# BSc in Actuarial Science

Syllabuses and Regulations

**2023-2024**

**Faculty of Science**
The University of Hong Kong

# SECTION I Objectives and Learning Outcomes

**Degree : Bachelor of Science in Actuarial Science**

Objectives : The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes of Actuarial Science Programme**

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

(1) understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(2) understand and identify the nature of insurance, finance and investment risks
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(3) develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(4) formulate effective business strategies to manage various kinds of risk
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(5) communicate and collaborate with people effectively on issues related to actuarial science
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(6) discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

## SECTION II Credit Unit Statement of the BSc(ActuarSc) Degree Curriculum

### 1. General guideline for contact hours requirement in the BSc (Actuarial Science) 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. IT-based or project-based courses, students are expected to devote about 120-180 hours for a 6-credit course.

### 2. Credit Unit Statement of the BSc (Actuarial Science) Degree Curriculum

The BSc(Actuarial Science) degree curriculum consists of five major types of courses based on the learning activities. The courses in the curriculum are 6 credits. Examples of the contact hours requirements for the five categories of courses are described as follows.

**(a) Lecture-based courses (6 credits)**
Contact hours: 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 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) Internship (6 credits)**

Students have to undertake at least 6 months or 120 working days 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 6 months or 120 working days of internship work arranged formally. Assessment tasks 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.

# SECTION III List of BSc(ActuarSc) Courses* on offer in 2023/2024 and 2024/2025^

| Course Code | Title | Credit | Pre-requisite | Available in | | Semester offered in 2023 - 2024 | Exam. held in 2023 - 2024 | Quota | Communication -intensive | Course Coordinator | Major / Minor *(The Major/Minor that this course appears as.)* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2023 - 2024 | 2024 - 2025 | 0=year long 1=1st sem 2=2nd sem S=Summer | | | | | *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 | No exam | --- | Y | Dr A Yau, English | | | | |
| CAES9820 | Academic English for science students | 6 | NIL | Y | Y | 1, 2 | No exam | --- | Y | Mr S D Boynton, English | | | | |
| CAES9821 | Professional and technical communication for mathematical sciences | 6 | NIL | Y | Y | 1, 2 | No exam | --- | Y | Mr S D Boynton, English | | | | |
| **School of Chinese** | | | | | | | | | | | | | | |
| CSCI9001 | Practical Chinese for science students | 6 | NIL | Y | Y | 1, 2 | Dec, May | --- | Y | Dr H F Poon, Chinese | | | | |
| **Department of 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<br>Not for students who have passed MATH1013 or (MATH1851 and MATH1853), or have already enrolled in these courses.<br>For BSc(ActuarSc) students only. | Y | Y | 1 | Dec | --- | N | Dr K H Law, Mathematics | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| MATH2822 | Mathematical methods for actuarial science II | 6 | Pass in MATH1821.<br>For BSc(ActuarSc) students only. | Y | Y | 2 | May | --- | N | Dr K H Law, Mathematics | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| **Department of Statistics & Actuarial Science** | | | | | | | | | | | | | | |
| STAT2901 | Probability and statistics: foundations of actuarial science | 6 | Pass in MATH1821 [for BSc(ActuarSc) students] or already enrolled in this course, or<br>Pass in MATH1013 or already enrolled in this course [for students outside the BSc(ActuarSc) programme]; and<br>Not for students who have passed or enrolled in any of these courses: STAT1601, STAT1602, STAT1603, STAT2601 | Y | Y | 2 | May | --- | N | Prof S M S Lee, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | Minor in Actuarial Studies (2020,2019,2018,2017, 2016) | | |
| STAT2902 | Financial mathematics | 6 | Pass in STAT2901, or already enrolled in this course; and<br>Not for students who have passed in STAT3615, or already enrolled in this course. | Y | Y | 2 | May | --- | N | Prof K C Yuen, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| STAT3602 | Statistical inference | 6 | Pass in STAT2602 or STAT3902 | Y | Y | 1 | Dec | --- | N | Prof S M S Lee, Statistics & Actuarial Science | | BSc in Actuarial Science (2017,2016); Major in Statistics (2023,2022,2021,2020, 2019,2018,2017,2016); Minor in Statistics (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT3612 | Statistical machine learning | 6 | Pass in STAT3600 or STAT3907, or already enrolled in this course; and<br>Pass in COMP1117 or STAT2604; and<br>Not for students who have passed in STAT4904, or already enrolled in this course; and<br>Not for BSc(Actuarial Science) students. BSc(Actuarial Science) students are advised to take STAT4904 Statistical learning for risk modelling instead.<br>Recommended: proficiency in Python, programming assignments will require use of Python | Y | Y | 1 | No exam | --- | N | Dr L Yu, Statistics & Actuarial Science | Bachelor of Arts and Sciences in Applied Artificial Intelligence (2023,2022,2021,2020, 2019); Major in Decision Analytics (2023,2022,2021,2020, 2019,2018,2017,2016) | BSc in Actuarial Science (2017,2016); Major in Risk Management (2023,2022,2021,2020, 2019,2018,2017,2016); Major in Statistics (2023,2022,2021,2020, 2019,2018,2017,2016); Minor in Actuarial Studies (2023,2022,2021,2020, 2019,2018,2017); Minor in Risk Management | | |

* This list only includes courses offered by the Department of Statistics & Actuarial Science and the Department of Mathematics and language courses.
^ Availability of courses in 2024-2025 is subject to change.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | (2023,2022,2021,2020, 2019,2018,2017,2016); Minor in Statistics (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT3616 | Advanced SAS programming | 6 | Pass in STAT2601 or STAT2901 (Students are strongly recommended to take STAT2603 or STAT2604 prior to taking this course.) | N | N | --- | --- | 50 | N | TBC, Statistics & Actuarial Science | | BSc in Actuarial Science (2017,2016); Major in Decision Analytics (2017,2016); Major in Statistics (2017,2016); Minor in Statistics (2017,2016) | | |
| STAT3901 | Life contingencies I | 6 | (Pass in STAT2602 and STAT3615) or (Pass in STAT2902 and (Pass in STAT3902 or already enrolled in this course)) or (Pass in STAT2602 and STAT2902) | Y | Y | 1 | Dec | --- | N | Prof K C Yuen, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | Minor in Actuarial Studies (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT3902 | Statistical models | 6 | Pass in STAT2901; and Not for students who have passed in STAT2602, or already enrolled in this course; and For BSc(Actuarial Science) students only. | Y | Y | 1 | Dec | --- | N | Dr D Y Zhang, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| STAT3903 | Stochastic models | 6 | Pass in STAT2901; and Not for students who have passed in MATH3603, or have already enrolled in this course; and Not for students who have passed in STAT3603, or have already enrolled in this course; and For BSc(Actuarial Science) students only. | Y | Y | 2 | May | --- | N | Dr K Zhu, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| STAT3904 | Corporate finance for actuarial science | 6 | [(Pass in ACCT1101 and STAT2902) or (Pass in STAT3615)]; and Not for students who have passed in FINA1310, or have already enrolled in this course. | Y | Y | 1 | Dec | --- | N | Dr D Lee, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | Minor in Actuarial Studies (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT3905 | Introduction to financial derivatives | 6 | Pass in STAT2902; and Not for students who have passed or already enrolled in any of the following courses: FINA2322, MATH3906, STAT3618; and For BSc(Actuarial Science) students only. | Y | Y | 2 | May | --- | N | Prof K C Cheung, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| STAT3906 | Risk theory I | 6 | Pass in STAT3903, or already enrolled in this course; or Pass in MATH3603 or STAT3603 | Y | Y | 1 | Dec | --- | N | Prof K C Cheung, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | Minor in Actuarial Studies (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT3907 | Linear models and forecasting | 6 | Pass in STAT2602 or STAT3902, or already enrolled in this course; and Not for students who have passed in STAT3600, or have already enrolled in this course; and Not for students who have passed in STAT4601, or have already enrolled in this course; and Not for students who have passed in ECON2280, or have already enrolled in this course; and For BSc(Actuarial Science) students only. | Y | Y | 2 | May | --- | N | Mr H Y Y Cheung, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| STAT3908 | Credibility theory and loss distributions | 6 | Pass in STAT2602 or STAT3902 or STAT3906 | Y | Y | 2 | May | --- | N | Dr M Hofert, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | Minor in Actuarial Studies (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT3909 | Life contingencies II | 6 | Pass in STAT3901, or already enrolled in this course; and For BSc(Actuarial Science) students only. | Y | Y | 2 | May | --- | N | Dr D Lee, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | | |
| STAT3910 | Financial economics I | 6 | Pass in STAT2602 or STAT3902; and Not for students who have passed in STAT3618, or have already enrolled in this course; and Not for students who have passed in | Y | Y | 1 | Dec | --- | N | Dr W Li, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | Minor in Actuarial Studies (2023,2022,2021,2020, 2019,2018,2017,2016) | | |

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| | | | FINA2322, or have already enrolled in this course; and<br>Not for students who have passed in MATH3906, or have already enrolled in this course<br>. | | | | | | | | | | | |
| STAT3911 | Financial economics II | 6 | Pass in MATH3603 or STAT3603 or STAT3903 or STAT3910; and<br>Not for students who have passed in MATH3906, or have already enrolled in this course. | Y | Y | 2 | May | --- | N | Dr W Li, Statistics & Actuarial Science | BSc in Actuarial Science (2017,2016) | BSc in Actuarial Science (2023,2022,2021,2020,2019,2018); Major in Risk Management (2023,2022,2021,2020,2019,2018,2017,2016); Minor in Actuarial Studies (2023,2022,2021,2020,2019,2018,2017,2016) | | |
| STAT3951 | Topics on advanced actuarial modelling | 6 | Pass in STAT3906, or already enrolled in this course; and<br>Pass in STAT3910, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | Y | Y | 2 | May | --- | N | Dr D Lee, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020,2019,2018,2017,2016) | | |
| STAT3952 | Investment and asset management | 6 | Pass in STAT3901; and<br>Not for students who have passed in FINA2320, or have already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | N | N | --- | --- | --- | N | TBC, Statistics & Actuarial Science | | | | |
| STAT3953 | Fundamentals of actuarial practice | 6 | Pass in STAT3901. | Y | Y | 1 | No exam | --- | N | Dr K P Wat, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020,2019,2018,2017,2016); Minor in Actuarial Studies (2023,2022,2021,2020,2019,2018,2017,2016) | | |
| STAT3954 | Current topics in actuarial science | 6 | Pass in STAT3901, or already enrolled in this course; or<br>Pass in STAT3909, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | N | N | --- | --- | --- | N | TBC, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020,2019,2018,2017,2016) | | |
| STAT3955 | Survival analysis | 6 | Pass in STAT3902, or already enrolled in this course; or<br>Pass in STAT3600 or STAT3901;<br>Not for students who have passed in STAT3955, or already enrolled in this course. | N | N | --- | --- | --- | N | TBC, Statistics & Actuarial Science | | Bachelor of Arts and Sciences in Applied Artificial Intelligence (2019); BSc in Actuarial Science (2019,2018,2017,2016); Major in Statistics (2019,2018,2017,2016); Minor in Statistics (2019,2018,2017,2016) | | |
| STAT3956 | Life contingencies III | 6 | Pass in STAT3909; and<br>For BSc(Actuarial Science) students only. | Y | Y | 1 | Dec | --- | N | Dr T Boonen, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020,2019,2018,2017,2016) | | |
| STAT4602 | Multivariate data analysis | 6 | Pass in STAT3600 or STAT3907 | Y | Y | 2 | May | 50 | N | Dr Y Cao, Statistics & Actuarial Science | Major in Statistics (2023,2022,2021,2020,2019,2018,2017,2016) | Bachelor of Arts and Sciences in Applied Artificial Intelligence (2023,2022,2021,2020,2019); BSc in Actuarial Science (2017,2016); Major in Decision Analytics (2023,2022,2021,2020,2019,2018,2017,2016); Minor in Statistics (2023,2022,2021,2020,2019,2018,2017,2016) | | |
| STAT4607 | Credit risk analysis | 6 | Pass in STAT3618 or STAT3905 or STAT3910 or (FINA2322 and any University level 3 course) | Y | Y | 2 | May | --- | N | Dr K P Wat, Statistics & Actuarial Science | | BSc in Actuarial Science (2019,2018,2017,2016); Major in Risk | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Management (2023,2022,2021,2020, 2019,2018,2017,2016); Minor in Risk Management (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT4608 | Market risk analysis | 6 | Pass in STAT3907 and STAT3910; or Pass in STAT4601 and (FINA2320 or STAT3609) | Y | Y | 2 | May | --- | N | Dr Z Zhang, Statistics & Actuarial Science | | BSc in Actuarial Science (2019,2018,2017,2016); Major in Risk Management (2023,2022,2021,2020, 2019,2018,2017,2016); Minor in Risk Management (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT4711 | Capstone experience for actuarial science undergraduates | 6 | Pass in at least 24 credits of advanced level disciplinary core/elective courses in BSc(Actuarial Science) programme including (Pass in STAT3901, or already enrolled in this course; or Pass in STAT3909, or already enrolled in this course); and This capstone course is only for BSc(Actuarial Science) students, and is mutually exclusive with STAT4767 and STAT4798. The earliest that a student is allowed to take this capstone course is their year 3 study. | Y | Y | 1, 2 | No exam | 50 | N | Prof S M S Lee, Statistics & Actuarial Science | | | | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) |
| STAT4767 | Actuarial science internship | 6 | Pass in at least 24 credits of advanced level disciplinary core/elective courses in BSc(Actuarial Science) programme including STAT3901; and This capstone course is only for BSc(Actuarial Science) students; 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 | --- | N | Dr E A L Li, Statistics & Actuarial Science | | | | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) |
| STAT4798 | Statistics and actuarial science project | 6 | Pass in at least 24 credits of advanced level disciplinary core/elective courses in BSc(Actuarial Science) programme including STAT3902 and STAT3907; and Pass or already enrolled in at least one of the following courses: STAT3911, STAT4602, STAT4904; and This capstone course is only for BSc(Actuarial Science) students; 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 | N | Prof S M S Lee, Statistics & Actuarial Science | | | | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) |
| STAT4901 | Risk theory II | 6 | Pass in STAT3906 | N | N | --- | --- | --- | N | TBC, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT4902 | Selected topics in actuarial science | 6 | Pass in STAT3906 | N | N | --- | --- | --- | Y | TBC, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT4903 | Actuarial techniques for general insurance | 6 | Pass in STAT3906, or already enrolled in this course. | Y | Y | 1 | Dec | --- | N | Dr D Lee, Statistics & Actuarial Science | | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018,2017,2016); Minor in Actuarial Studies | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | (2023,2022,2021,2020, 2019,2018,2017,2016) | | |
| STAT4904 | Statistical learning for risk modelling | 6 | Pass in STAT3907 or STAT3600; and Not for students who have passed in STAT3612, or already enrolled in this course; and For BSc(Actuarial Science) students only. | Y | Y | 2 | May | --- | N | Dr M M Y Zhang, Statistics & Actuarial Science | BSc in Actuarial Science (2023,2022,2021,2020, 2019,2018) | BSc in Actuarial Science (2017,2016) | | |
| STAT7609 | Research methods in statistics | 6 | Pass in STAT3600 or STAT3907 | Y | Y | 1 | Dec | --- | N | Dr K Zhu, Statistics & Actuarial Science | | | | |
| STAT7610 | Advanced probability | 6 | Pass in STAT3603 or STAT3903 | Y | Y | 1 | Dec | --- | N | Dr M Hofert, Statistics & Actuarial Science | | | | |
| STAT7611 | Computational statistics | 6 | Pass in STAT3600 or STAT3907 | N | N | --- | --- | --- | N | TBC, Statistics & Actuarial Science | | | | |
| STAT7614 | Advanced statistical modelling | 6 | Pass in STAT3600 or STAT3907 | Y | Y | 2 | May | --- | N | Dr C Wang, Statistics & Actuarial Science | | | | |
| STAT7615 | Advanced quantitative risk management and finance | 6 | Pass in STAT4608 | N | N | --- | --- | --- | N | TBC, Statistics & Actuarial Science | | | | |

# 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)<br>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 any non-science students admitted through non-JUPAS scheme, they are still required to obtain the approval from the Course Selection Adviser (or designated Course Approver) of the course offering department/school via Science Online Application Submission System (OASS) https://webapp.science.hku.hk/intranet/OnlineFormUG.html 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 BSc(ActuarSc) Programmes on offer in 2023/2024

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2023** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (132 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | |
|---|---|
| ACCT1101 | Introduction to financial accounting (6) |
| ECON1210 | Introductory microeconomics (6) |
| ECON1220 | Introductory macroeconomics (6) |
| MATH1821 | Mathematical methods for actuarial science I (6) |
| MATH2822 | Mathematical methods for actuarial science II (6) |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) |
| STAT2902 | Financial mathematics (6) |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | |
|---|---|
| COMP1117 | Computer programming (6) |
| STAT3901 | Life contingencies I (6) |
| STAT3902 | Statistical models (6) |
| STAT3903 | Stochastic models (6) |
| STAT3904 | Corporate finance for actuarial science (6) |
| STAT3905 | Introduction to financial derivatives (6) |
| STAT3907 | Linear models and forecasting (6) |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | |
|---|---|
| STAT3906 | Risk theory I (6) |
| STAT3908 | Credibility theory and loss distributions (6) |
| STAT3909 | Life contingencies II (6) |
| STAT3910 | Financial economics I (6) |
| STAT4904 | Statistical learning for risk modelling (6) |

**4. Year IV Courses**

**Disciplinary Electives (12 credits)**

*At least 12 credits selected from the following courses:*

| | |
|---|---|
| STAT3911 | Financial economics II (6) |
| STAT3951 | Topics on advanced actuarial modelling (6) |
| STAT3953 | Fundamentals of actuarial practice (6) |
| STAT3954 | Current topics in actuarial science (6) |
| STAT3956 | Life contingencies III (6) |
| STAT4901 | Risk theory II (6) |
| STAT4902 | Selected topics in actuarial science (6) |

| | |
|---|---|
| STAT4903 | Actuarial techniques for general insurance (6) |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in addition to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2022** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (132 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| ACCT1101 | Introduction to financial accounting (6) | |
| ECON1210 | Introductory microeconomics (6) | |
| ECON1220 | Introductory macroeconomics (6) | |
| MATH1821 | Mathematical methods for actuarial science I (6) | |
| MATH2822 | Mathematical methods for actuarial science II (6) | |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) | |
| STAT2902 | Financial mathematics (6) | |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| COMP1117 | Computer programming (6) | |
| STAT3901 | Life contingencies I (6) | |
| STAT3902 | Statistical models (6) | |
| STAT3903 | Stochastic models (6) | |
| STAT3904 | Corporate finance for actuarial science (6) | |
| STAT3905 | Introduction to financial derivatives (6) | |
| STAT3907 | Linear models and forecasting (6) | |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | | |
|---|---|---|
| STAT3906 | Risk theory I (6) | |
| STAT3908 | Credibility theory and loss distributions (6) | |
| STAT3909 | Life contingencies II (6) | |
| STAT3910 | Financial economics I (6) | |
| STAT4904 | Statistical learning for risk modelling (6) | |

**4. Year IV Courses**

**Disciplinary Electives (12 credits)**

*At least 12 credits selected from the following courses:*

| | | |
|---|---|---|
| STAT3911 | Financial economics II (6) | |
| STAT3951 | Topics on advanced actuarial modelling (6) | *[previous title: Further topics in contingencies to new course name (6)]* |
| STAT3953 | Fundamentals of actuarial practice (6) | |
| STAT3954 | Current topics in actuarial science (6) | |
| STAT3956 | Life contingencies III (6) | *[previous title: Pension funds and pension mathematics to new course name (6)]* |
| STAT4901 | Risk theory II (6) | |

| | |
|---|---|
| STAT4902 | Selected topics in actuarial science (6) |
| STAT4903 | Actuarial techniques for general insurance (6) |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in addition to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2021** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (132 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| ACCT1101 | Introduction to financial accounting (6) | |
| ECON1210 | Introductory microeconomics (6) | |
| ECON1220 | Introductory macroeconomics (6) | |
| MATH1821 | Mathematical methods for actuarial science I (6) | |
| MATH2822 | Mathematical methods for actuarial science II (6) | |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) | |
| STAT2902 | Financial mathematics (6) | |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| COMP1117 | Computer programming (6) | |
| STAT3901 | Life contingencies I (6) | |
| STAT3902 | Statistical models (6) | |
| STAT3903 | Stochastic models (6) | |
| STAT3904 | Corporate finance for actuarial science (6) | |
| STAT3905 | Introduction to financial derivatives (6) | |
| STAT3907 | Linear models and forecasting (6) | |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | | |
|---|---|---|
| STAT3906 | Risk theory I (6) | |
| STAT3908 | Credibility theory and loss distributions (6) | |
| STAT3909 | Life contingencies II (6) | |
| STAT3910 | Financial economics I (6) | |
| STAT4904 | Statistical learning for risk modelling (6) | |

**4. Year IV Courses**

**Disciplinary Electives (12 credits)**

*At least 12 credits selected from the following courses:*

| | | |
|---|---|---|
| STAT3911 | Financial economics II (6) | |
| STAT3951 | Topics on advanced actuarial modelling (6) | *[previous title: Further topics in contingencies to new course name (6)]* |
| STAT3953 | Fundamentals of actuarial practice (6) | |
| STAT3954 | Current topics in actuarial science (6) | |
| STAT3956 | Life contingencies III (6) | *[previous title: Pension funds and pension mathematics to new course name (6)]* |
| STAT4901 | Risk theory II (6) | |

| | |
|---|---|
| STAT4902 | Selected topics in actuarial science (6) |
| STAT4903 | Actuarial techniques for general insurance (6) |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in addition to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2020** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (132 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| ACCT1101 | Introduction to financial accounting (6) | |
| ECON1210 | Introductory microeconomics (6) | |
| ECON1220 | Introductory macroeconomics (6) | |
| MATH1821 | Mathematical methods for actuarial science I (6) | |
| MATH2822 | Mathematical methods for actuarial science II (6) | |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) | |
| STAT2902 | Financial mathematics (6) | |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| COMP1117 | Computer programming (6) | |
| STAT3901 | Life contingencies I (6) | |
| STAT3902 | Statistical models (6) | |
| STAT3903 | Stochastic models (6) | |
| STAT3904 | Corporate finance for actuarial science (6) | |
| STAT3905 | Introduction to financial derivatives (6) | |
| STAT3907 | Linear models and forecasting (6) | |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | | |
|---|---|---|
| STAT3906 | Risk theory I (6) | |
| STAT3908 | Credibility theory and loss distributions (6) | |
| STAT3909 | Life contingencies II (6) | |
| STAT3910 | Financial economics I (6) | |
| STAT4904 | Statistical learning for risk modelling (6) | |

**4. Year IV Courses**

**Disciplinary Electives (12 credits)**

*At least 12 credits selected from the following courses:*

| | | |
|---|---|---|
| STAT3911 | Financial economics II (6) | |
| STAT3951 | Topics on advanced actuarial modelling (6) | *[previous title: Further topics in contingencies to new course name (6)]* |
| STAT3953 | Fundamentals of actuarial practice (6) | |
| STAT3954 | Current topics in actuarial science (6) | |
| STAT3956 | Life contingencies III (6) | *[previous title: Pension funds and pension mathematics to new course name (6)]* |
| STAT4901 | Risk theory II (6) | |

| | |
|---|---|
| STAT4902 | Selected topics in actuarial science (6) |
| STAT4903 | Actuarial techniques for general insurance (6) |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in addition to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2019** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (132 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| ACCT1101 | Introduction to financial accounting (6) | |
| ECON1210 | Introductory microeconomics (6) | |
| ECON1220 | Introductory macroeconomics (6) | |
| MATH1821 | Mathematical methods for actuarial science I (6) | |
| MATH2822 | Mathematical methods for actuarial science II (6) | |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) | |
| STAT2902 | Financial mathematics (6) | |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| COMP1117 | Computer programming (6) | |
| STAT3901 | Life contingencies I (6) | |
| STAT3902 | Statistical models (6) | |
| STAT3903 | Stochastic models (6) | |
| STAT3904 | Corporate finance for actuarial science (6) | |
| STAT3905 | Introduction to financial derivatives (6) | |
| STAT3907 | Linear models and forecasting (6) | |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | | |
|---|---|---|
| STAT3906 | Risk theory I (6) | |
| STAT3908 | Credibility theory and loss distributions (6) | |
| STAT3909 | Life contingencies II (6) | |
| STAT3910 | Financial economics I (6) | |
| STAT4904 | Statistical learning for risk modelling (6) | |

**4. Year IV Courses**

**Disciplinary Electives (12 credits)**

*At least 12 credits selected from the following courses:*

| | | |
|---|---|---|
| STAT3911 | Financial economics II (6) | |
| STAT3951 | Topics on advanced actuarial modelling (6) | *[previous title: Further topics in contingencies to new course name (6)]* |
| STAT3953 | Fundamentals of actuarial practice (6) | |
| STAT3954 | Current topics in actuarial science (6) | |
| STAT3955 | Survival analysis (6) | |
| STAT3956 | Life contingencies III (6) | *[previous title: Pension funds and pension mathematics to new course name (6)]* |

| | |
|---|---|
| STAT4607 | Credit risk analysis (6) |
| STAT4608 | Market risk analysis (6) |
| STAT4901 | Risk theory II (6) |
| STAT4902 | Selected topics in actuarial science (6) |
| STAT4903 | Actuarial techniques for general insurance (6) |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in addition to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2018** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (132 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| ACCT1101 | Introduction to financial accounting (6) | |
| ECON1210 | Introductory microeconomics (6) | |
| ECON1220 | Introductory macroeconomics (6) | |
| MATH1821 | Mathematical methods for actuarial science I (6) | |
| MATH2822 | Mathematical methods for actuarial science II (6) | |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) | |
| STAT2902 | Financial mathematics (6) | |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| COMP1117 | Computer programming (6) | |
| STAT3901 | Life contingencies I (6) | |
| STAT3902 | Statistical models (6) | |
| STAT3903 | Stochastic models (6) | |
| STAT3904 | Corporate finance for actuarial science (6) | |
| STAT3905 | Introduction to financial derivatives (6) | |
| STAT3907 | Linear models and forecasting (6) | |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | | |
|---|---|---|
| STAT3906 | Risk theory I (6) | |
| STAT3908 | Credibility theory and loss distributions (6) | |
| STAT3909 | Life contingencies II (6) | |
| STAT3910 | Financial economics I (6) | |
| STAT4904 | Statistical learning for risk modelling (6) | |

**4. Year IV Courses**

**Disciplinary Electives (12 credits)**

*At least 12 credits selected from the following courses:*

| | | |
|---|---|---|
| STAT3911 | Financial economics II (6) | |
| STAT3951 | Topics on advanced actuarial modelling (6) | *[previous title: Further topics in contingencies to new course name (6)]* |
| STAT3953 | Fundamentals of actuarial practice (6) | |
| STAT3954 | Current topics in actuarial science (6) | |
| STAT3955 | Survival analysis (6) | |
| STAT3956 | Life contingencies III (6) | *[previous title: Pension funds and pension mathematics to new course name (6)]* |

| | |
|---|---|
| STAT4607 | Credit risk analysis (6) |
| STAT4608 | Market risk analysis (6) |
| STAT4901 | Risk theory II (6) |
| STAT4902 | Selected topics in actuarial science (6) |
| STAT4903 | Actuarial techniques for general insurance (6) |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in addition to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

| | |
|---|---|
| Programme Title | BSc in Actuarial Science |
| Offered to students admitted to Year 1 in | **2017** |

**Objectives:**

The Actuarial Science curriculum aims at providing formal academic and professional training to students who wish to join the actuarial profession. Although actuarial science is a separate discipline with its own area of knowledge, modern actuarial training requires multidisciplinary knowledge such as probability, statistics, economics, investment, finance, law, taxation, and accounting. The Actuarial Science curriculum reflects this by incorporating various interdisciplinary courses into the basic actuarial training. The programme is set up to equip students with solid background in actuarial science, to develop their confidence and analytical skills to define and tackle problems in actuarial science and other related fields. Specifically, the programme is designed to provide adequate knowledge for students to sit for the early professional examinations organized by international actuarial organizations so that they can successfully join the actuarial profession after graduation. In addition, the programme provides enough academic training for students who wish to pursue postgraduate studies in actuarial science or other related areas.

**Learning Outcomes:**

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

PLO 1 : understand and apply various analytic and quantitative methods to define and solve problems in insurance, finance, economics, investment, pension, financial risk management and demography (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 2 : understand and identify the nature of insurance, finance and investment risks (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 3 : develop analytical skills to evaluate and measure various kinds of risk, and appraise the related moral and ethical issues (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : formulate effective business strategies to manage various kinds of risk (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : communicate and collaborate with people effectively on issues related to actuarial science (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 6 : discuss current actuarial issues and acquire and apply practical knowledge in some specially designed courses (by means of coursework and tutorial classes and/or research-based project in the curriculum)

**Impermissible Combinations:**

Minor in Actuarial Studies

**Required courses (138 credits)**

**1. Year I Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| ACCT1101 | Introduction to financial accounting (6) | |
| ECON1210 | Introductory microeconomics (6) | |
| ECON1220 | Introductory macroeconomics (6) | |
| MATH1821 | Mathematical methods for actuarial science I (6) | |
| MATH2822 | Mathematical methods for actuarial science II (6) | |
| STAT2901 | Probability and statistics: foundations of actuarial science (6) | |
| STAT2902 | Financial mathematics (6) | |

**2. Year II Courses**

**Disciplinary Core Courses (42 credits)**

| | | |
|---|---|---|
| COMP1117 | Computer programming (6) | |
| STAT3901 | Life contingencies I (6) | *[previous title: Life contingencies (6)]* |
| STAT3902 | Statistical models (6) | |
| STAT3903 | Stochastic models (6) | |
| STAT3904 | Corporate finance for actuarial science (6) | |
| STAT3905 | Introduction to financial derivatives (6) | |
| STAT3907 | Linear models and forecasting (6) | |

**3. Year III Courses**

**Disciplinary Core Courses (30 credits)**

| | | |
|---|---|---|
| STAT3906 | Risk theory I (6) | |
| STAT3908 | Credibility theory and loss distributions (6) | |
| STAT3909 | Life contingencies II (6) | *[previous title: Advanced life contingencies (6)]* |
| STAT3910 | Financial economics I (6) | |
| STAT3911 | Financial economics II (6) | |

**4. Year IV Courses**

**Disciplinary Electives (18 credits)**

*At least 18 credits from List A and List B, with at least 12 credits from List A:*

*List A*

| | | |
|---|---|---|
| STAT3951 | Topics on advanced actuarial modelling (6) | *[previous title: Advanced contingencies (6)]* |
| STAT3954 | Current topics in actuarial science (6) | |
| STAT3955 | Survival analysis (6) | |
| STAT3956 | Life contingencies III (6) | |
| STAT4607 | Credit risk analysis (6) | |

| | | |
|---|---|---|
| STAT4608 | Market risk analysis (6) | |
| STAT4901 | Risk theory II (6) | |
| STAT4903 | Actuarial techniques for general insurance (6) | |
| STAT4904 | Statistical learning for risk modelling (6) | |

*List B*

| | | |
|---|---|---|
| STAT3602 | Statistical inference (6) | |
| STAT3612 | Statistical machine learning (6) | *[previous title: Data mining (6) ]* |
| STAT3616 | Advanced SAS programming (6) | |
| STAT3953 | Fundamentals of actuarial practice (6) | |
| STAT4602 | Multivariate data analysis (6) | |
| STAT4902 | Selected topics in actuarial science (6) | |

**5. Capstone Requirement (6 credits)**

*At least 6 credits selected from the following courses:*

| | |
|---|---|
| STAT4711 | Capstone experience for actuarial science undergraduates (6) |
| STAT4767 | Actuarial science internship (6) |
| STAT4798 | Statistics and actuarial science project (6) |

**Notes:**

1. Students are expected to be in full-time status for eight academic semesters (in additional to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BSc(ActuarSc) programme, provided that they fully satisfy the requirements.

**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 programme in order to satisfy the degree graduation requirements.

## SECTION VI Course Descriptions

| | | | |
|---|---|---|---|
| **CAES1000** | **Core University English (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | English | **Quota** | --- |
| **Course Co-ordinator** | Dr A Yau, English *(aliceyhy@hku.hk)* | | |
| **Teachers Involved** | (Dr A Yau,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. Four online-learning modules through the Moodle platform on academic speaking, academic grammar, academic vocabulary, citation and referencing skills and avoiding plagiarism will be offered to students to support their English learning. 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 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

| | |
|---|---|
| **Communication-intensive Course** | Y |
| **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 | report | 40 | |
| Essay | | 30 | |
| Presentation | individual presentation | 30 | |

| | | | |
|---|---|---|---|
| **CAES9820** | **Academic English for science students (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | English | **Quota** | --- |
| **Course Co-ordinator** | Mr S D Boynton, English *(sboynton@hku.hk)* | | |
| **Teachers Involved** | (Mr S D Boynton,Centre for Applied English Studies) | | |
| **Course Objectives** | This 6-credit English-in-the-Discipline course aims to develop students' professional and technical communication skills for disciplinary studies in the sciences. There are three main components in the course: 1) Writing a popular science article 2) An oral presentation and 3) Independent language learning. Students will learn rhetorical skills for presenting and explaining scientific concepts to a cross-disciplinary and non-specialist audience in both written and spoken communication. Students will also be given an opportunity to design a personalised language learning plan, carry out the plan and reflect on their own independent language learning experience. | | |
| **Course Contents & Topics** | Topics covered in the course will be:<br>- Finding, evaluating and using appropriate academic source materials;<br>- Compiling an academic bibliography;<br>- Contrasting academic and popular genres of Science;<br>- Writing for a specific audience, including stance, shared knowledge, levels of formality; and<br>- Organizing and articulating ideas in an academically suitable format including appropriate vocabulary and grammar; and<br>- 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:<br>CLO 1 identify and summarize disciplinary sources related to a specified topic<br>CLO 2 produce texts (written and spoken) appropriate for a cross-disciplinary audience based on their disciplinary knowledge<br>CLO 3 identify their own language learning needs and implement a plan to meet those needs | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | NIL | | |
| **Offer in 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |

| **Grade Descriptors (A+ to F)** | |
|---|---|
| **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. |

| | |
|---|---|
| **Communication-intensive Course** | Y |
| **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. |

| | | | |
|---|---|---|---|
| **CAES9821** | **Professional and technical communication for mathematical sciences (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | English | **Quota** | --- |
| **Course Co-ordinator** | Mr S D Boynton, English *(sboynton@hku.hk)* | | |
| **Teachers Involved** | (Mr S D Boynton,Centre for Applied English Studies) | | |
| **Course Objectives** | This 6-credit English-in-the-Discipline course aims to develop students' professional and technical communication skills for disciplinary studies in mathematical sciences. There are two main components in the course: 1). Case study report writing, 2). professional oral presentation. Students will learn rhetorical skills for presenting and explaining mathematical and statistical data and trends, and justifying analyses and recommendations convincingly in both written and spoken communication. This will be achieved through analysing samples of case study reports and presentations using a genre-based approach. Students of the BSc(Actuarial Science) and BASc(Applied AI) are required to take this course. Students who intend to major in decision analytics, mathematics, risk management, and statistics are strongly encouraged to take this course. Students from other science disciplines should take CAES9820. | | |
| **Course Contents & Topics** | There are two main components in the course:<br>1. Case study report writing<br>2. Professional oral presentation<br><br>Students will learn rhetorical skills for presenting and explaining mathematical and statistical data and trends, and justifying analyses and recommendations convincingly in both written and spoken communication. This will be achieved through analysing samples of case study reports and presentations using a genre-based approach. | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to: | | |
| | CLO 1 present and explain mathematical and statistical data and trends using appropriate rhetorical skills | | |
| | CLO 2 organize and articulate coherent ideas with appropriate language devices in a case study report and an oral presentation | | |
| | CLO 3 justify analyses and recommendations convincingly in a case study report and an oral presentation | | |
| | CLO 4 identify their own language learning needs, develop independent learning strategies to address those needs, and reflect on their own independent language learning experience | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | NIL | | |
| **Offer in 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **A** | Wholly appropriate productive skills displaying a complete awareness of audience, purpose and structure across all disciplinary work. Students are able to critically analyse a case scenario, convincingly justify analyses and recommendations, and discuss data limitations when relevant. Students are able to successfully evaluate their language performance in all areas and propose specific and relevant future language learning plans. Spoken language is fully comprehensible and fluent. Written language contains a sophisticated range of grammar and vocabulary, with very few systematic errors. |
| **B** | Mostly appropriate productive skills displaying good awareness of audience, purpose and structure, although there are occasional lapses in areas. Students are able to analyse a case scenario, justify analyses and recommendations, and discuss data limitations when relevant. Students are able to evaluate their language performance in most areas and propose relevant future language learning plans. Spoken language is comprehensible and fluent. Written language contains a good range of grammar and vocabulary, making some systematic errors of language which generally do not impede understanding. |
| **C** | Productive skills are generally appropriate for the intended audience. There is an overall sense that the work is communicating successfully. Purposes are generally clear and tone is generally suitable. Students are generally able to analyse a case scenario and make recommendations, but the analysis and recommendations need more justification. Students are able to evaluate their language performance in a limited number of areas and proposed future language learning plans are rather vague. Spoken language is generally comprehensible and fluent. Written language contains inaccuracies when complex grammar and vocabulary are used. |
| **D** | Productive skills display weaknesses in awareness of purpose and audience. Tone is at times unsuitable. Students superficially analyse a case scenario, and the analyses and recommendations are vague. The structure is generally appropriate although links between sections may be lacking. Students are able to evaluate their language performance only in few areas and the proposed future language learning plans may not be relevant. Written language contains frequent errors in complex grammar and vocabulary, but the written work can still be followed by a patient and sympathetic audience. Spoken language is comprehensible and quite fluent, but stain is at times placed on the listener. |
| **Fail** | Productive skills show little or no awareness of audience or are too limited to be able to successfully carry out tasks. Students are unable to analyse a case scenario and make reasonable recommendations. Ideas are incoherent, vague and unstructured. Students are not able to evaluate their language performance and propose future language learning plans. There are frequent language errors in both simple and complex grammar in written work, which impede successful comprehension of ideas and points. Spoken language places considerable strain on the listener throughout. Assessments may not have been attempted or contain plagiarism. |

| | |
|---|---|
| **Communication-intensive Course** | Y |
| **Course Type** | Lecture-based course |

**Course Teaching & Learning Activities**

| **Activities** | **Details** | **No. of Hours** |
|---|---|---|
| Lectures | seminars | 30 |
| Tutorials | small group tutorials | 6 |
| 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 | | 40 | |
| Presentation | | 30 | |
| Project reports | | 30 | |

| | |
|---|---|
| **Additional Course Information** | Students of the BSc (Actuarial Science) and BASc(Applied AI) are required to take this course. Students who intend to major in decision analytics, mathematics, risk management, and statistics are strongly encouraged to take this course. Students from other science disciplines should take CAES9820. |

| | | | |
|---|---|---|---|
| **CSCI9001** | **Practical Chinese for science students (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Chinese | **Quota** | --- |
| **Course Co-ordinator** | Dr H F Poon, Chinese *(hfpoon@hku.hk)* | | |
| **Teachers Involved** | (Dr C M Chan,Chinese)<br>(Dr K T Lam,Chinese)<br>(Dr S F Lee,Chinese)<br>(Mr K W Wong,Chinese) | | |
| **Course Objectives** | 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. | | |
| **Course Contents & Topics** | - 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 | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to: | | |
| | CLO 1 develop a balanced competency in modern Chinese and write well-formed sentences | | |
| | CLO 2 employ rhetorical devices and stylistics, as well as practical writing skills specific to their discipline | | |
| | CLO 3 explore new tactics of communication, initiate discussions and debates and address new challenges | | |
| | CLO 4 apply their disciplinary knowledge and their Chinese writing skills and professional presentation techniques analytically, critically and creatively in different social or professional discourses | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | NIL | | |
| **Offer in 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y | **Examination** | Dec May |

| **Grade Descriptors (A+ to F)** | |
|---|---|
| **A** | 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. |
| **B** | 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. |
| **C** | 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). |
| **D** | The student only has basic familiarity with the subject. |
| **Fail** | The student has very limited familiarity with the subject. |

| | | | |
|---|---|---|---|
| **Communication-intensive Course** | Y | | |
| **Course Type** | Lecture-based course | | |
| **Course Teaching & Learning Activities** | **Activities** | **Details** | **No. of Hours** |
| | Lectures | | 12 |
| | Tutorials | Small group tutorials | 12 |
| | Group work | Workshops | 24 |
| | Discussion | | 24 |
| | Reading / Self study | Reading/self study (20 hours) and preparation (12 hours) | 32 |
| | Assessment | | 16 |

| **Assessment Methods and Weighting** | **Methods** | **Details** | **Weighting in final course grade (%)** | **Assessment Methods to CLO Mapping** |
|---|---|---|---|---|
| | Assignments | coursework | 50 | |
| | Examination | | 50 | |
| **Required/recommended reading and online materials** | 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。 | | | |

| | | | |
|---|---|---|---|
| **MATH1821** | **Mathematical methods for actuarial science I (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Mathematics | **Quota** | --- |
| **Course Co-ordinator** | Dr K H Law, Mathematics *(lawkaho@connect.hku.hk)* | | |
| **Teachers Involved** | (Dr K H Law,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.<br>- Limits, continuity and differentiability.<br>- Mean value theorem; implicit differentiation; L'Hopital's rule.<br>- Bisection method and Newton's method.<br>- Higher order derivatives, maxima and minima, graph sketching.<br>- Taylor approximation and error estimation.<br>- Improper integrals, partial fractions, integration by parts.<br>- Numerical integration, Trapezoidal rule and Simpson's rule.<br>- Basic matrix and vector (of orders 2 and 3) operations, determinants.<br>- 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<br>Not for students who have passed MATH1013 or (MATH1851 and MATH1853), or have already enrolled in these courses.<br>For BSc(ActuarSc) students only. | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | Dec |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **Course Type** | Lecture-based course | | |

**Course Teaching & Learning Activities**

| Activities | Details | No. of Hours |
|---|---|---|
| Lectures | | 36 |
| Tutorials | | 12 |
| Reading / Self study | Students are expected to watch videos online before classes. | 100 |

**Assessment Methods and Weighting**

| Methods | Details | Weighting in final course grade (%) | Assessment Methods to CLO Mapping |
|---|---|---|---|
| Assignments | Tutorials, assignments, participation, etc. | 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** | George B. Thomas; as revised by Maurice D. Weir and Joel Hass: Thomas' Calculus (Addison Wesley, 12th edition)<br>Spence, Insel & Friedberg: Elementary Linear Algebra -- A Matrix Approach (Pearson, 2014) |
| **Course Website** | http://moodle.hku.hk/ |

| | | | |
|---|---|---|---|
| **MATH2822** | **Mathematical methods for actuarial science II (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Mathematics | **Quota** | --- |
| **Course Co-ordinator** | Dr K H Law, Mathematics *(lawkaho@connect.hku.hk)* | | |
| **Teachers Involved** | (Dr K H Law,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** | - Functions of several variables; partial differentiation.<br>- Gradients and directional derivatives.<br>- Taylor approximation.<br>- Maxima and minima; Lagrange multipliers.<br>- Double and triple integrals, areas and volumes.<br>- Matrices, systems of linear equations, determinants.<br>- Vector spaces and subspaces.<br>- Eigenvalues and eigenvectors, diagonalization of matrices. | | |
| **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.<br>For BSc(ActuarSc) students only. | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **Course Type** | Lecture-based course | | |
| **Course Teaching & Learning Activities** | **Activities** | **Details** | **No. of Hours** |
| | Lectures | | 36 |
| | Tutorials | | 12 |
| | Reading / Self study | Students are expected to watch videos online before classes. | 100 |

| **Assessment Methods and Weighting** | **Methods** | **Details** | **Weighting in final course grade (%)** | **Assessment Methods to CLO Mapping** |
|---|---|---|---|---|
| | Assignments | | 10 | CLO 1,2 |
| | Examination | | 50 | CLO 1,2 |
| | Test | | 40 | CLO 1,2 |

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|---|---|
| **Required/recommended reading and online materials** | George B. Thomas; as revised by Maurice D. Weir and Joel Hass: Thomas' Calculus (Addison Wesley, 12th edition)<br>Spence, Insel & Friedberg: Elementary Linear Algebra -- A Matrix Approach (Pearson, 2014) |
| **Course Website** | http://moodle.hku.hk/ |

| | | | |
|---|---|---|---|
| **STAT2901** | **Probability and statistics: foundations of actuarial science (6 credits)** | **Academic Year** | 2023 |
| **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** | 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. | | |
| **Course Contents & Topics** | 1. General probability<br>- Basic elements of probability in set notation<br>- Mutually exclusive events<br>- Addition and multiplication rules<br>- Independence of events<br>- Combinatorial probability<br>- Conditional probability and expectations<br>- Bayes theorem / Law of total probability<br>- Random variables<br>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<br>- Probability functions and probability density functions<br>- Cumulative distribution functions<br>- Mode, median, percentiles and moments<br>- Variance and measures of dispersion<br>- Central limit theorem<br>3. Sampling distributions and introduction of estimation | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to:<br>CLO 1 understand the mathematical theory underlying the modern practice of statistics<br>CLO 2 develop skills in probabilistic analysis for problems involving randomness<br>CLO 3 apply techniques in probability and statistics to solve actuarial science problems | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in MATH1821 [for BSc(ActuarSc) students] or already enrolled in this course, or<br>Pass in MATH1013 or already enrolled in this course [for students outside the BSc(ActuarSc) programme]; and<br>Not for students who have passed or enrolled in any of these courses: STAT1601, STAT1602, STAT1603, STAT2601 | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |

| **Grade Descriptors (A+ to F)** | |
|---|---|
| **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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 a class test) | 25 | CLO 1,2,3 |
| Examination | One 3-hour written examination | 75 | CLO 1,2,3 |

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|---|---|
| **Required/recommended reading and online materials** | Feller, W. (1968). An Introduction to Probability Theory and Its Applications. Wiley, New York.<br>Hassett, M. and Stewart, D. (2006). Probability for Risk Management (2nd Edition). ACTEX Publication: Winsted.<br>Hogg, R.V. and Tanis, E.A. (2009). Probability and Statistical Inference (8th Edition). Prentice Hall: Upper Saddle River.<br>Ross, S.M. (2005). A First Course in Probability (7th Edition). Prentice Hall: Upper Saddle River.<br>Wackerly, D., Mendenhall, R. and Scheaffer, R. (2008). Mathematical Statistics with Applications. (7th Edition). Thomson Brooks/Cole: California. |
| **Course Website** | http://moodle.hku.hk |

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|---|---|---|---|
| **STAT2902** | **Financial mathematics (6 credits)** | **Academic Year** | 2023 |
| **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: |

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|---|---|
| CLO 1 | understand basic concepts of financial mathematics |
| CLO 2 | understand and formulate elementary financial problems |
| CLO 3 | apply compound interest theory to tackle some practical financial problems |
| CLO 4 | show an understanding of the term structure of interest rates |
| CLO 5 | show an understanding of simple stochastic models for investment returns |

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|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT2901, or already enrolled in this course; and<br>Not for students who have passed in STAT3615, or already enrolled in this course. |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y **Examination** May |

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|---|---|
| **Grade Descriptors (A+ to F)** | |
| **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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, class test(s) and participation) | 50 | CLO 1,2,3,4,5 |
| | Examination | One 3-hour written examination | 50 | CLO 1,2,3,4,5 |

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|---|---|
| **Required/recommended reading and online materials** | Kellison, S. G.: The Theory of Interest (Irwin: Illinois, 2008, 3rd edition)<br>Broverman, S. A.: Mathematics of Investment and Credit (ACTEX Publications - Mad River Books: Connecticut, 2004, 3rd edition) |
| **Course Website** | http://moodle.hku.hk |

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|---|---|---|---|
| **STAT3602** | **Statistical inference (6 credits)** | **Academic Year** | 2023 |
| **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. Decision problem - frequentist approach: loss function; risk; decision rule; admissibility; minimaxity; unbiasedness; Bayes' rule.<br>2. Decision problem - Bayesian approach: prior and posterior distributions, Bayesian inference.<br>3. Estimation theory: exponential families; likelihood; sufficiency; minimal sufficiency; completeness; UMVU estimators; information inequality; large-sample theory of maximum likelihood estimation.<br>4. Hypothesis testing: uniformly most powerful test; monotone likelihood ratio; UMP unbiased test; conditional test; large-sample theory of likelihood ratio; confidence set.<br>5. Nonparametric inference: bootstrap methods. | | |
| **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 |

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|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT2602 or STAT3902 | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | Dec |

| | |
|---|---|
| **Grade Descriptors (A+ to F)** | |
| **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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|---|---|---|
| | **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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 |
| Examination | One 2-hour written examination | 60 | CLO 1,2,3 |

**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).
Efron, B. and Tibshirani, R.J. (1993). An Introduction to the Bootstrap. Chapman & Hall: New York.
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).
Wasserman, L. (2006). All of Nonparametric Statistics. Springer.
Young, G.A. & Smith, R.L.: Essentials of Statistical Inference (Cambridge University Press: Cambridge, 2005).

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| **Course Website** | http://moodle.hku.hk |

| **STAT3612** | **Statistical machine learning (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr L Yu, Statistics & Actuarial Science *(lqyu@hku.hk)* | | |
| **Teachers Involved** | (Dr L Yu,Statistics & Actuarial Science) | | |

**Course Objectives**

Machine learning is the study of computer algorithms that build models of observed data in order to make predictions or decisions. Statistical machine learning emphasizes the importance of statistical methodology in the algorithmic development. This course provides a comprehensive and practical coverage of essential machine learning concepts and a variety of learning algorithms under supervised and unsupervised settings.

**Course Contents & Topics**

Basics of machine learning, linear regression, logistic regression, regularization, cross-validation, tree-based methods, dimension reduction, principal component analysis, cluster analysis, neural network basics and deep models.

**Course Learning Outcomes**

On successful completion of this course, students should be able to:

| | |
|---|---|
| CLO 1 | get familiar with the workflow of a data science or machine learning project |
| CLO 2 | understand and apply a wide range of statistical machine learning methods, and recognize their characteristics, strengths and weaknesses |
| CLO 3 | identify and use appropriate techniques for a particular data science project |
| CLO 4 | evaluate the quality of the resulting model in terms of prediction accuracy and model explainability |
| CLO 5 | apply Python programming for solving data-scientific problems |

**Pre-requisites (and Co-requisites and Impermissible combinations)**

Pass in STAT3600 or STAT3907, or already enrolled in this course; and
Pass in COMP1117 or STAT2604; and
Not for students who have passed in STAT4904, or already enrolled in this course; and
Not for BSc(Actuarial Science) students.
BSc(Actuarial Science) students are advised to take STAT4904 Statistical learning for risk modelling instead.
Recommended: proficiency in Python, programming assignments will require use of Python

| | | | |
|---|---|---|---|
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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 1,2,3,5 |
| | Project reports | | 40 | CLO 1,2,3,4,5 |
| | Test | | 30 | CLO 2,3 |
| **Required/recommended reading and online materials** | 1. James, G., Witten, D, Hastie, T.m and Tibshirani R. (2021). An Introduction to Statistical Learning with Applications in R, Springer, New York. https://hastie.su.domains/ISLR2/ISLRv2_website.pdf<br>2. Hastie, T, Tibshirani, R. and Friedeman, J. (2009). The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Second Edition, Springer, New York. https://web.stanford.edu/~hastie/ElemStatLearn/<br>3. Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn and TensorFlow, OReilly. https://github.com/ageron/handson-ml2 | | | |
| **Course Website** | http://moodle.hku.hk | | | |

| **STAT3616** | **Advanced SAS programming (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | 50 |
| **Course Co-ordinator** | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | | | |
| **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)** | Pass in STAT2601 or STAT2901<br>(Students are strongly recommended to take STAT2603 or STAT2604 prior to taking this course.) | | |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N | **Examination** | --- |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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.<br>Carpenter, A.: Carpenters Complete Guide to the SAS Macro Language. Second Edition. (North Carolina: SAS Institute Inc., 2004) |
| **Course Website** | http://moodle.hku.hk |

| **STAT3901** | **Life contingencies I (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **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; loss-at-issue random variable; benefit premiums. | | |

**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 |

| | | | | |
|---|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | (Pass in STAT2602 and STAT3615) or<br>(Pass in STAT2902 and (Pass in STAT3902 or already enrolled in this course)) or<br>(Pass in STAT2602 and STAT2902) | | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | | **Examination** | Dec |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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, class test(s) and participation) | 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** | 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<br>Dickson, C.M.D., Hardy, M.R., and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge: Cambridge University Press, 3rd edition, 2020) |
| **Course Website** | http://moodle.hku.hk |

| **STAT3902** | **Statistical models (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr D Y Zhang, Statistics & Actuarial Science *(doraz@hku.hk)* | | |
| **Teachers Involved** | (Dr D Y Zhang,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. This course is an approved course for VEE Mathematical Statistics from the Society of Actuaries. | | |
| **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; and<br>Not for students who have passed in STAT2602, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | | **Examination** | Dec |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

| | | | | |
|---|---|---|---|---|
| **Communication-intensive Course** | N | | | |
| **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)<br>Hogg R. V., McKean J. W. & Craig A. T.: Introduction to Mathematical Statistics (Pearson Prentice Hall, 2005, 6th edition)<br>Arnold S. F.: Mathematical Statistics (Prentice-Hall, 1990)<br>Larsen R. J. and Marx M. L.: An Introduction to Mathematical Statistics and Its Appications (Pearson International Edition, 4th edition) | | | |
| **Course Website** | http://moodle.hku.hk | | | |

| | | | |
|---|---|---|---|
| **STAT3903** | **Stochastic models (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr K Zhu, Statistics & Actuarial Science *(mazhuke@hku.hk)* | | |
| **Teachers Involved** | (Dr K Zhu,Statistics & Actuarial Science) | | |
| **Course Objectives** | This is an introductory course in stochastic processes. It will cover the basic concepts of the theory of stochastic processes and explore different types of stochastic processes including Markov chains, Poisson processes and Brownian motions. | | |
| **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 inter-arrival 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 STAT2901; and<br>Not for students who have passed in MATH3603, or have already enrolled in this course; and<br>Not for students who have passed in STAT3603, or have already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |

| | | |
|---|---|---|
| **Grade Descriptors (A+ to F)** | **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. |

| | | | | |
|---|---|---|---|---|
| **Communication-intensive Course** | N | | | |
| **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** | http://moodle.hku.hk | | | |

| STAT3904 | Corporate finance for actuarial science (6 credits) | Academic Year | 2023 |
|---|---|---|---|
| Offering Department | Statistics & Actuarial Science | Quota | --- |
| Course Co-ordinator | Dr D Lee, Statistics & Actuarial Science *(leedav@hku.hk)* | | |
| Teachers Involved | (Dr D Lee,Statistics & Actuarial Science) | | |
| Course Objectives | This course is designed for actuarial science students to receive finance component of VEE Accounting and Finance from the 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, time value of money, and measures and performance assessment of financial performance. The main part of the course will focus on some important topics of corporate finance including: portfolio theory, utility theory, Markowitz mean-variance analysis, capital asset pricing model, weighted average cost of capital, market efficiency and behavioural finance, capital structure and dividend policy, financial leverage and firm value. | | |
| Course Learning Outcomes | On successful completion of this course, students should be able to: | | |

| | |
|---|---|
| CLO 1 | describe the tasks of a financial manager and the financial decisions made by a corporation |
| CLO 2 | recall the use of present and future values in calculating the value of bonds and stocks |
| CLO 3 | assess financial performance using various investment criteria and techniques of project analysis |
| CLO 4 | analyze the mean-variance portfolio theory, capital asset pricing model and arbitrage pricing theory |
| CLO 5 | identify 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 6 | describe the various forms of market efficiency, and explain investor behaviour using behavioural finance theories |
| CLO 7 | explain the core features of the utility theory |

| | | | |
|---|---|---|---|
| Pre-requisites (and Co-requisites and Impermissible combinations) | [(Pass in ACCT1101 and STAT2902) or (Pass in STAT3615)]; and<br>Not for students who have passed in FINA1310, or have already enrolled in this course. | | |
| Offer in 2023 - 2024 | Y 1st sem Offer in 2024 - 2025 : Y | Examination | Dec |

| Grade Descriptors (A+ to F) | |
|---|---|
| **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. |

| | |
|---|---|
| Communication-intensive Course | N |
| 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 | Brealey, R.A., Myers, S.C., Allen, F.: Principles of Corporate Finance (McGraw-Hill, 2020, 13th edition)<br>Berk, J., DeMarzo, P.: Corporate Finance (Pearson, 2020, 5th edition) |
| Course Website | http://moodle.hku.hk |

| STAT3905 | Introduction to financial derivatives (6 credits) | Academic Year | 2023 |
|---|---|---|---|
| Offering Department | Statistics & Actuarial Science | Quota | --- |
| Course Co-ordinator | Prof K C Cheung, Statistics & Actuarial Science *(kccg@hku.hk)* | | |
| Teachers Involved | (Prof K C Cheung,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 derivatives in risk management. Emphases are on pricing and hedging strategies, and the no-arbitrage principle. | | |
| Course Contents & Topics | Derivatives; short-selling; call options; put options; equity-linked CD; trading strategies; hedging; forwards and futures; commodity swaps; interest rate swaps; put-call parity; binomial model; Black-Scholes option pricing model. | | |
| 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, profit, and properties of basic derivative contracts, including forwards, futures, options |
| CLO 3 | explain how derivative securities can be used as tools to manage financial risk |

| | | |
|---|---|---|
| | CLO 4 | calculate option price using binomial model and Black-Scholes option pricing model |

| | |
|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT2902; and<br>Not for students who have passed or already enrolled in any of the following courses: FINA2322, MATH3906, STAT3618; and<br>For BSc(Actuarial Science) students only. |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y **Examination** May |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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 |

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|---|---|
| **Required/recommended reading and online materials** | McDonald, R. L. (2013). Derivatives Markets (3rd Edition). Pearson.<br>Hull, J. C. (2018). Options, Futures, and Other Derivatives (10th Edition). Pearson.<br>Hull, J. C. (2018). Risk Management and Financial Institutions (5th Edition). Wiley. |
| **Course Website** | http://moodle.hku.hk |

| **STAT3906** | **Risk theory I (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Prof K C Cheung, Statistics & Actuarial Science *(kccg@hku.hk)* | | |
| **Teachers Involved** | (Prof 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. | | |
| **Course Contents & Topics** | Severity models; frequency models; collective risk models; coverage modifications; risk measures. | | |

| **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 |

| | |
|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3903, or already enrolled in this course; or<br>Pass in MATH3603 or STAT3603 |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y **Examination** Dec |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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** | Klugman S. A., Panjer H. H., & Willmot G. E.: Loss Models: From Data to Decisions (John Wiley & Sons, Inc., 2019, 5th edition) | | | |
| **Course Website** | http://moodle.hku.hk | | | |

| **STAT3907** | **Linear models and forecasting (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Mr H Y Y Cheung, Statistics & Actuarial Science *(hcheung4@hku.hk)* | | |
| **Teachers Involved** | (Mr H Y Y Cheung,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; generalized linear models; 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 | identify and fit a suitable AR, MA or ARMA model to real data | |
| | CLO 4 | perform residual analysis | |
| | CLO 5 | do forecasting with these fitted models | |
| | CLO 6 | fit generalized linear model to real data | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT2602 or STAT3902, or already enrolled in this course; and<br>Not for students who have passed in STAT3600, or have already enrolled in this course; and<br>Not for students who have passed in STAT4601, or have already enrolled in this course; and<br>Not for students who have passed in ECON2280, or have already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **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, a computer-based assessment 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** | R. S. Pindyck & D. L. Rubinfeld: Econometric Models and Economic Forecasts (McGraw-Hill, 1998, 4th edition)<br>Abraham & J. Ledolter: Statistical Methods for Forecasting (John Wiley & Sons, 2005, 2nd edition)<br>G. E. P. Box, G. M. Jenkins & G. Reinsel: Time Series Analysis: Forecasting and Control (Prentice Hall, 1994, 3rd edition)<br>G James, D Witten, T Hastie and R Tibshirani (2021) An Introduction to Statistical Learning with Applications in R, second edition, Springer. | | | |
| **Course Website** | http://moodle.hku.hk | | | |

| **STAT3908** | **Credibility theory and loss distributions (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr M Hofert, Statistics & Actuarial Science *(mhofert@hku.hk)* | | |
| **Teachers Involved** | (Dr M Hofert,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. | | |

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|---|---|---|---|---|---|
| **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 or STAT3902 or STAT3906 | | | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | | | **Examination** | May |
| **Grade Descriptors (A+ to F)** | **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. | | | |
| **Communication-intensive Course** | N | | | | |
| **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, 2019, 5th edition). | | | | |
| **Course Website** | http://moodle.hku.hk | | | | |

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|---|---|---|---|
| **STAT3909** | **Life contingencies II (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr D Lee, Statistics & Actuarial Science *(leedav@hku.hk)* | | |
| **Teachers Involved** | (Dr D Lee,Statistics & Actuarial Science) | | |
| **Course Objectives** | This course aims at introducing further topics in life insurance. 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: expenses and asset shares; Thiele's differential equation and policy values at fractional years; multiple state models and their applications in multiple decrement and multiple life theories; profit testing. | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to: | | |
| | CLO 1 | incorporate expenses in gross premium and calculate policy values based on the gross premium for life insurances and annuities | |
| | CLO 2 | apply the recursion formula and Thiele's differential equation in calculating policy values | |
| | CLO 3 | calculate probabilities and actuarial present values under the multiple state model framework | |
| | CLO 4 | analyze multiple decrement models and calculate the life insurances and annuities in models with multiple decrements | |
| | CLO 5 | analyze multiple life models and calculate the life insurances and annuities in models with multiple lives | |
| | CLO 6 | explain the concept of profit testing and perform relevant calculations | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3901, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |
| **Grade Descriptors (A+ to F)** | **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 | |

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|---|---|---|
| | | 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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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, a computer-based assessment 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 |

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| **Required/recommended reading and online materials** | Bowers. N.L., Gerber, H.U., Hickman, J.C., Jones, D.A., and Nesbitt, C.J.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd edition)<br>Dickson, D.C.M., Hardy, M.R., and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge University Press, 2020, 3rd edition) |
| **Course Website** | http://moodle.hku.hk |

| **STAT3910** | **Financial economics I (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr W Li, Statistics & Actuarial Science *(wylsaas@hku.hk)* | | |
| **Teachers Involved** | (Dr W Li,Statistics & Actuarial Science) | | |
| **Course Objectives** | This course is on option pricing and hedging. The course will concentrate on the theory and idea of derivatives pricing and risk management. | | |
| **Course Contents & Topics** | Option market; European and American options; conditional expectation and discrete-time martingale, discrete-time option pricing theory; true probabilities vs. risk-neutral probabilities; estimating volatility; the Black-Scholes formula; implied volatility; option Greeks; market-making and hedging; exotic options.<br><br>For obtaining IFoA credit, the assessment is different. The assessment becomes final exam (60%), midterm test (10%) and computer-based assessment (30%). | | |

| **Course Learning Outcomes** | On successful completion of this course, students should be able to: |
|---|---|
| | CLO 1 understand the Black-Scholes formula, including the assumptions, the Greek letters, option elasticity, and implied volatility |
| | CLO 2 understand the hedging strategies and portfolio, market-maker risk, self-financing portfolio |
| | CLO 3 understand the market-maker's profit |
| | CLO 4 understand exotic options, including Asian options, barrier options, compound options, gap options, and exchange options |
| | CLO 5 understand discrete-time martingales and option pricing theory |

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|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT2602 or STAT3902; and<br>Not for students who have passed in STAT3618, or have already enrolled in this course; and<br>Not for students who have passed in FINA2322, or have already enrolled in this course; and<br>Not for students who have passed in MATH3906, or have already enrolled in this course<br>. | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | Dec |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

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| **Communication-intensive Course** | N |
| **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, a computer-based assessment and a class test) | 25 | CLO 1,2,3,4,5 |
| | Examination | One 3-hour written examination | 75 | CLO 1,2,3,4,5 |

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| **Required/recommended reading and online materials** | 1. Derivatives Markets, Chapters 12-14, 2nd edition or later edition, by Robert L. McDonald.<br>2. Options, Futures and Other Derivatives, 4th or later edition, by J. Hull. |
| **Course Website** | http://moodle.hku.hk |

| **STAT3911** | **Financial economics II (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr W Li, Statistics & Actuarial Science *(wylsaas@hku.hk)* | | |
| **Teachers Involved** | (Dr W Li,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. | | |
| **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 | understanding measure-theory-based probability | |
| | CLO 2 | understanding conditional probability and martingale | |
| | CLO 3 | understand Brownian motion and its properties | |
| | CLO 4 | understand the Ito calculus and Ito formula | |
| | CLO 5 | understand the Black-Scholes model and option pricing theory | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in MATH3603 or STAT3603 or STAT3903 or STAT3910; and<br>Not for students who have passed in MATH3906, or have already enrolled in this course. | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **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 |

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|---|---|
| **Required/recommended reading and online materials** | Robert L. McDonald: Derivatives Markets (2nd edition), Chapters 20, 21 and 24.<br>John Hull: Options, Futures and Other Derivatives (2008, 7th edition)<br>Alison Etheridge: A Course in Financial Calculus (2002)<br>Steven Shreve: Stochastic Calculus for Finance II Continuous-Time Models (2008) |
| **Course Website** | http://moodle.hku.hk |

| **STAT3951** | **Topics on advanced actuarial modelling (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr D Lee, Statistics & Actuarial Science *(leedav@hku.hk)* | | |
| **Teachers Involved** | (Dr D Lee,Statistics & Actuarial Science) | | |
| **Course Objectives** | This course covers more advanced actuarial models and techniques used in the field of life and non-life insurance. | | |
| **Course Contents & Topics** | Topics include: estimation of transition intensities; graduation and related tests; unit-linked contracts; cost of guarantees and options; equity-linked life-contingent insurance products and their valuation; extreme value theory; copulas; simple ruin models for non-life insurance portfolios. | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to: | | |
| | CLO 1 | estimate age-dependent transition intensities | |
| | CLO 2 | explain the concept of graduation and apply statistical tests for mortality table comparisons | |
| | CLO 3 | apply the Esscher transform on probability distributions and stochastic processes | |
| | CLO 4 | price various equity-linked insurance products using Esscher transforms and risk-neutral methods | |
| | CLO 5 | apply the extreme value theory on univariate data sets | |
| | CLO 6 | describe the properties of common copula models and apply such models to capture the dependence structures of different risks | |
| | CLO 7 | formulate simple ruin models and evaluate ruin probabilities as well as related quantities | |

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| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3906, or already enrolled in this course; and<br>Pass in STAT3910, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y **Examination** May |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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 |

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|---|---|
| **Required/recommended reading and online materials** | Subject CS2 Risk Modelling and Survival Analysis, Core Principles, Core Reading (Institute and Faculty of Actuaries, 2022)<br>Denuit M., Dhaene J., Goovaerts M., Kaas R.: Actuarial Theory for Dependent Risks (Wiley, 2005)<br>Coles S.: An Introduction to Statistical Modeling of Extreme Values (Springer, 2001) |
| **Course Website** | http://moodle.hku.hk |

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|---|---|---|---|
| **STAT3952** | **Investment and asset management (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | | | |
| **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:

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|---|---|
| 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 |

| | |
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| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3901; and<br>Not for students who have passed in FINA2320, or have already enrolled in this course; and<br>For BSc(Actuarial Science) students only. |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N **Examination** --- |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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 |

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|---|---|
| **Required/recommended reading and online materials** | D. Babbel & F. J. Fabozzi: Investment Management for Insurers (Frank J. Fabozzi & Assoc., 1999)<br>Z. Bodie, A. Kane, & A. Marcus: Investments (McGraw-Hill, 2005, 7th edition)<br>Crouhy, Galai, & Mark: Risk Management (2001)<br>F. J. Fabozzi: Handbook of Fixed Income Securities (McGraw-Hill, 2005, 7th edition)<br>Litterman: Modern Investment Management: An Equilibrium Approach (2003) |
| **Course Website** | http://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)<br>Tilman: Asset / Liability Management of Financial Institutions (2003) |

| **STAT3953** | **Fundamentals of actuarial practice (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **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** | 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 and 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 on behalf of financial security system providers or as a consultant to those providers |
| | CLO 4 | apply actuarial skills in nontraditional and emerging areas of practice |
| | CLO 5 | provide context for the specific mathematical and technical skills developed in the basic actuarial courses |
| | CLO 6 | communicate technical information and participate in peer review |
| | CLO 7 | manage uncertainty by responding to questions in ambiguous or open-ended situations with limited time to prepare or react |
| | CLO 8 | prepare for the professional role as an Associate of the Society of Actuaries |

| | | | |
|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3901. | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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, interim report and peer review | 30 | CLO 4,5,6,7 |
| | Project reports | Written report | 30 | CLO 4,5,6 |

| | | | | |
|---|---|---|---|---|
| | Test | In-class quizzes, discussions and participation | 40 | CLO 1,2,3,4,5,6,7,8 |
| **Required/recommended reading and online materials** | Klugman, S. A. (2012). Understanding Actuarial Practice. Society of Actuaries.<br>Bellis, C., Lyon, R., Klugman, S., and Shepherd, J. (2010). Understanding Actuarial Management: The Actuarial Control Cycle (2nd Edition). Institute of Actuaries of Australia.<br>Brown, R. L. and Lennox, W. S. (2015). Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance (4th Edition). ACTEX Publications, Inc.<br>Segal, S. (2011). Corporate Value of Enterprise Risk Management: The Next Step in Business Management. Wiley. | | | |
| **Course Website** | http://moodle.hku.hk | | | |

| **STAT3954** | **Current topics in actuarial science (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | | | |
| **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.<br><br>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.<br><br>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, or already enrolled in this course; or<br>Pass in STAT3909, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. | | |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N | **Examination** | --- |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **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** | http://moodle.hku.hk | | | |

| **STAT3955** | **Survival analysis (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | | | |

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|---|---|
| **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:<br>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<br>CLO 2 perform estimation for some commonly used survival models under different types of censoring mechanisms<br>CLO 3 analyze survival data using the Cox's semiparametric proportional hazards model<br>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, or already enrolled in this course; or<br>Pass in STAT3600 or STAT3901;<br>Not for students who have passed in STAT3955, or already enrolled in this course. |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N **Examination** --- |
| **Grade Descriptors (A+ to F)** | **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.<br>**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.<br>**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.<br>**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.<br>**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. |
| **Communication-intensive Course** | N |
| **Course Type** | Lecture-based course |
| **Course Teaching & Learning Activities** | **Activities** / **Details** / **No. of Hours**<br>Lectures / / 36<br>Tutorials / / 12<br>Reading / Self study / / 100 |
| **Assessment Methods and Weighting** | **Methods** / **Details** / **Weighting in final course grade (%)** / **Assessment Methods to CLO Mapping**<br>Assignments / Coursework (assignments, tutorials, and a class test) / 25 / CLO 1,2,3,4<br>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)<br>Hosmer, D. W. and Lemeshow, S.: Applied Survival Analysis: Regression Modeling of Time to Event Data (Wiley, 1999)<br>Klein, J. P. and Moeschberger, M. L.: Survival Analysis: Techniques for Censored and Truncated Data (Springer Verlag, New York, 2005, 2nd ed.) |
| **Course Website** | http://moodle.hku.hk |

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|---|---|---|---|
| **STAT3956** | **Life contingencies III (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr T Boonen, Statistics & Actuarial Science *(tjboonen@hku.hk)* | | |
| **Teachers Involved** | (Dr T Boonen,Statistics & Actuarial Science) | | |
| **Course Objectives** | This course covers concepts and methods in life contingencies that are used in the valuation and financing of long-term actuarial plans and products. | | |
| **Course Contents & Topics** | The following topics will be covered: Fundamentals of pension plans; pricing valuation and funding of pension obligations; universal life insurance; options that are embedded in life insurance and annuity contracts. | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to:<br>CLO 1 calculate the pension benefits in accordance with the provisions of a pension plan<br>CLO 2 perform pension valuation and funding calculations<br>CLO 3 describe the key features of universal life insurance and perform profit tests<br>CLO 4 define and calculate payoffs under various options embedded in insurance and annuity contracts<br>CLO 5 value the guaranteed minimum death benefit and the guaranteed minimum accumulation/maturity benefit using the Black-Scholes model<br>CLO 6 comment on the risk management of various options embedded in insurance products | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3909; and<br>For BSc(Actuarial Science) students only. | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | Dec |
| **Grade Descriptors (A+ to F)** | **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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 |

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| **Required/recommended reading and online materials** | Dickson, D.C.M., Hardy, M.R., and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge University Press, 2020, 3rd edition)<br>Anderson, A.W., Pension Mathematics for Actuaries (ACTEX Publications, 2006, 3rd edition) |
| **Course Website** | http://moodle.hku.hk |

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|---|---|---|---|
| **STAT4602** | **Multivariate data analysis (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | 50 |
| **Course Co-ordinator** | Dr Y Cao, Statistics & Actuarial Science *(yuancao@hku.hk)* | | |
| **Teachers Involved** | (Dr Y Cao,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:

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|---|---|
| CLO 1 | 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 |

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|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3600 or STAT3907 | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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)<br>Mardia K. V., Kent J. T., and Bibby J. M.: Multivariate Analysis (Academic Press, 1979)<br>Seber G. A. F.: Multivariate Observations (John Wiley & Sons, 1984)<br>Morrison D. F.: Multivariate Statistical Methods (McGraw-Hill, 1990, 3rd ed.)<br>Hair J. F., Anderson R. E., Tatham R. L., & Black W. C.: Multivariate Data Analysis (Prentice-Hall, 2006, 6th edition)<br>Srivastava M. S.: Methods of Multivariate Statistics (John Wiley and Sons, 2002)<br>SAS Manuals on-line: Use the HELP button. | | | |
| **Course Website** | http://moodle.hku.hk | | | |

| **STAT4607** | **Credit risk analysis (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **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** | Credit risk has always been a significant financial risk in the banking industry. It is related to the possibility of loss arising from defaults on debts, swaps, 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 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 credit rating systems | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3618 or STAT3905 or STAT3910 or (FINA2322 and any University level 3 course) | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **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 (participation, 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** | Bluhm, C., Overbeck, L., and Wagner, C. (2010). Introduction to Credit Risk Modeling (2nd Edition). CRC Press.<br>Löffler, G. and Posch, P. N. (2011). Credit Risk Modeling using Excel and VBA (2nd Edition). Wiley.<br>Resti, A. and Sironi, A. (2007). Risk Management and Shareholders' Value in Banking: From Risk Measurement Models to Capital Allocation Policies. Wiley.<br>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.<br>Crouhy, M., Galai, D., and Mark, R. (2001). Risk Management. McGraw-Hill.<br>Jorion, P. (2011). Financial Risk Manager Handbook (6th Edition). Wiley.<br>Hull, J. C. (2018). Risk Management and Financial Institutions (5th Edition). Wiley.<br>Hull, J. C. (2018). Options, Futures, and Other Derivatives (10th Edition). Pearson. | | | |

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| | Gujarati, D. N. and Porter, D. C. (2009). Basic Econometrics (5th Edition). McGraw-Hill.<br>Gregory, J. (2015). The xVA Challenge: Counterparty Credit Risk, Funding, Collateral and Capital (3rd Edition). Wiley.<br>Malz, A. M. (2011). Financial Risk Management: Models, History, and Institutions. Wiley. |
| **Course Website** | http://moodle.hku.hk |

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|---|---|---|---|
| **STAT4608** | **Market risk analysis (6 credits)** | **Academic Year** | 2023 |
| **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: | | |

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|---|---|
| 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 |

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|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3907 and STAT3910; or<br>Pass in STAT4601 and (FINA2320 or STAT3609) | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |

| | |
|---|---|
| **Grade Descriptors (A+ to F)** | |
| **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. |

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|---|---|
| **Communication-intensive Course** | N |
| **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 |

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| **Required/recommended reading and online materials** | Jorion, P.: Value-at-Risk: The New Benchmark for Managing Financial Risk (McGraw-Hill, 2007, 3rd edition)<br>Alexander, C.: Market Models: A Guide to Financial Data Analysis (Wiley, 2001)<br>Alexander, C.: Market Risk Analysis: Practical Financial Econometrics (Wiley, 2008)<br>Alexander, C.: Market Risk Analysis: Value-at-Risk Models (Wiley, 2009)<br>Tsay, R. S.: Analysis of Financial Time Series (Wiley, 2005, 2nd edition) |
| **Course Website** | http://moodle.hku.hk |

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| **STAT4711** | **Capstone experience for actuarial science undergraduates (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | 50 |
| **Course Co-ordinator** | Prof S M S Lee, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | (Various teachers as the assessors of oral presentations and written reports,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 three to 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.<br><br>Topics acceptable for projects in this course can be related to any of the traditional actuarial areas of practice such | | |

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| | 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.<br><br>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:<br>CLO 1 define a practical problem, discuss the issues faced by different stakeholders, and design workable solutions for the problems<br>CLO 2 integrate theoretical results and practical approaches, and to specify limitations of current developments<br>CLO 3 work in a team and to collaborate with members with different background<br>CLO 4 deliver actuarial results effectively in a written report and in oral presentations<br>CLO 5 develop further logical, critical thinking, creativity, technical report writing, communication and consultation skills<br>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 in BSc(Actuarial Science) programme including (Pass in STAT3901, or already enrolled in this course; or<br>Pass in STAT3909, or already enrolled in this course); and<br>This capstone course is only for BSc(Actuarial Science) students, and is mutually exclusive with STAT4767 and STAT4798.<br>The earliest that a student is allowed to take this capstone course is their year 3 study. |
| **Offer in 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y **Examination** No Exam |
| **Grade Descriptors (A+ to F)** | **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.<br>**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.<br>**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.<br>**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.<br>**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. |
| **Communication-intensive Course** | N |
| **Course Type** | Project-based course |
| **Course Teaching & Learning Activities** | **Activities** \| **Details** \| **No. of Hours**<br>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**<br>Oral presentation \| oral presentation, progress, attendance and in-class discussion \| 50 \| CLO 1,2,3,4,5,6<br>Research report \| written report \| 50 \| CLO 1,2,3,4,5 |
| **Course Website** | http://moodle.hku.hk |

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| **STAT4767** | **Actuarial science internship (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr E A L Li, Statistics & Actuarial Science *(ericli11@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 a 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:<br>CLO 1 gain practical experiences during internship<br>CLO 2 describe basic actuarial practices learned during the internship<br>CLO 3 explain how actuarial theories learned in University can be applied in practice<br>CLO 4 provide context for specific technical skills developed in basic actuarial courses<br>CLO 5 effectively communicate technical information to a non-technical audience | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in at least 24 credits of advanced level disciplinary core/elective courses in BSc(Actuarial Science) programme including STAT3901; and<br>This capstone course is only for BSc(Actuarial Science) students; and is mutually exclusive with STAT4711.<br>The earliest that a student is allowed to take this capstone course is their year 3 study. | | |
| **Offer in 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |
| **Grade Descriptors Distinction/Pass/Fail** | **Distinction** Demonstrates excellent ability in applying knowledge to solve problems in the workplace. Demonstrates excellent performance in handling and carrying out the work required in the job or assigned by supervisor(s). Establishes highly 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, with excellent performance in written and oral report, and excellent evaluation by supervisor(s), etc.<br>**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 | | |

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| | | 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. |

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| **Communication-intensive Course** | N | | | |
| **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** | **Methods** | **Details** | **Weighting in final course grade (%)** | **Assessment Methods to CLO Mapping** |
| | Oral presentation | oral presentation and in-class discussion | 40 | CLO 1,2,3,4,5 |
| | Written report | written report | 60 | CLO 1,2,3,4,5 |
| **Course Website** | http://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.<br>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.<br>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. | | | |

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| **STAT4798** | **Statistics and actuarial science project (6 credits)** | **Academic Year** | 2023 |
| **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: | | |
| | CLO 1 | formulate meaningful research problems | |
| | CLO 2 | learn and apply advanced techniques in probability and/or statistics to solve real life problems | |
| | CLO 3 | summarize and present research findings in a professional manner | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in at least 24 credits of advanced level disciplinary core/elective courses in BSc(Actuarial Science) programme including STAT3902 and STAT3907; and<br>Pass or already enrolled in at least one of the following courses: STAT3911, STAT4602, STAT4904; and<br>This capstone course is only for BSc(Actuarial Science) students; and subject to the consent of course coordinator.<br>This course is mutually exclusive with STAT4711.<br>The earliest that a student is allowed to take this capstone course is their year 3 study. | | |
| **Offer in 2023 - 2024** | Y 1st sem 2nd sem Offer in 2024 - 2025 : Y | **Examination** | No Exam |

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| **Grade Descriptors (A+ to F)** | **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. |

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| **Communication-intensive Course** | N | | | |
| **Course Type** | Project-based course | | | |
| **Course Teaching & Learning Activities** | **Activities** | **Details** | | **No. of Hours** |
| | Reading / Self study | | | 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 1,2,3 |
| | Research report | written report | 60 | CLO 1,2,3 |
| **Course Website** | http://moodle.hku.hk | | | |
| **Additional Course Information** | Approval is subject to past academic performance. | | | |

| STAT4901 | Risk theory II (6 credits) | Academic Year | 2023 |
|---|---|---|---|
| Offering Department | Statistics & Actuarial Science | Quota | --- |
| Course Co-ordinator | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| Teachers Involved | | | |
| 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: | | |

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| 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 |

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| Pre-requisites (and Co-requisites and Impermissible combinations) | Pass in STAT3906 | | |
| Offer in 2023 - 2024 | N Offer in 2024 - 2025 : N | Examination | --- |

| Grade Descriptors (A+ to F) | |
|---|---|
| **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. |

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| Communication-intensive Course | N |
| 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 |

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| 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).<br>Kaas R., Goovaerts M., Dhaene J., & Denuit M.: Modern Actuarial Risk Theory (Springer, 2004, 1st edition).<br>Bowers N.L., Gerber H.U., Hickman J.C. & Jones D.A.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd edition).<br>Willmot G.E. & Lin X.S.: Lundberg Approximations for Compound Distributions with Insurance Applications (Springer, 2000, 1st edition). |
| Course Website | http://moodle.hku.hk |

| STAT4902 | Selected topics in actuarial science (6 credits) | Academic Year | 2023 |
|---|---|---|---|
| Offering Department | Statistics & Actuarial Science | Quota | --- |
| Course Co-ordinator | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| Teachers Involved | | | |
| Course Objectives | This course is an advanced course in actuarial science which discusses selected topics useful for potential graduate students. It focuses on tools in the frontier of actuarial risk management, their communication, examples and applications. | | |
| Course Contents & Topics | Topics may include: Enterprise risk management; Risk identification and taxonomy; Risk measures; Extreme value theory; Multivariate distributions; Copulas; Aggregate risk; Applications to risk management; Other topics as determined by the instructor | | |
| Course Learning Outcomes | On successful completion of this course, students should be able to: | | |

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| CLO 1 | understand, identify and classify different types of risks |
| CLO 2 | explain approaches for managing risk |
| CLO 3 | model risks |
| CLO 4 | communicate risk orally and in written form |
| CLO 5 | communicate modelling assumptions, uncertainty and outcomes orally and in written form |

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| Pre-requisites (and Co-requisites | Pass in STAT3906 |

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| **and Impermissible combinations)** | |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N **Examination** --- |

**Grade Descriptors (A+ to F)**

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|---|---|
| **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. |

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| **Communication-intensive Course** | Y |
| **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 | 3 assignments | 15 | CLO 1,2,3,4,5 |
| Presentation | Oral presentation | 20 | CLO 1,2,3,4,5 |
| Project reports | Written report | 20 | CLO 3,4,5 |
| Test | Midterm | 45 | CLO 3,4,5 |

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| **Required/recommended reading and online materials** | Quantitative Risk Management: Concepts, Techniques and Tools, McNeil A.J., Frey R., Embrechts P. (Princeton University Press, 2015, 2nd edition) |
| **Course Website** | http://moodle.hku.hk |

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| **STAT4903** | **Actuarial techniques for general insurance (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr D Lee, Statistics & Actuarial Science *(leedav@hku.hk)* | | |
| **Teachers Involved** | (Dr D Lee,Statistics & 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 market in Hong Kong. Students will acquire the fundamental concept on general insurance actuarial science together with the supporting calculations.

**Course Contents & Topics**

1. General insurance market in Hong Kong
- Introduction of general insurance markets
- Regulations on general insurance

2. Basic techniques for ratemaking
- Techniques related to exposures
- Techniques related to premiums
- Techniques related to loss and loss adjustment expenses
- Calculate the underwriting expense provisions
- Pure premium methods
- Loss ratio methods
- Considerations when selecting the final rates

3. Estimating claim liabilities
- Data requirement
- Build and analyze claim development triangles
- Expected claims method
- Frequency-severity methods
- Bornhuetter-Ferguson and Benktander methods
- Appraisal and validation of the estimated results

**Course Learning Outcomes**

On successful completion of this course, students should be able to:

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| CLO 1 | describe the features and underlying risks of general insurance products |
| CLO 2 | use appropriate techniques to adjust premium, exposure and expense data for use in ratemaking procedures |
| CLO 3 | calculate the premium rate for basic general insurance products |
| CLO 4 | estimate the claims liabilities for general insurance products |

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| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3906, or already enrolled in this course. |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y **Examination** Dec |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

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| | **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. |

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| **Communication-intensive Course** | N |
| **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 |

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| **Required/recommended reading and online materials** | Friedland, J.F., Estimating Unpaid Claims Using Basic Techniques, Casualty Actuarial Society, Third Version, July 2010<br>Werner, G, and Modlin, C., Basic Ratemaking, Casualty Actuarial Society, Fifth Edition, May 2016<br>Brown, R.L. and Lennox, W.S., Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance, ACTEX Publications, Fifth edition, 2022 |
| **Course Website** | http://moodle.hku.hk |

| **STAT4904** | **Statistical learning for risk modelling (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr M M Y Zhang, Statistics & Actuarial Science *(mzhang18@hku.hk)* | | |
| **Teachers Involved** | (Dr M M Y Zhang,Statistics & Actuarial Science) | | |
| **Course Objectives** | To make sense of the vast and complex data sets that have emerged in insurance and finance, it is essential to have a firm understanding of the basic statistical modelling and prediction techniques. This course introduces some useful predictive analytics techniques, such as principal component analysis, naive Bayes classification, decision tree models, and cluster analysis. The R programming language will be used for actual implementation. | | |
| **Course Contents & Topics** | Basics of statistical learning, cross-validation, linear model selection and regularization (subset selection, shrinkage methods, dimensional reduction methods), tree-based methods (decision trees, bagging, boosting, random forests), principal component analysis, naive Bayes classification, cluster analysis (K-means clustering, hierarchical clustering), deep learning, survival analysis, multiple testing. | | |

| **Course Learning Outcomes** | On successful completion of this course, students should be able to: |
|---|---|
| | CLO 1 understand and apply a wide range of predictive analytics techniques for risk modelling |
| | CLO 2 apply the techniques by using the R programming language and interpret the outputs |
| | CLO 3 recognize and compare the characteristics, strengths and weaknesses of different methods |

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| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3907 or STAT3600; and<br>Not for students who have passed in STAT3612, or already enrolled in this course; and<br>For BSc(Actuarial Science) students only. |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y **Examination** May |

| **Grade Descriptors (A+ to F)** | | |
|---|---|---|
| | **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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, class test(s) and computer-based project(s)) | 25 | CLO 1,2,3 |
| | Examination | One 2-hour written examination | 75 | CLO 1,2,3 |

| | |
|---|---|
| **Required/recommended reading and online materials** | An Introduction to Statistical Learning, with Applications in R, James, Witten, Hastie, Tibshirani, 2021, New York: Springer |
| **Course Website** | http://moodle.hku.hk |

| **STAT7609** | **Research methods in statistics (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr K Zhu, Statistics & Actuarial Science *(mazhuke@hku.hk)* | | |
| **Teachers Involved** | (Dr K Zhu,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:<br>(1) Basic asymptotic methods: modes of convergence; stochastic orders; laws of large numbers; central limit theorems; delta method; Edgeworth expansions; saddlepoint approximations.<br>(2) Parametric and nonparametric likelihood methods: high-order approximations; profile likelihood and its variants; signed likelihood ratio statistics; empirical likelihood.<br>(3) Nonparametric statistical inference: sample quantiles; sign and rank tests; Kolmogorov-Smirnov test; nonparametric regression; density estimation; kernel methods.<br>(4) Computationally-intensive methods: cross-validation; bootstrap; permutation methods.<br>(5) Robust methods: measures of robustness; M-estimator; L-estimator; R-estimator; estimating functions.<br>(6) U-statistics, projection methods.<br>(7) Other topics as determined by the instructor. | | |
| **Course Learning Outcomes** | On successful completion of this course, students should be able to:<br>CLO 1 comprehend the language and technicalities found in statistical research literature<br>CLO 2 understand the use of standard mathematical tools for conducting statistical research<br>CLO 3 apply a variety of research tools to solve standard statistical problems<br>CLO 4 acquire exposure to some developments in contemporary statistical research | | |
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3600 or STAT3907 | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | **Examination** | Dec |

| **Grade Descriptors (A+ to F)** | |
|---|---|
| **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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 |

| | |
|---|---|
| **Required/recommended reading and online materials** | Efron, B. and Tibshirani, R.J. (1993). An Introduction to the Bootstrap. Chapman & Hall: New York.<br>Owen, A.B. (2001). Empirical Likelihood. Chapman & Hall: Boca Raton.<br>Shao, J. (1999). Mathematical Statistics. Springer: New York.<br>Vaart, A. (1998). Asymptotic Statistics. Cambridge: Cambridge University Press. |
| **Course Website** | http://moodle.hku.hk |

| **STAT7610** | **Advanced probability (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr M Hofert, Statistics & Actuarial Science *(mhofert@hku.hk)* | | |
| **Teachers Involved** | (Dr M Hofert,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** | Contents include: 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:<br>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 or STAT3903 | | | |
| **Offer in 2023 - 2024** | Y 1st sem Offer in 2024 - 2025 : Y | | **Examination** | Dec |
| **Grade Descriptors (A+ to F)** | **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. | | |
| **Communication-intensive Course** | N | | | |
| **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 |

| | |
|---|---|
| **Required/recommended reading and online materials** | Jean Jacod and Philip Protter: Probability Essentials (Universitext, Springer-Verlag, New York, 2004, 2nd edition)<br>Chung K. L.: A Course in Probability Theory (Academic Press, 2001, 3rd edition) |
| **Course Website** | http://moodle.hku.hk |

| **STAT7611** | **Computational statistics (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | | | |
| **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: Bayesian statistics, Markov chain Monte Carlo methods including Gibbs sampler, the Metropolis-Hastings algorithm, and data augmentation; Generation of random variables including the inversion methods, rejection sampling, the sampling/importance resampling method; Optimization techniques including Newton' s method, expectation-maximization (EM) algorithm and its variants, and minorization-maximization (MM) algorithms; Integration including Laplace approximations, Gaussian quadrature, the importance sampling method; and other topics such as Hidden Markov models, neural networks, 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 or STAT3907 | | | |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N | | **Examination** | --- |
| **Grade Descriptors (A+ to F)** | **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **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) | 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).<br>Givens, G.H. and Hoeting, J.A.: Computational Statistics (Wiley, 2005)<br>Robert, C.P. and Casella, G.: Monte Carlo Statistical Methods (Springer, 2005, 2nd edition) |
| **Course Website** | http://moodle.hku.hk |

| **STAT7614** | **Advanced statistical modelling (6 credits)** | **Academic Year** | 2023 |
|---|---|---|---|
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | Dr C Wang, Statistics & Actuarial Science *(stacw@hku.hk)* | | |
| **Teachers Involved** | (Dr C Wang,Statistics & Actuarial Science)<br>(Dr C Zhang,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 R or Python. It will cover both the underlying principles of each modelling approach and the model estimation procedures. | | |
| **Course Contents & Topics** | Topics from: (i) Linear regression models; (ii) Generalized linear models; (iii) Model selection and regularization; (iv) Kernel and local polynomial regression; selection of smoothing parameters; (v) Generalized additive models; (vi) Hidden Markov models and Bayesian networks. | | |

**Course Learning Outcomes**

On successful completion of this course, students should be able to:

| | |
|---|---|
| CLO 1 | describe clearly the basic characteristic and rationale behind the formulation of each statistical model |
| CLO 2 | identify for a given set of data the most suitable statistical model and tools to use |
| CLO 3 | demonstrate the ability of using computing software for building scoring models for various management and prediction problems involving binary and counting responses; employing the powerful tool of kernel smoothing using R or Python for real data mining problems |

| | | | |
|---|---|---|---|
| **Pre-requisites (and Co-requisites and Impermissible combinations)** | Pass in STAT3600 or STAT3907 | | |
| **Offer in 2023 - 2024** | Y 2nd sem Offer in 2024 - 2025 : Y | **Examination** | May |

**Grade Descriptors (A+ to F)**

| | |
|---|---|
| **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. |

| | |
|---|---|
| **Communication-intensive Course** | N |
| **Course Type** | Lecture-based course |

**Course Teaching & Learning Activities**

| **Activities** | **Details** | **No. of Hours** |
|---|---|---|
| Lectures | | 24 |
| 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** | R.H. Myers et al., 2010: Generalized Linear Models (2nd ed.), Wiley<br>W. Hardle et al., 2004: Nonparametric and Semi-parametric Models. Springer<br>W. Zucchini & I.L. MacDonald, 2009: Hidden Markov Models for Time Series: An Introduction Using R, CRC Press<br>M. Scutari & J. Denis, 2015: Bayesian Networks: with Examples in R, CRC Press |
| **Course Website** | http://moodle.hku.hk |

| | | | |
|---|---|---|---|
| **STAT7615** | **Advanced quantitative risk management and finance (6 credits)** | **Academic Year** | 2023 |
| **Offering Department** | Statistics & Actuarial Science | **Quota** | --- |
| **Course Co-ordinator** | TBC, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)* | | |
| **Teachers Involved** | | | |
| **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** | Contents include: Elementary Stochastic Calculus; 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; Value-at-risk and expected shortfall; estimation, back-testing and stress testing; 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 | | |
| **Offer in 2023 - 2024** | N Offer in 2024 - 2025 : N | **Examination** | --- |
| **Grade Descriptors (A+ to F)** | **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. | |
| **Communication-intensive Course** | N | | |
| **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).<br>Glasserman, Paul: Monte Carlo Methods in Financial Engineering. (Springer, 2003).<br>Danielsson Jon: Financial Risk Forecasting (Willy 2011)<br>McNeil, A. J., Frey, R. & Embrechts, P.: Quantitative Risk Management (Princeton, 2005)<br>Tsay, R.S.: Analysis of Financial Time Series (Wiley, 2010, 3rd edition) |
| **Course Website** | http://moodle.hku.hk |

## SECTION VII Degree Regulations

### REGULATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE BSc(ActuarSc)

*These regulations apply to students admitted under the 4-year curriculum to the BSc in Actuarial Science degree curriculum to the first year in the academic year 2018-19 and thereafter.*

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

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**Definitions**

**AS1**[1] For the purpose of these regulations and the syllabuses for the degree of BSc in Actuarial Science, unless the context otherwise requires:

"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 in Actuarial Science degree**

**AS2** To be eligible for admission to the BSc in Actuarial Science 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.

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**Period of study**

**AS3** The curriculum for the BSc(ActuarSc) 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**

**AS4** 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**

**AS5**

(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, including 132 credits of the required courses as prescribed in the professional core of the BSc(ActuarSc) degree curriculum.

(c) 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.

(d) 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 AS5(e).

(e) 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.

(f) 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.

(g) 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 AS3, unless otherwise permitted by the Board of the Faculty.

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**Advanced standing**

**AS6** Advanced standing 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**

**AS7**

(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 other forms of assessment.

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**Award of BSc in Actuarial Science Degree**

**AS8** To be eligible for the award of the BSc in Actuarial Science 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 132 credits of the required courses as prescribed in the professional core of the BSc(ActuarSc) degree curriculum.

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**Honours classification**

**AS9**

(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(ActuarSc) in accordance with the following Graduation GPA scores, with all 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[2]:

| *Class of honours* | *GGPA 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 Graduation GPA and the Board of Examiners for the Degree of BSc(ActuarSc) 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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[2] For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core course with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

# REGULATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE BSc(ActuarSc)

*These regulations apply to students admitted under the 4-year curriculum to the BSc in Actuarial Science degree curriculum to the first year in the academic year 2017-18.*

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

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**Definitions**

**AS1**[1] For the purpose of these regulations and the syllabuses for the degree of BSc in Actuarial Science, unless the context otherwise requires:

"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 in Actuarial Science degree**

**AS2** To be eligible for admission to the BSc in Actuarial Science 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.

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**Period of study**

**AS3** The curriculum for the BSc(ActuarSc) 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**

**AS4** 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**

**AS5**

(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, including 138 credits of the required courses as prescribed in the professional core of the BSc(ActuarSc) degree curriculum.

(c) 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.

(d) 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 AS5(e).

(e) 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.

(f) 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.

(g) 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 AS3, unless otherwise permitted by the Board of the Faculty.

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**Advanced standing**

**AS6** Advanced standing 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**

**AS7**

(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 other forms of assessment.

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**Award of BSc in Actuarial Science Degree**

**AS8** To be eligible for the award of the BSc in Actuarial Science 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 138 credits of the required courses as prescribed in the professional core of the BSc(ActuarSc) degree curriculum.

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**Honours classification**

**AS9**

(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(ActuarSc) in accordance with the following Graduation GPA scores, with all 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[2]:

| *Class of honours* | *GGPA 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 Graduation GPA and the Board of Examiners for the Degree of BSc(ActuarSc) 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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[2] For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core course with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

# REGULATIONS FOR FIRST DEGREE CURRICULA[1]

*(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 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

[1] These regulations are applicable to candidates admitted from 2022-23 onwards. 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.

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.

'Graduation Grade Point Average' or 'Graduation GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) at the point of graduation. For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core courses with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

'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.

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**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) unless otherwise prescribed in the curriculum regulations and syllabuses, 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 with not more than 24 credits of course being selected within one academic year except where candidates are required to make up for failed credits;

(d) successful completion of a capstone experience as specified in the syllabuses of the degree curriculum; and

(e) successful completion of any other non-credit bearing courses as required.

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**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 exempted must replace the number of exempted credits with courses of the same credit value.

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[2] Candidates who have achieved Level 5 or above in English Language in the Hong Kong Diploma of Secondary Education Examination, or equivalent, are exempted from this requirement, and Core University English is optional. Those who do not take this course 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*.

**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.

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**UG 8 Grading system:**

(a) The grades, their standards and the grade points for assessment shall be as follows[5]:

| *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 calculation of the GPA.

[5] UG 8 is not applicable to the respective Professional Core of the BDS and MBBS curricula.

**UG 9 Honours classifications:**

(a) Honours classifications shall be awarded in five divisions[6]: 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 Graduate GPA scores (GGPA), with all courses taken (including failed courses) carrying weightings which are proportionate to their credit values[7]:

| *Class of honours* | *GGPA 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 Graduation 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 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.

[6] UG 9 is not applicable to the BChinMed, BDS and MBBS curricula.

[7] For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core course with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

# SECTION VIII Teaching Weeks

***Teaching Weeks 2023-24 for Undergraduate and Taught Postgraduate Students***

| | SUN | MON | TUE | WED | THUR | FRI | SAT |
|---|---|---|---|---|---|---|---|
| SEP-23 | | | | | | 1 | 2 |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 24 | 25 | 26 | 27 | 28 | 29 | [30] |
| OCT-23 | 1 | [2] | 3 | 4 | 5 | 6 | 7 |
| | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| | 22 | [23] | 24 | 25 | 26 | 27 | 28 |
| | 29 | 30 | 31 | | | | |
| NOV-23 | | | | 1 | 2 | 3 | 4 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| | 26 | 27 | 28 | 29 | 30 | | |
| DEC-23 | | | | | | 1 | 2 |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 24 | [25] | [26] | 27 | 28 | 29 | 30 |
| | 31 | | | | | | |
| JAN-24 | | [1] | 2 | 3 | 4 | 5 | 6 |
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| | 28 | 29 | 30 | 31 | | | |
| FEB-24 | | | | | 1 | 2 | 3 |
| | 4 | 5 | 6 | 7 | 8 | <9> | [10] |
| | 11 | [12] | [13] | 14 | 15 | 16 | 17 |
| | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| | 25 | 26 | 27 | 28 | 29 | | |
| MAR-24 | | | | | | 1 | 2 |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | 10 | 11 | 12 | 13 | 14 | 15 | (16) |
| | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 24 | 25 | 26 | 27 | 28 | [29] | [30] |
| | 31 | | | | | | |
| APR-24 | | [1] | 2 | 3 | [4] | 5 | 6 |
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| | 28 | 29 | 30 | | | | |
| MAY-24 | | | | [1] | 2 | 3 | 4 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | 12 | 13 | 14 | [15] | 16 | 17 | 18 |
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| | 26 | 27 | 28 | 29 | 30 | 31 | |
| JUN-24 | | | | | | | 1 |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | 9 | [10] | 11 | 12 | 13 | 14 | 15 |
| | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| | 30 | | | | | | |
| JUL-24 | | [1] | 2 | 3 | 4 | 5 | 6 |
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| | 28 | 29 | 30 | 31 | | | |
| AUG-24 | | | | | 1 | 2 | 3 |
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| | 25 | 26 | 27 | 28 | 29 | 30 | 31 |

| **FIRST SEMESTER: SEP 1 - DEC 23, 2023** | **Week** |
|---|---|
| First Day of Teaching: Sep 1, 2023 | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7(Reading) |
| Reading/Field Trip Week: Oct 16 - 21, 2023 | 8 |
| | 9 |
| | 10 |
| | 11 |
| | 12 |
| | 13 |
| Last Day of Teaching: Nov 30, 2023 | |
| Revision Period: Dec 1 - 7, 2023 | 14(Revision) |
| Assessment Period: Dec 8 - 23, 2023 | 1 |
| | 2 |
| | 3 |
| | Break |
| | Break |
| **SECOND SEMESTER: JAN 15 - MAY 21, 2024** | Break |
| First Day of Teaching: Jan 15, 2024 | 1 |
| | 2 |
| | 3 |
| Class Suspension Period for the Lunar New Year: Feb 10 - 16, 2024 | 4 |
| | 5 |
| | 6 |
| Reading/Field Trip Week: Mar 4 - 9, 2024 | 7(Reading) |
| | 8 |
| | 9 |
| | 10 |
| | 11 |
| | 12 |
| | 13 |
| Last Day of Teaching: Apr 27, 2024 | 14 |
| Revision Period: Apr 29 - May 4, 2024 | 15(Revision) |
| Assessment Period: May 6 - 21, 2024 | 1 |
| | 2 |
| | 3 |
| | Break |
| | Break |
| | Break |
| **OPTIONAL SUMMER SEMESTER** | Break |
| JUN 24 - AUG 17, 2024 | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7 |
| | 8 |

[ ] 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: 10 Mondays, 12 Tuesdays, Wednesdays, Thursdays and Fridays, 11 Saturdays

Second Semester: 12 Mondays, 13 Tuesdays and Wednesdays, 12 Thursdays, 11.5 Fridays, 11 Saturdays

# Useful contacts and websites

| | | | |
|---|---|---|---|
| Faculty of Science | Office Location | : | Ground Floor,<br>Chong Yuet Ming Physics Building |
| | Tel | : | 3917 2683 |
| | Fax | : | 2858 4620 |
| | Email | : | science@hku.hk (General Enquiries)<br>sci.ug.enquiry@hku.hk (Academic Matters)<br>sci.ug.el@hku.hk (Experiential Learning & Enrichment Opportunities) |
| | Website | : | https://www.scifac.hku.hk/ |
| | *(Please visit https://www.scifac.hku.hk/ for the latest updates of BSc courses, timetables, notices and forms)* | | |
| Departments/Schools | | | |
| Biological Sciences | Website | : | https://www.biosch.hku.hk/ |
| Biomedical Sciences | Website | : | https://www.sbms.hku.hk/ |
| Chemistry | Website | : | https://www.chemistry.hku.hk/ |
| Earth Sciences | Website | : | https://www.earthsciences.hku.hk/ |
| Mathematics | Website | : | https://hkumath.hku.hk/web/index.php |
| Physics | Website | : | https://www.physics.hku.hk/ |
| Statistics and Actuarial Science | Website | : | https://saasweb.hku.hk/ |
| Academic Advising and Scholarships Office | Tel | : | 3917 0128 |
| | Website | : | https://aas.hku.hk/ |
| Academic Services Office | Office Location | : | G04, Run Run Shaw Building |
| | Tel | : | 2859 2433 |
| | Fax | : | 2540 1405 |
| | Email | : | asoffice@hku.hk |
| | Website | : | http://ase.hku.hk/asoffice/ |
| Common Core courses | Website | : | https://commoncore.hku.hk/ |
| HKU Worldwide Undergraduate Exchange Programme | Website | : | https://intlaffairs.hku.hk/ |
| Centre of Development and Resources for Students **(CEDARS)** | Tel | : | 3917 2305 |
| | Website | : | https://www.cedars.hku.hk/ |
| University Health Service | Tel | : | 3917 2501 (General enquiries)<br>2549 4686 (Medical appointments only) |
| | Website | : | http://www.uhs.hku.hk |
| Plagiarism | Website | : | https://tl.hku.hk/plagiarism/ |