnd the definition and basic characteristics of each statistical model
	CLO 2	identify for a given set of data the most suitable statistical model and tools to use
	CLO 3	develop skills of building a scoring model for various management and prediction, problems involving a binary response; employing the powerful tool of kernel density estimation using SAS or R for real data mining problems; and analysing data with SAS procedures PROC LOGISTIC, PROC GENMOD, PROC GLM, PROC UNIVARIATE (option KERNEL) or equivalent R Packages

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3600 Linear statistical analysis		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments and class test(s))	50	CLO 1,2,3
Examination	One 2-hour written examination	50	CLO 1,2,3

Required/recommended reading and online materials

1. Textbook : R.H. Myers et al.: Genelized Linear Models (2nd ed.), Wiley
2. Textbook : W. Hardle et al., 2004: Nonparametric and Semi-parametric Models. Springer
3. Suggested Reading : M. Panik, 2009: Regression Modeling, CRC Press

Course Website: moodle.hku.hk

STAT7615 Advanced quantitative risk management and finance (6 credits)		**Academic Year**	**2015**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof W K Li, Statistics & Actuarial Science *(hrntlwk@hku.hk)*		
Teachers Involved	Prof W K Li, Statistics & Actuarial Science Dr J Song, Statistics & Actuarial Science		
Course Objectives	This course covers statistical methods and models of importance to risk management and finance and links finance theory to market practice via statistical modeling and decision making. Emphases will be put on empirical analyses to address the discrepancy between finance theory and market data.		
Course Contents & Topics	Basic Monte Carlo and Quasi-Monte Carlo Methods; Variance Reduction Techniques; Simulating the value of options and the value-at-risk for risk management; Review of univariate volatility models; multivariate volatility models; Stochastic interest rate models; Extreme value theory for risk management.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		

CLO 1	apply Monte Carlo methods to determine the value of options and other derivative securities
CLO 2	predict volatility of a set of securities using appropriate models
CLO 3	estimate the value-at-risk under extreme value theory

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT4608 Market risk analysis		
Offer in 2015 - 2016	Y 2nd sem	**Examination**	May
Offer in 2016 - 2017	Y		

Course Grade	A+ to F
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials	McLeish, Don L.: Monte Carlo Simulation & Finance. (Wiley, 2005). Glasserman, Paul: Monte Carlo Methods in Financial Engineering. (Springer, 2003). Danielsson Jon: Financial Risk Forecasting (Willy 2011) McNeil, A. J., Frey, R. & Embrechts, P.: Quantitative Risk Management (Princeton, 2005) Tsay, R.S.: Analysis of Financial Time Series (Wiley, 2010, 3rd edition)
Course Website	moodle.hku.hk

Useful contacts and websites

SCIENCE

Useful contacts and websites

Faculty of Science	Office Location	:	Ground Floor, Chong Yuet Ming Physics Building
	Tel	:	3917 2683
	Fax	:	2858 4620
	Email	:	science@hku.hk
	Website	:	http://www.scifac.hku.hk

(Please visit http://www.scifac.hku.hk for the latest updates of BSc courses, timetables, notices and forms)

Departments/School			
Biological Sciences	Website	:	http://www.biosch.hku.hk
Biomedical Sciences	Website	:	http://www.sbms.hku.hk
Chemistry	Website	:	http://www.chemistry.hku.hk
Earth Sciences	Website	:	http://www.earthsciences.hku.hk
Mathematics	Website	:	http://www.math.hku.hk
Physics	Website	:	http://www.physics.hku.hk
Statistics and Actuarial Science	Website	:	http://www.saasweb.hku.hk
Academic Advising Office	Tel	:	2219 4686
	Website	:	http://aao.hku.hk
Academic Services Office	Office Location	:	G04, Run Run Shaw Building
	Tel	:	2859 2433
	Fax	:	2540 1405
	Email	:	asoffice@hku.hk
	Website	:	http://www.ase.hku.hk
Common Core courses	Website	:	http://commoncore.hku.hk
HKU Worldwide Undergraduate Exchange Programme	Website	:	http://www.als.hku.hk/admission/exchange
Centre of Development and	Tel	:	2859 2305
Resources for Students (CEDARS)	Website	:	http://cedars.hku.hk
University Health Service	Tel	:	2859 2501 (General enquiries) 2549 4686 (Medical appointments only)
	Website	:	http://www.uhs.hku.hk
Plagiarism	Website	:	http://www.hku.hk/plagiarism