

**REGULATIONS FOR THE DEGREES OF BACHELOR OF SCIENCE  
AND MASTER OF RESEARCH  
(BSc&MRes)**

*For students admitted in the academic year 2021-22 and thereafter.*

*(See also General Regulations and Regulations for First Degree Curricula, and Regulations for Taught Postgraduate Curricula)*

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**Definitions**

**BM1<sup>1</sup>** For the purpose of these regulations and the syllabuses for the BSc and MRes degrees, unless the context otherwise requires:

“Science course” means any course offered by the Faculty of Science, and the BIOC prefix courses offered by 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.

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**Admission to the BSc and MRes degrees**

**BM2** To be eligible for admission to the BSc and MRes degrees, candidates shall:

- (a) comply with the General Regulations;
  - (b) comply with the Regulations for First Degree Curricula and Regulations for Taught Postgraduate Curricula, and the latter with a waiver of Regulation TPG2(b); and
  - (c) satisfy all the requirements of the curriculum in accordance with these regulations and the syllabuses.
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**Period of study**

**BM3** The curriculum for the BSc and MRes degrees 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

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<sup>1</sup> This regulation should be read in conjunction with UG1 of the Regulations for First Degree Curricula and TPG1 of the Regulations for Taught Postgraduate Curricula.

studies beyond the maximum period of registration of six academic years.

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### **Selection of courses**

**BM4** 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.

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### **Curriculum requirements and progression in curriculum**

**BM5** To complete the curriculum, candidates shall:

- (a) comply with the General Regulations;
- (b) pass not fewer than a total of 303 credits, consisting of not fewer than 240 credits for the BSc degree and 63 credits for the MRes degree, in the manner specified in these regulations and the syllabuses;
- (c) for the completion of the BSc degree, candidates shall
  - (i) satisfy the requirements prescribed in UG5 of the Regulations for First Degree Curricula<sup>2</sup>, except that in the case of the Common Core Curriculum, only 24 credits shall be required, with one course from each Area of Inquiry; and
  - (ii) take and pass not fewer than 240 credits, comprising 144 credits (or a higher credit requirement by the accredited bodies) of Science courses including all required courses in the intensive major programme of the BSc degree curriculum; and
- (d) for the completion of the MRes degree, candidates shall
  - (i) satisfy the requirements prescribed in TPG6 of the Regulations for Taught Postgraduate Curricula;
  - (ii) take and pass not fewer than 63 credits, including 21 credits of Research postgraduate courses and 42 credits of research project as prescribed in the syllabus;
  - (iii) satisfy the examiners in the courses by continuous assessments and/or by written examinations; and
  - (iv) complete and present a satisfactory research report on an approved research project. The examiners may also prescribe an oral examination.

### **BM6**

- (a) Candidates shall normally be required to take not fewer than 60 credits nor more than 84 credits of undergraduate or undergraduate plus postgraduate courses in any academic year with a waiver of Regulation UG4(a) to (c) of the Regulations of First Degree Curricula, unless otherwise permitted or required by the Board of the Faculty. The maximum curriculum study load for the normative period of study and for the maximum period of registration of undergraduate courses are 288 credits and 432 credits respectively.

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<sup>2</sup> Specific requirements are spelt out in the syllabuses.

- (b) Candidates may, with the approval of the Board of the Faculty, transfer credits to the BSc degree 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 BSc degree of the candidates during their candidature at the University.
  - (c) Candidates have to achieve a CGPA of 3.6 or above at the end of Year 2 to remain enrolled in the BSc and MRes degrees, or else they have to switch to the 6901 BSc programme, and should from the next semester on refer to and comply with the relevant Regulations for the Degree of Bachelor of Science.
  - (d) Candidates shall be recommended for discontinuation of their BSc and MRes studies if they have:
    - (i) failed to complete successfully 36 or more credits of their BSc studies 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 BM3, unless otherwise permitted by the Board of the Faculty.
  - (e) Candidates shall be recommended for discontinuation of their MRes studies only if they have fulfilled the requirements in BM5(c) for the completion of the BSc degree, but failed to fulfil the requirements in BM5(d) for the completion of the MRes degree within the prescribed maximum period of registration.
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### **Advanced standing**

**BM7** Advanced standing for the BSc degree may be granted to candidates in recognition of studies completed successfully before admission to the University 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.

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### **Assessment**

**BM8** For the courses that candidates take for the BSc degree:

- (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 seven calendar days 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.

**BM9** For the courses and research project that candidates take for the MRes degree:

- (a) The assessment in any course shall consist of elements prescribed by the course teachers, and will normally comprise either written coursework alone, or coursework combined with formal examinations; in either case participation in field work or practical work may form part of the assessment.
- (b) Candidates who have failed to satisfy the examiners
  - (i) at the first attempt in any course in the examination held during any of the academic years of study may be permitted to present themselves for re-examination in the course or courses at a specified subsequent examination, with or without repeating any part of the curriculum;
  - (ii) at the first submission of project report may be permitted to submit a new or revised project report within a specified period;
  - (iii) in any prescribed fieldwork or practical work may be permitted to present themselves for re-examination in fieldwork or practical work within a specified period.
- (c) Failure to take the examination as scheduled, normally results in automatic course failure. Candidates who are unable because of illness to be present at any examination of a course, may apply for permission to be present at some other time. Any such application shall be made on the form prescribed within seven calendar days of the examination.

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### **Award of the BSc and MRes Degrees**

#### **BM10**

- (a) To be eligible for the award of the BSc and MRes degrees, candidates shall have:
  - (i) comply with the General Regulations, the Regulations for First Degree Curricula and the Regulations for Taught Postgraduate Curricula; and
  - (ii) successfully completed the curriculum and satisfy the examiners as stipulated under BM5.
- (b) Candidates who have not satisfied the completion of the MRes degree in BM5(d) but have satisfied the requirements for the award of BSc degree may be allowed to exit with a BSc, subject to the approval of the Board of the Faculty.

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### **Grading**

**BM11** Individual courses shall be graded according to one of the following grading systems as determined

by the Board of Examiners:

(a) Letter grading, their standards and the grade points for assessment as follows:

Grade	Standard	Grade Point
A+	<b>Excellent</b>	4.3
A		4.0
A-		3.7
B+	<b>Good</b>	3.3
B		3.0
B-		2.7
C+	<b>Satisfactory</b>	2.3
C		2.0
C-		1.7
D+	<b>Pass</b>	1.3
D		1.0
F	<b>Fail</b>	0

or

\* (b) 'Distinction', 'Pass' or 'Fail', or

\* (c) 'Pass' or 'Fail'.

Courses which are graded according to (b) or (c) above will not be included in the calculation of the GPA.

\* Only applies to courses that candidates take for the MRes degree, and certain undergraduate courses with special permission given by Senate.

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### Honours classification of BSc Degree

#### BM12

(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 Degrees of BSc & MRes in accordance with the following Graduation GPA scores, with all undergraduate courses taken (including failed courses, but not including courses approved by the Senate graded as 'Pass', 'Fail' or 'Distinction') carrying weightings which are proportionate to their credit values:

<u>Class of honours</u>	<u>GGPA range</u>
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 Graduation GPA and the Board of Examiners for the Degrees of BSc & MRes 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 Graduation 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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**Assessment results of MRes Degree**

**BM13** On successful completion of the MRes degree, candidates who have shown exceptional merit may be awarded a mark of distinction, and this mark shall be recorded in the candidates' degree diploma.

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# **SYLLABUSES FOR THE DEGREES OF BACHELOR OF SCIENCE AND MASTER OF RESEARCH (BSc&MRes)**

## **A. Curriculum Structure**

Each student must complete at least 240 credits in their Bachelor of Science (BSc) degree and 63 credits in the Master of Research (MRes) degree, with a total 303 credits for these 2 degrees.

The BSc Degree (240 credits):

To complete the BSc degree curriculum, you have to pass at least 240 credits, equivalent to 40 6-credit courses, which comprises:

(i) UG5:

- 2 English courses and 1 Chinese course for university language requirements (18 credits)
- 4 common core courses, including one course from each Area of Inquiry (24 credits)

(ii) Intensive Science major:

- 24 - 25 courses for the intensive Science major including 2 Science Foundation courses, Disciplinary courses and capstone course(s) (144 - 150 credits)
- A choice of 8 - 9 courses as elective courses, or to fulfill the requirements of a minor (36-48 credits)

The intensive science majors available include the followings:

- Biological Sciences (Intensive)
- Chemistry (Intensive)
- Ecology & Biodiversity (Intensive)
- Geology (Intensive)
- Mathematics (Intensive)
- Molecular Biology & Biotechnology (Intensive)
- Physics (Intensive)

The syllabuses of the intensive science majors can be found at

<https://webapp.science.hku.hk/sr4/servlet/enquiry>

The MRes Degree (63 credits):

The MRes of the programme consists of course work and research project. Each student must complete at least 63 credits, including one compulsory course on research ethics (3 credits), 18 credits of Faculty-offered Research Postgraduate courses, and 42 credits of a research project. The project report of the research project will be in the form of a literature review paper and an original research paper in the relevant field. The below shows the current course list of the MRes component which is updated on a regular basis under the current quality assurance mechanism:

## Core Course

GRSC6033 Research Ethics for Graduate Students (Faculty of Science) (3 credits)

## Elective Courses (6 credits each)

### School of Biological Sciences

Course Code	Course Title
BIOL8021	Presentation Skills and Research Seminars in Cell and Molecular Biology
BIOL8022	Science Communication
BIOL8023	Topics in Ecology & Biodiversity
BIOL6004	Advanced Topics in Food Science
BIOL6005	Advanced Topics in Nutrition
BIOL6014	Guided Study in Endocrine/Microbial Research
BIOL6015	Advanced Experimental Techniques in Endocrinology/ Microbiology

### Department of Chemistry

Course Code	Course Title
CHEM6101	Chemistry Seminars
CHEM6102	Research Techniques in Chemistry
CHEM6103	Special Topics in Chemistry
CHEM6108*	Introduction to Macromolecules ( <i>CUHK</i> )

### Department of Earth Sciences

Course Code	Course Title
EASC6001	Research Seminars and Presentation of Thesis Proposal
EASC6002	Geochemical Techniques
EASC6005	Advanced Regional Geology
EASC6006	Special Topics in Earth and Planetary Sciences
EASC6007	Mass Extinctions
EASC6008	Solid Earth Geophysics
EASC6009	Earth Systems Through Time
EASC6010	Nanogeoscience

### Department of Mathematics

Course Code	Course Title
MATH6101	Intermediate Complex Analysis
MATH6201	Topics in Geometry
MATH6202	Complex Manifolds
MATH6217	Topics in Financial Mathematics
MATH6219	Topics in Applied Functional Analysis
MATH6224	Topics in Advanced Probability Theory
MATH6501	Topics in Algebra
MATH6502	Topics in Applied Discrete Mathematics
MATH6503	Topics in Mathematical Programming and Optimization
MATH6504	Geometric Topology
MATH6505	Real Analysis



Department of Physics

Course Code	Course Title
PHYS8351	Graduate Quantum Mechanics
PHYS8450	Graduate Electromagnetic Field Theory
PHYS8552	Physics of Quantum Liquids
PHYS8701	Physics Experimental Technique
PHYS8750	Nanophysics

Remarks: \* Course offered by sister institutions under Joint Centre for Advanced Study (JCAS), subject to further confirmation

**Capstone Project**

INRE7999 Research Project (42 credits)

## Course contents

### For the BSc:

Course contents of the courses prescribed in the BSc curriculum can be found at <https://webapp.science.hku.hk/sr4/servlet/enquiry>

### For the MRes:

#### **GRSC6033 Research Ethics for Graduate Students (Faculty of Science)**

This course covers the international standards of ethical research as applied to the conduct of basic science research in a laboratory setting. This course reviews the standards of good laboratory practice and laboratory safety from the perspective of an ethical commitment. This course also reviews the standards of scientific research misconduct in the laboratory setting.

Assessment: Course work (100%)

#### **BIOL8021 Presentation Skills and Research Seminars in Cell and Molecular Biology**

This course aims to equip students with the skills needed to critique, construct and deliver scientific presentations effectively. Students are encouraged to think critically about the important elements of a good scientific presentation. The course will not only coach the students through the delivery of their own seminar, but also involving students in the preparation, discussion and analysis of seminars delivered by others.

Assessment: Course work (100%)

#### **BIOL8022 Science Communication**

This course aims to train the Ecology & Biodiversity research postgraduate to use a modern toolkit to develop effective communication of science while exploring other transferable skills related to professional development in the sciences.

Assessment: Course work (100%)

#### **BIOL8023 Topics in Ecology & Biodiversity**

This course aims to elevate RPg conceptual understanding of classic ecological concepts through the reading and discussion of classic papers in ecology and evolution.

Assessment: Course work (100%). Students will be expected to lead and participate in discussions.

#### **BIOL6004 Advanced Topics in Food Science**

This course aims to introduce students to special food science topics which are of relevance to their research study. Students will be required to do further guided readings and/or attend extra tutorials and activities including exchange with food science related International programmes. Assessment will be based on critical and logical thinking in problem-based-learning models in food science.

Assessment: Written assignments (80%) and continuous assessment (20%)

#### **BIOL6005 Advanced Topics in Nutrition**

This course aims at providing in depth knowledge on special topics in human and animal nutrition. Students need to consult their supervisor and select three topics from the following: Nutritional Status Assessment, Body Weight Regulation and Obesity, Nutrient-Gene Interactions,

Metabolic Programming, Nutrition & Immunity, Nutrition & Cancer, Laboratory Animal Handling and Surgical Techniques.

Assessment: Written assignments (50-80%) and continuous assessment (20-50%) for each topic

### **BIOL6014 Guided Study in Endocrine/Microbial Research**

This course aims at providing the student a guided approach to his/her chosen area of research study in endocrinology or microbiology. The guided study is coordinated by the student's research supervisor. Students are required to consult their supervisors and select topics that are related to their research project(s).

Assessment: Written assignments (50-70%) and continuous assessment (30-50%)

### **BIOL6015 Advanced Experimental Techniques in Endocrinology/ Microbiology**

This course focuses on advanced techniques in experimental animal and microbial sciences to assist the student's research studies. The learning is coordinated and taught by the student's research supervisor. Students are required to consult their supervisors and select topics related to their thesis studies from and not limited to the following: Advances in Growth Hormone Research, Signal Transduction within Animal Cells, Cell Culture and Biosensing Techniques and Design, Cytochemical and Cytometry Techniques, Gene Cloning and Related Techniques, Laboratory Animal Handling and Surgical Techniques, Protein and Peptide Analysis and Synthesis, Transgenic Biotechnology in Animals, Advanced Immunoassays and Immunotechniques, Clinical Laboratory Techniques.

Assessment: Written assignments (50-70%) and continuous assessment of laboratory performance (30-50%)

### **CHEM6101 Chemistry Seminars**

This course aims to provide students with the essential communication skills to give scientific presentation in both written and oral formats. Students taking this course will also have the chance to expose to recent development in frontier research in different areas of chemistry.

Assessment: Course work (100%)

### **CHEM6102 Research Techniques in Chemistry**

This course aims to provide the principles and practice of some important and widely used research techniques in chemistry. Topics selected on the advice of the supervisor from: nuclear magnetic resonance spectroscopy and electron spin resonance spectroscopy, x-ray diffraction, mass spectrometry, material characterization, molecular modeling techniques, vibrational spectroscopy, laser spectroscopy, separation techniques, combinatorial chemistry.

Assessment: One 3-hour written examination (100%)

### **CHEM6103 Special Topics in Chemistry**

This course aims to provide more advanced treatment in topics in chemistry. A research topic selected on the advice of the supervisor from: selected advanced topics of current interest in analytical chemistry, inorganic chemistry, organometallic chemistry, organic chemistry, physical chemistry and theoretical chemistry, etc.

Assessment: A written report of no less than 2,500 words (100%) to be submitted at the end of the course.

### **CHEM6108 Introduction to Macromolecules (CUHK)**

This is a postgraduate course offered by the Joint Centre for Advanced Study. Lectures will be delivered by faculty members from CUHK, HKUST, and HKU. Both introduction to macromolecular science and some frontier topics will be covered. The lectures will be held at the campus of these three institutions. Details will be announced at the beginning of the class.

Assessment: One 3-hour written examination (100%)

### **EASC6001 Research Seminars and Presentation of Thesis Proposal**

This course enables students to present their research proposals and receive a broad and timely suggestions and critiques. Students are required to present their thesis proposals, and should attend the weekly seminar series held in the department. Students are required to enroll for this course of their first year of their degree programs and orally present the thesis proposal (20-30 minute talk) before submitting their biannual progress reports.

Assessment: Class participation in weekly seminars (50%) and presentation (50%); to be assessed by departmental staff members

### **EASC6002 Geochemical Techniques**

This course aims to provide students with knowledge of the modern geochemical instruments necessary for their research projects in geochemistry. A series of lectures and hands on sessions with instruments selected from MC-ICP-MS, LAM-ICP-MS, SRF, SRD, and SEM.

Assessment: Continuous assessment (100%)

### **EASC6005 Advanced Regional Geology**

This course aims to provide an overview of the regional geology, including current major problem in regional geology (e.g., climate-erosion-tectonics interactions) and how multi-disciplinary approaches are used to solve regional geological questions (e.g., integration of thermochronology and tectonic reconstruction). Additional emphasis is placed on east Asian tectonics, as this our home region and a focal site of much regional geological discovery over the past ~ 40 years. A major project, each of which can be tailored to correspond with the research interests of the postgraduate student, will be the dominant graded element.

Assessment: Continuous assessment (100%)

### **EASC6006 Special Topics in Earth and Planetary Sciences**

This course aims to provide in depth knowledge of selected special topics in earth and planetary sciences, including engineering and environmental geology, hydrogeology, engineering geophysics, quaternary geology, astrobiology and planetary sciences. Directed studies in a focused field of research recommended by the research group/supervisor, and writing of review reports and critiques.

Assessment: Continuous assessment (100%)

### **EASC6007 Mass Extinctions**

This course aims to review five mass extinction events in earth history. The instructor will first explain the concepts of background extinction rate and major extinction events. Later students will learn the causes and effects for five mass extinction events. Additionally we will discuss if the 6th extinction event is coming.

Assessment: Continuous assessment (100%)

**EASC6008 Solid Earth Geophysics**

An overview of the state-of-the-art solid Earth geophysics in terms of current progress on structure, dynamics and evolution of deep planetary interior.

Assessment: Continuous assessment (100%)

**EASC6009 Earth Systems Through Time**

Evaluate various integrative Earth systems in space and time. Course Contents & Topics: Biogeochemical and tectonic processes that influence Earth's surface environment. Each semester topics may cover: "Origin of the Continental Crust", "The Carbon Cycle", "Oxygenation of the Atmosphere", "Mountains and Climate", amongst others.

Assessment: Continuous assessment (100%)

**EASC6010 Nanogeoscience**

This course provides an overview of nanomaterial properties and nano-scale processes that take place in solids, fluids/droplets, vapors and across reacting interfaces with an emphasis on the Earth and environmental sciences.

Assessment: Continuous assessment (100%)

**MATH6101 Intermediate Complex Analysis**

The objective is to familiarize students with concepts and techniques in Complex Analysis beyond an introductory course in Functions of a Complex Variable. This course covers a choice of topics in Complex Analysis in one complex variable such as complex potential theory, meromorphic functions, open Riemann surfaces, compact Riemann surfaces, normal families, geometric theory of holomorphic mappings and complex dynamics.

Assessment: Coursework (50%); Written or oral examinations (50%)

**MATH6201 Topics in Geometry**

This course aims to introduce students to different research areas in geometry and their applications. This course covers a choice of topics in different areas of geometry such as Riemannian geometry, symplectic geometry, gauge theory and calculus of variations.

Assessment: Coursework (50%); Examination (50%)

**MATH6202 Complex Manifolds**

This course aims to introduce students to research on complex manifolds. This course contains an introductory part on basic notions such as holomorphic vector bundles, sheaves and sheaf cohomology, cohomology theories in terms of differential forms, and Hermitian and Kaehler manifolds, together with a choice of topics on analytic and geometric aspects of the theory of complex manifolds.

Assessment: Coursework (50%); Written or oral examinations (50%)

**MATH6217 Topics in Financial Mathematics**

This is a course intended for graduate students or ambitious undergraduate students who are interested in financial mathematics. Minimal knowledge in finance is needed as we shall introduce necessary backgrounds along our way. Starting from the basics, we shall describe fundamental results on optimization theory and its applications to optimal portfolio selection problems.

Assessment: Coursework (50%); Examination (50%)

### **MATH6219 Topics in Applied Functional Analysis**

Topics will be chosen from the following list: 1. Generalized functions (also called distributions), delta function, generalized Fourier Transform. Applications to differential equations, Fundamental solution, Green's function. 2. Sobolev spaces, Sobolev Embedding Theorem, Trace. 3. Hilbert space linear operator theory (bounded operators, compact operators, closed unbounded operators), spectral theory. Applications on differential equations (infinitesimal generator, semigroup of linear operators). 4. Applications on 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).

Assessment: Coursework (50%); Examination (50%)

### **MATH6224 Topics in Advanced Probability Theory**

This is a course intended for students who are interested in probability theory and its applications. The course is a fundamental course for those students who will conduct advanced research in the field of probability theory and other related fields, such as stochastic analysis, information theory and so on. It also provides necessary tools and techniques that are needed for a wide-range of applications of probability theory, such as in financial engineering, electrical engineering and signal processing. The prospective students are expected to have basic knowledge of probability theory and analysis. We will cover the following topics: measure theory, law of large numbers, central limit theorems, random walks, martingales, Markov chains, ergodic theorems, Brownian motion. Upon request, other optional topics may be covered as well.

Assessment: Coursework (50%); Examination (50%)

### **MATH6501 Topics in Algebra**

This course aims to provide students specializing in mathematics with the opportunity to study some topics in algebra in greater depth. This course covers a selection of topics in algebra, such as group theory, rings and modules, Galois theory, quadratic forms, multilinear algebra, algebraic number theory, group representation, introduction to commutative algebra, Groebner basis theory, introduction to algebraic geometry. The selected topics may vary from year to year.

Assessment: Coursework (50%); Examination (50%)

### **MATH6502 Topics in Applied Discrete Mathematics**

This course aims to provide students with the opportunity to study some further topics in applied discrete mathematics. A selection of topics in discrete mathematics applied in combinatorics and optimization (such as algebraic coding theory, cryptography, discrete optimization, etc.) The selected topics may vary from year to year.

Assessment: Coursework (50%); Examination (50%)

### **MATH6503 Topics in Mathematical Programming and Optimization**

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. This course covers a selection of topics which may include convex, quadratic, geometric, stochastic programming, or discrete combinatorial optimization. The selected topics may vary from year to year.

Assessment: Coursework (50%); Examination (50%)

### **MATH6504 Geometric Topology**

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. Continuity, compactness, connectedness, the fundamental group, triangulations and classification of surfaces, theory and applications of simplicial homology, theory of covering spaces.

Assessment: Coursework (50%); Examination (50%)

### **MATH6505 Real Analysis**

The aim of the course is to introduce the basic ideas and techniques of measure theory and the Lebesgue integral.

Assessment: Coursework (50%); Examination (50%)

### **PHYS8351 Graduate Quantum Mechanics**

This course introduces postgraduates to theory and advanced techniques in quantum mechanics, and their applications to select topics in condensed matter physics.

Assessment: Assignments (30%); Examination (70%)

### **PHYS8450 Graduate Electromagnetic Field Theory**

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.

Assessment: Assignments (30%); Examination (70%)

### **PHYS8552 Physics of Quantum Liquids**

The collective behavior of systems consisting of many particles (bosons or fermions) gives rise to new states of matter, which emerge at low temperatures where interactions are important. This course aims to introduce the students to those novel quantum states, emphasizing the general themes such as elementary excitations, broken symmetry, hydrodynamic description, and topological properties of condensed matter. Theoretical language useful in the interpretation of experiments, such as response functions, will be discussed. The emphasis will be on a selected few examples that illustrate the above concepts and techniques. The course is intended for both experimentalists and theorists.

Assessment: Continuous assessment including homework assignments and term paper (100%)

### **PHYS8701 Physics Experimental Technique**

This course provides a detailed account of some common experimental techniques in physics research. It introduces the basic working principles, the operational knowhow, and the strength and limitations of the techniques.

Assessment: Attendance (20%); Presentation (40%); In class quizzes (40%)

### **PHYS8750 Nanophysics**

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.

Assessment: Assignments (10%); Essay (20%); Examination (70%)

**INRE7999 Research Project**

This course aims at providing students with an opportunity to pursue their own research interest under the supervision of a teacher. The period of the research project will last for the 1<sup>st</sup> semester, 2<sup>nd</sup> semester until the summer semester.

Assessment: Project report (80%); Oral examination (20%)