4

BSc

Syllabuses and Regulations
(4-year curriculum)

2013-14

Faculty of Science
The University of Hong Kong

General Information

SCIENCE

This booklet includes information on:

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

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

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

- ***Majors & Minors***

  Details of the Science Majors and Minors available for students.

- ***Degree regulations***

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

- ***Teaching weeks***

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

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

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

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SECTION I

BSc Degree Curriculum and Graduation Requirements

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SECTION I BSc Degree Curriculum and Graduation Requirements

1. A BSc Degree Curriculum

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

All students admitted to the 6901 BSc programme under the 4-year curriculum are required to complete at least one Science major out of the 15 Science majors as the primary major for the award of the BSc degree. In addition to the primary Science major, students may take a second major or a minor in a Science or non-Science discipline. Students should note that some non-Science majors and minors may require students to have achieved a minimum academic result before they are allowed to enroll in them.

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

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

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

Curriculum requirements (240 credits)

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

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

+

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

+

Language Courses: 18 credits
English: 12 credits [6 credits in Core University English (CAES1000△) and
6 credits in English in the Discipline(CAES9820)]
Chinese: 6 credits (CSCI9001)

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

Notes:

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

△ Students who have achieved the following qualifications shall be exempted from taking CAES1000 Core University English and should take a 6-credit elective course in lieu:
- 5** on the HKDSE English Language Paper
- tested by CAES to be of a native English speaker standard
- graduated with an undergraduate degree from an English-medium university
- achieved an overall IELTS score of no less than a 7.5 and no less than a 7 on the Reading, Speaking, Listening and Writing Tests
- achieved an overall TOEFL Internet Based Test score of no less than 102 and no less than a 27 on the writing section and no less than a 24 on the speaking, listening and reading sections
- achieved a level 5 (in either the SL or HL paper) at A1 English in the International Baccalaureate
- achieved an SAT essay score of no less than 10 and no less than 700 on the Critical Reading and Writing Tests
- achieved a score of no less than 5 on the Advanced Placement English Language and Composition or Literature and Composition Tests

^ Credit requirement for different majors or minors may vary.

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

(b) Common Core Curriculum

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

(c) Capstone Requirement

Capstone experience is an integral part of the major programme which focuses on integration and application of knowledge and skills gained in the early years of study. The capstone course carries a minimum of 6 credits and students must complete this for fulfillment of the graduation requirements. Capstone course is normally taken in the senior years (year 3 or 4) of study. The capstone courses in each Science major may be different but a range of courses (e.g. research project, field work, internship) is offered to suit individual student's needs and interests. More details about the capstone courses will be available in due course.

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

(a) Award of a BSc degree

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

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

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

[#] UG5 specifies that students have to successfully complete:

(a) 12 credits in English language enhancement, including 6 credits in Core University English[1] (i.e. CAES1000) and 6 credits in an English in the Discipline course[2] (i.e. CAES9820 Academic English for Science Students);
(b) 6 credits in Chinese language enhancement[3] (i.e. CSCI9001 Practical Chinese for Science Students);
(c) 36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and not more than two courses from each Area of Inquiry during the whole period of study; and
(d) a capstone experience as specified in the syllabuses of the degree curriculum.

(b) Honours Classification

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

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

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

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

Students with 5** on the English examination for the HKDSE
Students whose first language is English
Students who have completed the International Baccalaureate in English
Students with an IELTS score of no less than a 7 on all of the four tests (The IELTS Reading, Writing, Listening and Speaking Tests)
Students with a TOEFL IBT score of 95 or above
Students with a degree already awarded from an English Medium University

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

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

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

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

SECTION II

Credit Unit Statement of

BSc Degree Curriculum

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

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

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

2. Credit Unit Statement of the BSc Degree Curriculum

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

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

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

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

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

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

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

3. The types of courses in the 15 Science Majors and 16 Science Minors are as follows:

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

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

SECTION III

List of BSc Courses and English and Chinese language courses on offer in 2013-14 and 2014-15

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SECTION III List of BSc Courses on offer in 2013/14 and 2014/15^

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Biochemistry											
BIOC1600	Perspectives in biochemistry	6	Level 3 or above in HKDSE Biology, Chemistry, or Combined Science with Biology or Chemistry component, or equivalent	Y	Y	1	Dec	---	Dr J Tanner, Biochemistry	2012 Major in Biochemistry 2013 Major in Biochemistry	2012 Minor in Biochemistry 2013 Minor in Biochemistry
BIOC2600	Basic biochemistry	6	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells; and Not for students who have passed in BIOL2220 Principles of biochemistry or already enrolled in this course.	Y	Y	1	Dec	300	Prof D K Y Shum, Biochemistry	2012 Major in Biochemistry 2013 Major in Biochemistry	2012 Major in Molecular Biology & Biotechnology 2012 Minor in Biochemistry 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Biochemistry 2013 Minor in Molecular Biology & Biotechnology
BIOC3601	Metabolism	6	Pass in BIOC2600 Basic Biochemistry or BIOL2220 Principles of Biochemistry	N	Y	---	---	80	Dr N S Wong, Biochemistry	2012 Major in Biochemistry 2013 Major in Biochemistry	2012 Minor in Biochemistry 2013 Minor in Biochemistry
BIOC3602	Understanding metabolism diseases	6	Pass in BIOC3601 Metabolism	N	N	---	---	40	Dr L Y L Cheng, Biochemistry		
BIOC3604	Essential techniques in biochemistry and molecular biology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of Biochemistry	Y	Y	2	May	60	Dr K M Yao, Biochemistry	2012 Major in Biochemistry 2013 Major in Biochemistry	2012 Minor in Biochemistry 2013 Minor in Biochemistry
BIOC3605	Sequence bioinformatics	6	Pass in BIOC2600 Basic Biochemistry or BIOL2220 Principles of Biochemistry	N	Y	---	---	30	Dr B C W Wong, Biochemistry		2012 Major in Biochemistry 2012 Minor in Biochemistry 2013 Major in Biochemistry 2013 Minor in Biochemistry
BIOC3606	Molecular medicine	6	Pass in BIOC2600 Basic Biochemistry or BIOL2220 Principles of Biochemistry	N	Y	---	---	50	Prof D Y Jin, Biochemistry		2012 Major in Biochemistry 2012 Minor in Biochemistry 2013 Major in Biochemistry 2013 Minor in Biochemistry
BIOC3607	Directed studies in biochemistry	6	This course is for Biochemistry major students only; and Pass in BIOC2600 Basic biochemistry and BIOL3401 Molecular biology, and any two elective courses at advanced level in the Biochemistry Major.	N	Y	---	---	36	Dr J D Huang, Biochemistry		2012 Minor in Biochemistry 2013 Minor in Biochemistry
BIOC4610	Advanced biochemistry	6	Pass in BIOC3601 Metabolism or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3404 Protein structure and function	N	Y	---	---	50	Dr K M Yao, Biochemistry	2012 Major in Biochemistry 2013 Major in Biochemistry	2012 Minor in Biochemistry 2013 Minor in Biochemistry
BIOC4611	Advanced biochemistry II	6	Pass in BIOC3601 Metabolism; and BIOL3404 Protein Structure and Function or CHEM2441 Organic Chemistry I; and Pass in BIOC4610 Advanced Biochemistry I, or already enrolled in this course.	N	N	---	---	50	Dr D Chan, Biochemistry		
BIOC4612	Molecular biology of the gene	6	Pass in BIOC3601 Metabolism or BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology or BIOL3404 Protein structure and function	N	Y	---	---	50	Prof K S E Cheah, Biochemistry		2012 Major in Biochemistry 2012 Minor in Biochemistry 2013 Major in Biochemistry 2013 Minor in Biochemistry

^ Availability of courses in 2014-2015 is subject to change.

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Biochemistry (Cont'd)											
BIOC4613	Advanced techniques in biochemistry & molecular biology	6	Pass in BIOC3604 Essential techniques in biochemistry and molecular biology	N	Y	---	---	50	Dr D Chan, Biochemistry	2012 Major in Biochemistry 2013 Major in Biochemistry	2012 Minor in Biochemistry 2013 Minor in Biochemistry
BIOC4614	Biochemistry project	12	Pass in BIOC3604 Essential Techniques in Biochemistry and Molecular Biology; and Pass in BIOC4610 Advanced Biochemistry , or already enrolled in this course; and Pass in BIOC4613 Advanced Techniques in Biochemistry & Molecular Biology, or already enrolled in this course.	N	Y	---	---	15	Dr N S Wong, Biochemistry		
BIOC4988	Biochemistry internship	6	Pass in BIOC3604 Essential Techniques in Biochemistry & Molecular Biology Students are expected to have satisfactorily completed their Year 2 study.	N	Y	---	---	18	Dr J D Huang, Biochemistry		
School of Biological Sciences											
BIOL1110	From molecules to cells	6	NIL	Y	Y	1, 2	Dec, May	169	Prof B K C Chow, Biological Sciences	2012 Major in Biochemistry 2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2012 Major in Food & Nutritional Science 2012 Major in Molecular Biology & Biotechnology 2013 Major in Biochemistry 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity 2013 Major in Food & Nutritional Science 2013 Major in Molecular Biology & Biotechnology	2012 Minor in Biochemistry 2012 Minor in Food & Nutritional Science 2012 Minor in Molecular Biology & Biotechnology 2012 Minor in Plant Science 2013 Minor in Biochemistry 2013 Minor in Food & Nutritional Science 2013 Minor in Molecular Biology & Biotechnology 2013 Minor in Plant Science
BIOL1111	Introductory microbiology	6	NIL	Y	Y	1	Dec	80	Dr V Dvornyk, Biological Sciences	2012 Major in Biological Sciences 2013 Major in Biological Sciences	
BIOL1201	Introduction to food and nutrition	6	NIL	Y	Y	1	Dec	110	Prof N P Shah, Biological Sciences	2012 Major in Food & Nutritional Science 2013 Major in Food & Nutritional Science	2012 Minor in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL1309	Evolutionary diversity	6	NIL	Y	Y	2	May	105	Prof R M K Saunders, Biological Sciences	2012 Major in Biological Sciences 2012 Major in Earth System Science 2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2013 Major in Biological Sciences 2013 Major in Earth System Science 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity	2012 Minor in Marine Biology 2012 Minor in Plant Science 2013 Minor in Marine Biology 2013 Minor in Plant Science
BIOL1501	Bioethics	6	NIL	N	Y	---	---	40	Prof F C Leung, Biological Sciences		
BIOL1502	The gene	6	NIL Not for students with level 3 or above in HKDSE Biology or Combined Science with Biology component or equivalent.	N	Y	---	---	50	Prof F C Leung, Biological Sciences		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
School of Biological Sciences (Cont'd)											
BIOL2102	Biostatistics	6	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells or BIOL2306 Ecology and evolution or ENVS1301 Environmental life science	Y	Y	2	May	135	Dr G Panagiotou, Biological Sciences	2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2012 Major in Food & Nutritional Science 2012 Major in Molecular Biology & Biotechnology 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity 2013 Major in Food & Nutritional Science 2013 Major in Molecular Biology & Biotechnology	2012 Major in Environmental Science 2012 Minor in Environmental Science 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Environmental Science 2013 Minor in Molecular Biology & Biotechnology
BIOL2103	Biological sciences laboratory course	6	Pass in BIOL1110 From molecules to cells	Y	Y	1, 2	No exam	85	Dr W Y Lui, Biological Sciences	2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2012 Major in Food & Nutritional Science 2012 Major in Molecular Biology & Biotechnology 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity 2013 Major in Food & Nutritional Science 2013 Major in Molecular Biology & Biotechnology	2012 Minor in Molecular Biology & Biotechnology 2012 Minor in Plant Science 2013 Minor in Molecular Biology & Biotechnology 2013 Minor in Plant Science
BIOL2220	Principles of biochemistry	6	Pass in BIOL1110 From molecules to cells; and Not for students who have passed in BIOC2600 Basic biochemistry or have already enrolled in this course.	Y	Y	1	Dec	100	Dr C S C Lo, Biological Sciences	2012 Major in Food & Nutritional Science 2013 Major in Food & Nutritional Science	2012 Major in Molecular Biology & Biotechnology 2012 Minor in Food & Nutritional Science 2012 Minor in Molecular Biology & Biotechnology 2012 Minor in Plant Science 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Food & Nutritional Science 2013 Minor in Molecular Biology & Biotechnology 2013 Minor in Plant Science
BIOL2306	Ecology and evolution	6	Pass in BIOL1309 Evolutionary diversity or BIOL1110 From molecules to cells	Y	Y	1	Dec	200	Prof D Dudgeon, Biological Sciences	2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2012 Major in Food & Nutritional Science 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Ecology & Biodiversity 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity 2013 Major in Food & Nutritional Science 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Ecology & Biodiversity	2012 Minor in Marine Biology 2012 Minor in Molecular Biology & Biotechnology 2013 Minor in Marine Biology 2013 Minor in Molecular Biology & Biotechnology
BIOL3105	Animal physiology and environmental adaptation	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	2	May	35	Prof A O L Wong, Biological Sciences		2012 Major in Biological Sciences 2013 Major in Biological Sciences
BIOL3107	Plant physiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	1	Dec	30	Dr W K Yip, Biological Sciences		2012 Major in Biological Sciences 2012 Minor in Plant Science 2013 Major in Biological Sciences 2013 Minor in Plant Science
BIOL3108	Microbial physiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	1	Dec	60	Dr A Yan, Biological Sciences		2012 Major in Biological Sciences 2013 Major in Biological Sciences
BIOL3109	Environmental microbiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	2	May	40	Dr J D Gu, Biological Sciences		2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity
BIOL3110	Environmental toxicology	6	Pass in BIOL2103 Biological sciences laboratory course or ENVS3042 Pollution or CHEM3141 Environmental chemistry	Y	Y	1	Dec	80	Dr J D Gu, Biological Sciences		2012 Major in Biological Sciences 2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Biological Sciences 2013 Major in Environmental Science 2013 Minor in Environmental Science
BIOL3112	Biological sciences field course I	6	Students are expected to have completed year 2 study satisfactorily.	N	Y	---	---	20	Dr L Karczmarski, Biological Sciences		

Course Code	Title	Credit	Pre-requisite	Available in 2013-2014	Available in 2014-2015	Semester offered in 2013-2014 0=year long 1=1st sem 2=2nd sem S=summer	Exam held in 2013-2014	Quota	Course Coordinator TBC = To be confirmed	Major / Minor (The Major/Minor that this course appears as a required course) Compulsory Course (Must Take)	Core Course (With Choices)
School of Biological Sciences (Cont'd)											
BIOL3113	Directed studies in biological sciences	6	Pass in at least 18 credits of any BIOL2XXX courses; and Cumulative GPA of 2.7 or above	N	Y	---	---	50	Dr M Sun, Biological Sciences		
BIOL3122	Biological sciences field course II	6	Students are expected to have completed year 2 study satisfactorily.	N	Y	---	---	20	Dr L Karczmarski, Biological Sciences		
BIOL3201	Food chemistry	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	90	Dr J C Y Lee, Biological Sciences	2012 Major in Food & Nutritional Science 2013 Major in Food & Nutritional Science	2012 Minor in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3202	Nutritional biochemistry	6	Pass in BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry	N	Y	---	---	100	Dr E T S Li, Biological Sciences	2012 Major in Food & Nutritional Science 2013 Major in Food & Nutritional Science	2012 Major in Biochemistry 2012 Minor in Biochemistry 2012 Minor in Food & Nutritional Science 2013 Major in Biochemistry 2013 Minor in Biochemistry 2013 Minor in Food & Nutritional Science
BIOL3203	Food microbiology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	60	Dr H S El-Nezami, Biological Sciences	2012 Major in Food & Nutritional Science 2013 Major in Food & Nutritional Science	2012 Minor in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3204	Nutrition and the life cycle	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3202 Nutritional biochemistry	N	Y	---	---	80	Dr E T S Li, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3205	Human physiology	6	Pass in BIOL2103 Biological sciences laboratory course	N	Y	---	---	105	Dr W Y Lui, Biological Sciences		2012 Major in Biological Sciences 2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Biological Sciences 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3206	Clinical nutrition	6	Pass in BIOL3202 Nutritional biochemistry or BIOL3203 Food microbiology or BIOL3204 Nutrition and the life cycle or BIOL3205 Human physiology	N	Y	---	---	70	Dr J M F Wan, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3207	Food and nutritional toxicology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3205 Human physiology	Y	Y	2	May	80	Dr H S El-Nezami, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3208	Food safety and quality management	6	Pass in BIOL3201 Food chemistry or BIOL3203 Food microbiology	N	Y	---	---	40	Prof H Corke, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3209	Food and nutrient analysis	6	Pass in BIOL3201 Food chemistry	N	Y	---	---	70	Dr M F Wang, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL3210	Grain production and utilization	6	Pass in any level 2 BIOL course	Y	Y	1	Dec	40	Prof H Corke, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2012 Minor in Plant Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science 2013 Minor in Plant Science
BIOL3211	Nutrigenomics	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	80	Dr K C Tan-Un, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science

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School of Biological Sciences (Cont'd)											
BIOL3301	Marine biology	6	Pass in BIOL2306 Ecology and evolution	Y	Y	2	May	40	Dr M Yasuhara, Biological Sciences	2012 Minor in Marine Biology 2013 Minor in Marine Biology	2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity
BIOL3302	Systematics and phylogenetics	6	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course	Y	Y	1	Dec	60	Prof R M K Saunders, Biological Sciences	2012 Major in Ecology & Biodiversity 2013 Major in Ecology & Biodiversity	2012 Major in Biological Sciences 2012 Minor in Ecology & Biodiversity 2013 Major in Biological Sciences 2013 Minor in Ecology & Biodiversity
BIOL3303	Conservation ecology	6	Pass in BIOL2306 Ecology and evolution	Y	Y	2	May	40	Dr T C Bonebrake, Biological Sciences	2012 Major in Ecology & Biodiversity 2013 Major in Ecology & Biodiversity	2012 Major in Biological Sciences 2012 Major in Environmental Science 2012 Minor in Ecology & Biodiversity 2012 Minor in Environmental Science 2012 Minor in Marine Biology 2013 Major in Biological Sciences 2013 Major in Environmental Science 2013 Minor in Ecology & Biodiversity 2013 Minor in Environmental Science 2013 Minor in Marine Biology
BIOL3304	Fish biology	6	Pass in BIOL3301 Marine biology	N	Y	---	---	50	Prof Y J Sadovy, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2012 Minor in Marine Biology 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity 2013 Minor in Marine Biology
BIOL3313	Freshwater ecology	6	Pass in BIOL2102 Biostatistics or BIOL2306 Ecology and evolution	Y	Y	1	Dec	40	Prof D Dudgeon, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity
BIOL3314	Plant structure and evolution	6	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course	Y	Y	2	May	60	Prof R M K Saunders, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2012 Minor in Plant Science 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity 2013 Minor in Plant Science
BIOL3318	Experimental intertidal ecology	6	Pass in BIOL2102 Biostatistics or BIOL3301 Marine biology	Y	Y	2	May	40	Prof G A Williams, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2012 Minor in Marine Biology 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity 2013 Minor in Marine Biology
BIOL3319	Terrestrial ecology	6	Pass in BIOL3303 Conservation ecology	N	Y	---	---	30	TBC, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity
BIOL3320	The biology of marine mammals	6	Pass in BIOL2306 Ecology and evolution	Y	Y	1	Dec	30	Dr L Karczmarski, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2012 Minor in Marine Biology 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity 2013 Minor in Marine Biology

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School of Biological Sciences (Cont'd)											
BIOL3401	Molecular biology	6	Pass in BIOL2103 Biological sciences laboratory course or BIOC3604 Essential techniques in biochemistry and molecular biology	N	Y	---	---	80	Prof B K C Chow, Biological Sciences	2012 Major in Biochemistry 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Biochemistry 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology	2012 Major in Biological Sciences 2012 Minor in Biochemistry 2013 Major in Biological Sciences 2013 Minor in Biochemistry
BIOL3402	Cell biology and cell technology	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry	Y	Y	1	Dec	120	Prof A S T Wong, Biological Sciences	2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology	2012 Major in Biochemistry 2012 Major in Biological Sciences 2012 Minor in Biochemistry 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Biochemistry 2013 Major in Biological Sciences 2013 Minor in Biochemistry 2013 Minor in Molecular Biology & Biotechnology
BIOL3403	Immunology	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL2103 Biological sciences laboratory course	Y	Y	2	May	100	Prof W W M Lee, Biological Sciences		2012 Major in Biochemistry 2012 Major in Biological Sciences 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Biochemistry 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Biochemistry 2013 Major in Biological Sciences 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Biochemistry 2013 Minor in Molecular Biology & Biotechnology
BIOL3404	Protein structure and function	6	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry	Y	Y	2	May	150	Prof W W M Lee, Biological Sciences		2012 Major in Biochemistry 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Biochemistry 2013 Major in Biochemistry 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Biochemistry
BIOL3405	Molecular microbiology	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	2	May	50	Dr J S H Tsang, Biological Sciences		2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology
BIOL3406	Reproduction and reproductive biotechnology	6	Pass in BIOL2103 Biological sciences laboratory course	N	Y	---	---	45	Prof A O L Wong, Biological Sciences		2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology
BIOL3407	Fermentation technology	6	Pass in BIOL3401 Molecular biology	N	N	---	---	60	TBC, Biological Sciences		2012 Major in Molecular Biology & Biotechnology 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology
BIOL3408	Genetics	6	Pass in BIOL2103 Biological sciences laboratory course	N	Y	---	---	100	Dr C S C Lo, Biological Sciences		2012 Major in Biochemistry 2012 Major in Biological Sciences 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Plant Science 2013 Major in Biochemistry 2013 Major in Biological Sciences 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Plant Science
BIOL3409	Business aspects of biotechnology	6	Pass in any level 2 BIOL or BIOC course	Y	Y	2	May	40	Dr W B L Lim, Biological Sciences		2012 Major in Biological Sciences 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Biological Sciences 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology
BIOL3501	Evolution	6	Pass in BIOL2306 Ecology and evolution or BIOL3408 Genetics	Y	Y	1	Dec	50	Dr M Sun, Biological Sciences		

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School of Biological Sciences (Cont'd)											
BIOL3502	Conservation genetics	6	Pass in BIOL2306 Ecology and evolution or BIOL3303 Conservation ecology or BIOL3408 Genetics	N	Y	---	---	50	Dr M Sun, Biological Sciences		
BIOL3503	Endocrinology: human physiology II	6	Pass in BIOL2103 Biological sciences laboratory course	Y	Y	2	May	120	Prof B K C Chow, Biological Sciences		
BIOL4113	Biological sciences project	12	Pass in at least 18 credits of BIOL1XXX or BIOL2XXX level courses and 18 credits of BIOL3XXX or BIOL4XXX level courses; and Cumulative GPA of 3.0 or above	N	Y	---	---	30	Prof G A Williams, Biological Sciences		
BIOL4201	Public health nutrition	6	Pass in BIOL3201 Food chemistry or BIOL3202 Nutritional biochemistry	N	Y	---	---	90	Dr J M F Wan, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL4204	Diet, brain function and behavior	6	Pass in BIOL3204 Nutrition and the life cycle	N	Y	---	---	40	Dr E T S Li, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL4205	Food processing and engineering	6	Pass in BIOL3201 Food chemistry	N	Y	---	---	70	Dr J C Y Lee, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL4207	Meat and dairy sciences	6	Pass in BIOL3201 Food chemistry	N	Y	---	---	50	Prof N P Shah, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL4209	Functional foods	6	Pass in BIOL3201 Food chemistry or BIOL3202 Nutritional biochemistry	N	Y	---	---	40	Dr M F Wang, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2012 Minor in Plant Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science 2013 Minor in Plant Science
BIOL4210	Food product development	6	Pass in BIOL3203 Food microbiology or BIOL4205 Food processing and engineering	N	Y	---	---	40	Dr M F Wang, Biological Sciences		2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science
BIOL4301	Fisheries and mariculture	6	Pass in BIOL3301 Marine biology or BIOL3304 Fish biology	N	Y	---	---	50	Prof Y J Sadovy, Biological Sciences		2012 Major in Biological Sciences 2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2012 Minor in Marine Biology 2013 Major in Biological Sciences 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity 2013 Minor in Marine Biology
BIOL4302	Environmental impact assessment	6	Pass in BIOL2103 Biological sciences laboratory course or BIOL2306 Ecology and Evolution; and Any BIOL3XXX courses or ENVS3004 Environment, society and economics	N	Y	---	---	30	Prof R S S Wu, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Major in Environmental Science 2012 Minor in Ecology & Biodiversity 2012 Minor in Environmental Science 2013 Major in Ecology & Biodiversity 2013 Major in Environmental Science 2013 Minor in Ecology & Biodiversity 2013 Minor in Environmental Science

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School of Biological Sciences (Cont'd)											
BIOL4303	Animal behaviour	6	Pass in BIOL2306 Ecology and evolution; and pass in one of the following courses: BIOL3301 Marine biology or BIOL3313 Freshwater ecology or BIOL3319 Terrestrial ecology or BIOL3320 The biology of marine mammals or ENVS3003 Demographic principles in ecology and evolution	N	Y	---	---	30	Dr L Karczmarski, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity
BIOL4305	Conservation in practice	6	Pass in BIOL3303 Conservation ecology	N	Y	---	---	30	Prof Y J Sadovy, Biological Sciences		2012 Major in Ecology & Biodiversity 2012 Minor in Ecology & Biodiversity 2013 Major in Ecology & Biodiversity 2013 Minor in Ecology & Biodiversity
BIOL4401	Medical microbiology and applied immunology	6	Pass in BIOL3403 Immunology	N	Y	---	---	80	Dr W Y Lui, Biological Sciences		2012 Major in Biological Sciences 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Biological Sciences 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology
BIOL4402	Microbial biotechnology	6	Pass in BIOL3401 Molecular biology	N	Y	---	---	60	Dr J S H Tsang, Biological Sciences	2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology	2012 Minor in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology
BIOL4409	General virology	6	Pass in BIOL3401 Molecular biology or BIOL3403 Immunology	N	Y	---	---	40	Dr B L Lim, Biological Sciences		2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology
BIOL4411	Plant and food biotechnology	6	Pass in BIOL3401 Molecular biology or BIOL3211 Nutrigenomics	N	N	---	---	80	Prof M L Chye, Biological Sciences	2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology	2012 Major in Food & Nutritional Science 2012 Minor in Food & Nutritional Science 2012 Minor in Molecular Biology & Biotechnology 2012 Minor in Plant Science 2013 Major in Food & Nutritional Science 2013 Minor in Food & Nutritional Science 2013 Minor in Molecular Biology & Biotechnology 2013 Minor in Plant Science
BIOL4415	Healthcare biotechnology	6	Pass in BIOL3401 Molecular biology	N	Y	---	---	80	Prof A S T Wong, Biological Sciences	2012 Major in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology	2012 Minor in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology
BIOL4416	Stem cells and regenerative biology	6	Pass in BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology	N	Y	---	---	---	Dr K W Y Yuen, Biological Sciences		2012 Major in Molecular Biology & Biotechnology 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Molecular Biology & Biotechnology
BIOL4417	'Omics' and systems biology	6	Pass in BIOL3401 Molecular biology or BIOL3402 Cell biology and cell technology	N	Y	---	---	---	Dr K W Y Yuen, Biological Sciences		2012 Major in Biochemistry 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Biochemistry 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Biochemistry 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Biochemistry 2013 Minor in Molecular Biology & Biotechnology
BIOL4501	Molecular phylogenetics and evolution	6	Pass in BIOL3401 Molecular biology or BIOL3408 Genetics	N	Y	---	---	25	Dr V Dvornyk, Biological Sciences		
BIOL4988	Biological sciences internship	6	Students are expected to have satisfactorily completed their Year 3 study.	N	Y	---	---	---	TBC, Biological Sciences		
ENVS1301	Environmental life science	6	NIL	Y	Y	1	Dec	40	Dr T Vengatesen, Biological Sciences		2012 Major in Environmental Science 2012 Minor in Environmental Science 2012 Minor in Marine Biology 2013 Major in Environmental Science 2013 Minor in Environmental Science 2013 Minor in Marine Biology

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School of Biological Sciences (Cont'd)											
ENVS2001	Environmental field and lab course	6	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity	Y	Y	1	No exam	50	Dr D M Baker, Biological Sciences	2013 Major in Environmental Science	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Minor in Environmental Science
ENVS2002	Environmental data analysis	6	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity	Y	Y	2	May	50	Dr T C Bonebrake, Biological Sciences	2013 Major in Environmental Science	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Minor in Environmental Science
ENVS3003	Demographic principles in ecology and evolution	6	Pass in BIOL2102 Biostatistics or CHEM2041 Principles of chemistry or EASC2404 Introduction to atmosphere and hydrosphere or BIOL2306 Ecology and evolution or STAT2601 Probability and statistics I or STAT2602 Probability and statistics II or STAT2605 Introduction to demographic and socio-economic statistics or STAT2901 Probability and statistics: foundations of actuarial science or ECON2210 Microeconomic theory or ACCT2102 Intermediate financial accounting I or MATH2101 Linear algebra I	N	Y	---	---	60	TBC, Biological Sciences		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
ENVS3019	Urban Ecology	6	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution	N	Y	---	---	50	Dr T C Bonebrake, Biological Sciences		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
ENVS3020	Global change ecology	6	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution	Y	Y	2	May	50	Dr C Dingle, Biological Sciences		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
ENVS3313	Environmental oceanography	6	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution or EASC2404 Introduction to atmosphere and hydrosphere	Y	N	2	May	---	Dr D M Baker, Biological Sciences	2012 Minor in Marine Biology 2013 Minor in Marine Biology	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
ENVS4016	Environmental science in practice	6	Satisfactorily completed Year 3 study in Environmental Science major	N	N	---	---	18	Dr M Yasuhara, Biological Sciences		
ENVS4103	Population Dynamics	6	Pass in ENVS3003 Demographic principles in ecology and evolution	N	Y	---	---	60	TBC, Biological Sciences		
ENVS4110	Environmental remediation	6	Pass in BIOL3109 Environmental microbiology or BIOL3110 Environmental toxicology or ENVS3042 Pollution	N	Y	---	---	30	Dr J D Gu, Biological Sciences		2012 Major in Environmental Science 2012 Major in Molecular Biology & Biotechnology 2012 Minor in Environmental Science 2012 Minor in Molecular Biology & Biotechnology 2013 Major in Environmental Science 2013 Major in Molecular Biology & Biotechnology 2013 Minor in Environmental Science 2013 Minor in Molecular Biology & Biotechnology
ENVS4988	Environmental science internship	6	Students are expected to have satisfactorily completion of level 3 courses.	N	Y	---	---	---	Dr C Dingle, Biological Sciences		

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Centre for Applied English Studies											
CAES1000	Core University English	6	NIL	Y	Y	1, 2	Dec, May	---	Mr S Boynton, English		
CAES9820	Academic English for science students	6	NIL	Y	Y	2	May	---	Mr S Boynton, English		
Department of Chemistry											
CHEM1041	Foundations of chemistry	6	Level 3 or above in HKDSE Combined Science with Chemistry component or Integrated Science, or equivalent. Students without such background but keen on taking this foundation chemistry course may approach the course coordinator for consideration. Not for students with Level 3 or above in HKDSE Chemistry.	Y	Y	1	Dec	150	Dr A P L Tong, Chemistry		
CHEM1042	General chemistry	6	Level 3 or above in HKDSE Chemistry or equivalent; students without Level 3 or above in HKDSE Chemistry but having a pass in CHEM1041 Foundations of chemistry may be allowed to take this course.	Y	Y	1, 2	Dec, May	255	Dr A P L Tong, Chemistry	2012 Major in Biochemistry 2012 Major in Chemistry 2012 Minor in Chemistry 2013 Major in Biochemistry 2013 Major in Chemistry 2013 Minor in Chemistry	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
CHEM2041	Principles of chemistry	6	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2341 Inorganic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2441 Organic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2541 Physical chemistry I, or have already enrolled in this course; and Not for Chemistry major students.	Y	Y	1, 2	Dec, May	140	Dr I K Chu, Chemistry		2012 Major in Environmental Science 2012 Minor in Chemistry 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Chemistry 2013 Minor in Environmental Science
CHEM2042	Principles of chemistry for pharmacy students	6	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Prinicples of chemistry, or already enrolled in this course. (This course is for BPharm students only)	N	N	---	---	30	Dr A M Y Yuen, Chemistry		
CHEM2241	Analytical chemistry I	6	Pass in CHEM1042 General chemistry	Y	Y	1, 2	Dec, May	40	Dr W T Chan, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	2012 Minor in Chemistry 2013 Minor in Chemistry
CHEM2341	Inorganic chemistry I	6	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Principles of chemistry or have already enrolled in this course.	Y	Y	1, 2	Dec, May	60	Prof V W W Yam, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	2012 Minor in Chemistry 2013 Minor in Chemistry

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Department of Chemistry (Cont'd)											
CHEM2441	Organic chemistry I	6	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Principles of chemistry or CHEM2442 Fundamental of organic chemistry or have already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Prof P Chiu, Chemistry	2012 Major in Biochemistry 2012 Major in Chemistry 2013 Major in Biochemistry 2013 Major in Chemistry	2012 Minor in Chemistry 2013 Minor in Chemistry
CHEM2442	Fundamentals of organic chemistry	6	Pass in CHEM1042 General chemistry; and Not for students who have passed CHEM2441 Organic chemistry I or have already enrolled in this course.	Y	Y	1	Dec	120	Dr P H Toy, Chemistry		2012 Minor in Chemistry 2013 Minor in Chemistry
CHEM2443	Fundamentals of organic chemistry for pharmacy students	6	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2442 Fundamentals of organic chemistry, or already enrolled in this course. (This course is for BPharm students only)	Y	Y	1	Dec	60	Dr P H Toy, Chemistry		
CHEM2541	Physical chemistry I	6	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Principles of chemistry or have already enrolled in this course.	Y	Y	1, 2	Dec, May	80	Dr J Y Tang, Chemistry	2012 Major in Biochemistry 2012 Major in Chemistry 2013 Major in Biochemistry 2013 Major in Chemistry	2012 Minor in Chemistry 2013 Minor in Chemistry
CHEM3141	Environmental chemistry	6	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Physical chemistry I	Y	Y	2	May	100	Dr W T Chan, Chemistry		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
CHEM3142	Chemical process industries and analysis	6	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Physical chemistry I	Y	Y	2	May	60	Prof G K Y Chan, Chemistry		
CHEM3143	Introduction to materials chemistry	6	Pass in CHEM 2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Physical chemistry I or CHEM2041 Principles of chemistry or CHEM2442 Fundamentals of organic chemistry	N	Y	---	---	100	Prof W K Chan, Chemistry		
CHEM3144	Directed studies in chemistry	6	Pass in CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Physical chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM3146 Principles and applications of spectroscopic techniques	N	Y	---	---	---	Prof D L Phillips, Chemistry		
CHEM3146	Principles and applications of spectroscopic and analytical techniques	6	Pass in any CHEM2XXX level course	Y	Y	2	May	110	Dr X Li, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	

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Department of Chemistry (Cont'd)											
CHEM3241	Analytical chemistry II: chemical instrumentation	6	Pass in CHEM2041 Principles of chemistry or CHEM2241 Anlytical chemistry I or CHEM3146 Principles and applications of spectroscopic techniques	Y	Y	1	Dec	80	Dr W T Chan, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
CHEM3242	Food and water analysis	6	Pass in CHEM2241 Analytical chemistry I or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Physical chemistry I or CHEM2041 Principles of chemistry; and Pass in CHEM3241 Analytical chemistry II: chemical instrumentation, or already enrolled in this course.	Y	Y	2	May	120	Prof G H Chen, Chemistry		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
CHEM3243	Introductory instrumental chemical analysis	6	Pass in CHEM2041 Principles of chemistry or CHEM2241 Analytical chemistry I; and Not for students who have passed CHEM3241 Analytical chemistry II: chemical instrumentation or have already enrolled in this course.	Y	Y	2	May	100	Dr X Li, Chemistry		
CHEM3244	Analytical techniques for pharmacy students	6	For BPharm students only; and Pass in BPHM2136 Physical chemistry: principles and applications in pharmaceutical science	N	Y	---	---	30	Dr X Li, Chemistry		
CHEM3341	Inorganic chemistry II	6	Pass in CHEM2341 Inorganic chemistry I	Y	Y	1	Dec	82	Prof V W W Yam, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	
CHEM3342	Bioinorganic chemistry	6	Pass in CHEM2341 Inorganic chemistry I	Y	Y	2	May	50	Prof H Z Sun, Chemistry		
CHEM3441	Organic chemistry II	6	Pass in CHEM2441 Organic chemistry I; and Pass in CHEM3146 Principles of applications of spectroscopic techniques, or already enrolled in this course.	Y	Y	2	May	90	Prof D Yang, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	2012 Major in Biochemistry 2013 Major in Biochemistry
CHEM3442	Organic chemistry of biomolecules	6	Pass in CHEM2442 Fundamental of organic chemistry or CHEM2443 Fundamentals of organic chemistry for pharmacy students or CHEM3441 Organic chemistry II	Y	Y	1	Dec	50	Dr P H Toy, Chemistry		
CHEM3541	Physical chemistry II: introduction to quantum chemistry	6	Pass in CHEM2541 Physical chemistry I	Y	Y	1	Dec	80	Prof A S C Cheung, Chemistry	2012 Major in Chemistry 2013 Major in Chemistry	
CHEM4141	Chemistry project	12	Pass in CHEM3241 Analytical chemistry II: chemistry instrumentation, and CHEM3341 Inorganic chemistry II, and CHEM3441 Organic chemistry II, and CHEM3541 Physical chemistry II: introduction to quantum chemistry	N	Y	---	---	---	Prof D L Phillips, Chemistry		
CHEM4142	Symmetry, group theory and applications	6	Pass in CHEM3341 Inorganic chemistry II	N	Y	---	---	60	Prof V W W Yam, Chemistry		
CHEM4143	Interfacial science and technology	6	Pass in CHEM3541 Physical chemistry II: introduction to quantum chemistry	N	Y	---	---	50	Prof G K Y Chan, Chemistry		

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Department of Chemistry (Cont'd)											
CHEM4144	Advanced materials	6	Pass in CHEM3143 Introduction to materials chemistry	N	Y	---	---	50	Prof W K Chan, Chemistry		
CHEM4145	Medicinal chemistry	6	Pass in CHEM3441 Organic chemistry II	N	Y	---	---	140	Prof H Z Sun, Chemistry		2012 Major in Biochemistry 2013 Major in Biochemistry
CHEM4146	Chemistry literacy and research	6	To be confirmed	N	Y	---	---	---	TBC, Chemistry		
CHEM4241	Modern chemical instrumentation and applications	6	Pass in CHEM3241 Analytical chemistry II: chemical instrumentation	N	Y	---	---	50	Dr I K Chu, Chemistry		
CHEM4242	Analytical chemistry	6	Pass in CHEM3241 Analytical chemistry II or CHEM3242 Food and water analysis	N	Y	---	---	50	Dr K M Ng, Chemistry		
CHEM4341	Advanced inorganic chemistry	6	Pass in CHEM3341 Inorganic chemistry II; and Pass in CHEM4142 Symmetry, group theory and applications, or already enrolled in this course.	N	Y	---	---	60	Prof C M Che, Chemistry		2012 Major in Chemistry 2013 Major in Chemistry
CHEM4342	Organometallic chemistry	6	Pass in CHEM3341 Inorganic chemistry II	N	Y	---	---	40	Prof V W W Yam, Chemistry		
CHEM4441	Advanced organic chemistry	6	Pass in CHEM3441 Organic chemistry II	N	Y	---	---	80	Prof D Yang, Chemistry		2012 Major in Chemistry 2013 Major in Chemistry
CHEM4443	Integrated organic synthesis	6	Pass in CHEM3441 Organic chemistry II	N	Y	---	---	---	Prof P Chiu, Chemistry		2012 Major in Chemistry 2013 Major in Chemistry
CHEM4444	Chemical Biology	6	Pass in CHEM3441 Organic chemistry II or BIOC3601 Metabolism	N	Y	---	---	50	Dr X C Li, Chemistry		2012 Major in Biochemistry 2012 Minor in Biochemistry 2013 Major in Biochemistry 2013 Minor in Biochemistry
CHEM4541	Physical chemistry III: statistical thermodynamics and kinetic theory	6	Pass in CHEM3541 Physical chemistry II: introduction to quantum chemistry	N	Y	---	---	40	Dr H Hu, Chemistry		2012 Major in Chemistry 2013 Major in Chemistry
CHEM4542	Computational chemistry	6	Pass in CHEM3541 Physical chemistry II: introduction to quantum chemistry or PHYS3351 Quantum mechanics; and Not for students who have passed in CHEM6109 Computational chemistry, or have already enrolled in this course.	N	Y	---	---	60	Prof G H Chen, Chemistry		
CHEM4941	HKUtopia: capstone experience for chemistry undergraduates	6	Students are expected to have satisfactorily completed all introductory chemistry core courses and at least four advanced chemistry core courses. Students who are interested in taking the course should contact the Department for application.	N	Y	---	---	---	Dr A P L Tong, Chemistry		
CHEM4988	Chemistry internship	6	Students are expected to have satisfactorily completed their Year 3 study.	N	Y	---	---	---	Dr W T Chan, Chemistry		
ENVS3042	Pollution	6	Pass in ENVS1401 Introduction to environmental science or BIOL1110 From molecules to cells or ENVS1301 Environmental life science; and CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	Y	Y	2	May	60	Dr W T Chan, Chemistry		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science

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School of Chinese											
CSCI9001	Practical Chinese for science students	6	NIL	N	Y	---	---	---	Mr K W Wong, Chinese		
Department of Earth Sciences											
EASC1020	Introduction to climate science	6	NIL	Y	Y	2	May	---	Dr Z H Liu, Earth Sciences		2012 Major in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
EASC1401	Blue planet	6	NIL	Y	Y	1, 2	Dec, May	---	Dr P Bach, Earth Sciences	2012 Major in Earth System Science 2013 Major in Earth System Science	2012 Major in Environmental Science 2012 Minor in Earth Sciences 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Earth Sciences 2013 Minor in Environmental Science
EASC1402	Principles of geology	6	NIL	Y	Y	1	Dec	---	Prof L S Chan, Earth Sciences	2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology	2012 Minor in Earth Sciences 2013 Minor in Earth Sciences
EASC1403	Geological heritage of Hong Kong	6	NIL	Y	Y	2	May	35	Prof M F Zhou, Earth Sciences		
EASC1404	Early life on earth	6	NIL	N	N	---	---	50	Dr K H Lemke, Earth Sciences		
EASC1405	Peaceful use of nuclear technologies	6	NIL	Y	Y	1	Dec	---	Dr S H Li, Earth Sciences		
EASC2401	Fluid/solid interactions in earth processes	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology	Y	Y	2	May	---	Dr K Lemke, Earth Sciences	2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology	2012 Minor in Earth Sciences 2013 Minor in Earth Sciences
EASC2402	Field methods	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology	Y	Y	1	Dec	---	Dr P Bach, Earth Sciences	2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology	
EASC2404	Introduction to atmosphere and hydrosphere	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology	Y	Y	1	Dec	50	Dr J R Ali, Earth Sciences	2012 Major in Earth System Science 2013 Major in Earth System Science	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Minor in Environmental Science
EASC2406	Geochemistry	6	Pass in EASC1402 Principles of geology	Y	Y	1	Dec	---	Dr S H Li, Earth Sciences	2012 Major in Geology 2013 Major in Geology	
EASC2407	Mineralogy	6	Pass in EASC1402 Principles of geology	Y	Y	1	Dec	30	Prof M Sun, Earth Sciences	2012 Major in Geology 2013 Major in Geology	
EASC2408	Planetary geology	6	Pass in EASC1401 Blue planet or EASC1402 Principles of geology or PHYS1650 Nature of the universe	Y	Y	2	May	---	Dr M H Lee, Earth Sciences	2012 Major in Astronomy 2013 Major in Astronomy	
EASC3020	Global change: anthropogenic impacts	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere or ENVS2001 Environmental field and lab course	N	Y	---	---	---	Dr Z H Liu, Earth Sciences		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
EASC3400	Directed studies in earth sciences	6	Pass in at least 18 credits of EASC2XXX level courses; and GPA of 2.5 or above	N	Y	---	---		Prof M Sun, Earth Sciences		2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology
EASC3402	Petrology	6	Pass in EASC2407 Mineralogy	Y	Y	2	May	---	Prof G C Zhao, Earth Sciences	2012 Major in Geology 2013 Major in Geology	
EASC3403	Sedimentary environments	6	Pass in EASC3402 Petrology	Y	Y	2	May	---	Dr S C Chang, Earth Sciences	2012 Major in Geology 2013 Major in Geology	2012 Major in Earth System Science 2013 Major in Earth System Science
EASC3404	Structural geology	6	Pass in EASC2402 Field methods and EASC3402 Petrology	Y	Y	1	Dec	40	Dr J R Ali, Earth Sciences	2012 Major in Geology 2013 Major in Geology	
EASC3405	Earth observation	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere	N	Y	---	---	---	TBC, Earth Sciences	2012 Major in Earth System Science 2013 Major in Earth System Science	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science

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Department of Earth Sciences (Cont'd)											
EASC3406	Reconstruction of past climate	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere	Y	N	2	May	---	Dr S H Li, Earth Sciences		2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology
EASC3408	Geophysics	6	Pass in EASC2401 Fluid/solid interactions in earth processes or EASC2402 Field methods or PHYS2250 Introductory mechanics	Y	Y	2	May	---	Prof L S Chan, Earth Sciences	2012 Major in Geology 2013 Major in Geology	2012 Major in Earth System Science 2013 Major in Earth System Science
EASC3409	Igneous and metamorphic petrogenesis	6	Pass in EASC3402 Petrology	N	Y	---	---	30	Prof M Sun, Earth Sciences	2012 Major in Geology 2013 Major in Geology	
EASC3410	Hydrogeology	6	Pass in EASC2402 Field methods	Y	Y	1	Dec	40	Prof J J Jiao, Earth Sciences		2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology
EASC3411	Solid earth, ocean, atmosphere interactions	6	Pass in EASC2404 Introduction to atmoshpere and hydrosphere	N	Y	---	---	---	TBC, Earth Sciences	2012 Major in Earth System Science 2013 Major in Earth System Science	
EASC3412	Earth resources	6	Pass in EASC3402 Petrology	Y	Y	1	Dec	40	Prof M F Zhou, Earth Sciences		2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology
EASC3413	Engineering geology	6	Pass in EASC3410 Hydrogeology, or already enrolled in this course	Y	Y	2	May	40	Prof J J Jiao, Earth Sciences		2012 Major in Geology 2013 Major in Geology
EASC3414	Soil and rock mechanics	6	Pass in EASC3410 Hydrogeology, or already enrolled in this course	Y	Y	2	May	40	Prof J J Jiao, Earth Sciences		2012 Major in Geology 2013 Major in Geology
EASC3415	Metereology	6	Pass in EASC2404 Introduction to atmosphere and hydrosphere	Y	Y	1	Dec	---	Dr Z H Liu, Earth Sciences		
EASC3416	Advanced geochemistry	6	Pass in EASC2407 Mineralogy	N	Y	---	---	50	TBC, Earth Sciences		
EASC4400	Earth sciences project	12	Pass in at least 18 credits of EASC3XXX level or EASC4XXX level courses; and GPA of 3.0 or above	N	Y	---	---		Prof M Sun, Earth Sciences		2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology
EASC4401	Integrated field studies	6	Pass in EASC3403 Sedimentary environments, EASC3404 Structural geology, EASC3409 Igneous and metamorphic petrogenesis	N	Y	---	---	---	TBC, Earth Sciences		
EASC4403	Biogeochemical cycles	6	Pass in EASC3411 Solid earth, ocean, atmosphere interactions	N	Y	---	---	---	TBC, Earth Sciences	2012 Major in Earth System Science 2013 Major in Earth System Science	
EASC4404	Earth system history	6	Pass in EASC3411 Solid earth, ocean, atmosphere interactions	Y	Y	1	Dec	---	Prof J G Malpas, Earth Sciences	2012 Major in Earth System Science 2013 Major in Earth System Science	
EASC4405	Earth system: contemporary issues	6	Pass in EASC3405 Earth observation or EASC3411 Solid earth, ocean, atmosphere interactions	N	Y	---	---	---	TBC, Earth Sciences		
EASC4406	Earth dynamics	6	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3408 Geophysics or EASC3409 Igneous and metamorphic petrogenesis	Y	Y	2	May	---	Prof J G Malpas, Earth Sciences	2012 Major in Geology 2013 Major in Geology	
EASC4407	Regional geology	6	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3409 Igneous and metamorphic petrogenesis	Y	N	1	Dec	40	Dr J R Ali, Earth Sciences		2012 Major in Geology 2013 Major in Geology

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Department of Earth Sciences (Cont'd)											
EASC4408	Special topics in earth sciences	6	Pass in any EASC3XXX or EASC4XXX course	N	N	---	---	---	TBC, Earth Sciences		2012 Major in Earth System Science 2012 Major in Geology 2013 Major in Earth System Science 2013 Major in Geology
EASC4988	Earth sciences internship	6	Students are expected to have satisfactorily completed their Year 2 study.	N	Y	---	---		Prof L S Chan, Earth Sciences		
ENVS1401	Introduction to environmental science	6	NIL	Y	Y	1	Dec	---	Dr C Dingle, Earth Sciences	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science	
ENVS3004	Environment, society and economics	6	Pass in ENVS2001 environmental field & lab course or ENVS2002 Environmental data analysis or EASC2404 Introduction to atmosphere and hydrosphere or CHEM2041 Principles of chemistry	Y	Y	2	May	---	Prof Y Q Zong, Earth Sciences	2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science	
ENVS3007	Natural hazards and mitigation	6	Pass in ENVS1401 Introduction to environmental science; and either ENVS2001 Environmental field and lab course, ENVS2002 Environmental data analysis or EASC2404 Introduction to atmosphere and hydrosphere	N	Y	---	---	---	Prof Y Q Zong, Earth Sciences		2012 Major in Earth System Science 2012 Major in Environmental Science 2012 Major in Geology 2012 Minor in Environmental Science 2013 Major in Earth System Science 2013 Major in Environmental Science 2013 Major in Geology 2013 Minor in Environmental Science
ENVS3018	Directed studies in environmental science	6	Pass in 36 credits of introductory courses in the major in environmental science. GPA 2.5 or above in Year 2 courses.	N	Y	---	---	---	Prof Y Q Zong, Earth Sciences		
ENVS4015	Environmental science project	6	Pass in at least 18 credits of advanced level courses in Environmental Science major; and Students must have a GPA of 3.0 or above; and Major in Environmental Science.	N	N	---	---	---	Prof Y Q Zong, Earth Sciences		
Department of Mathematics											
MATH1011	University mathematics I	6	Level 2 or above in HKDSE Mathematics or equivalent; and Not for students with Level 2 or above in Module 1 or Module 2 of HKDSE Mathematics or equivalent.	Y	Y	1, 2	Dec, May	---	Dr K H Law, Mathematics		
MATH1013	University mathematics II	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I; and Not for students who have passed MATH1821 Mathematical methods for actuarial science I, or have already enrolled in this course.	Y	Y	1, 2	Dec, May	560	Dr Y M Chan, Mathematics	2012 Major in Mathematics 2012 Major in Mathematics/Physics 2012 Major in Risk Management 2012 Major in Statistics 2012 Minor in Computational & Financial Mathematics 2012 Minor in Mathematics 2013 Major in Mathematics 2013 Major in Mathematics/Physics 2013 Major in Risk Management 2013 Major in Statistics 2013 Minor in Computational & Financial Mathematics 2013 Minor in Mathematics	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
MATH1641	Mathematical laboratory and modeling	6	NIL	N	Y	---	---	20	TBC, Mathematics		

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Department of Mathematics (Cont'd)											
MATH1821	Mathematical methods for actuarial science I	6	Level 4 or above in HKDSE Mathematics plus Module 1, or Level 4 or above in HKDSE Mathematics plus Module 2, or equivalent; and Not for students who have passed MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics), or have already enrolled in these courses.	Y	Y	1	Dec	---	Dr J T Chan, Mathematics	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	
MATH1851	Calculus and ordinary differential equations	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University Mathematics I (This course is exclusive for Engineering students.)	Y	Y	1, 2	Dec, May	560	Dr S Wu, Mathematics		
MATH1853	Linear algebra, probability and statistics	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University Mathematics I (This course is exclusively for Engineering students.)	Y	Y	1, 2	Dec, May	560	Dr W K Ching, Mathematics		
MATH2012	Fundamental concepts of mathematics	6	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics)	Y	Y	1, 2	Dec, May	---	Dr Y M Chan, Mathematics	2012 Major in Mathematics 2013 Major in Mathematics	
MATH2101	Linear algebra I	6	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics)	Y	Y	1, 2	Dec, May	---	Dr K H Law, Mathematics	2012 Major in Mathematics 2012 Major in Mathematics/Physics 2012 Minor in Computational & Financial Mathematics 2012 Minor in Mathematics 2013 Major in Mathematics 2013 Major in Mathematics/Physics 2013 Minor in Computational & Financial Mathematics 2013 Minor in Mathematics	
MATH2102	Linear algebra II	6	Pass in MATH2101 Linear algebra I or MATH2822 Mathematical methods for actuarial science II	Y	Y	1, 2	Dec, May	---	Dr Y K Lau, Mathematics	2012 Major in Mathematics 2013 Major in Mathematics	
MATH2211	Multivariable calculus	6	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics)	Y	Y	1, 2	Dec, May	---	Dr J Fullwood, Mathematics	2012 Major in Mathematics 2012 Major in Mathematics/Physics 2012 Minor in Computational & Financial Mathematics 2012 Minor in Mathematics 2013 Major in Mathematics 2013 Major in Mathematics/Physics 2013 Minor in Computational & Financial Mathematics 2013 Minor in Mathematics	
MATH2241	Introduction to mathematical analysis	6	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics) or MATH2822 Mathematical methods for actuarial science II	Y	Y	1, 2	Dec, May	---	Dr J T Chan, Mathematics	2012 Major in Mathematics 2013 Major in Mathematics	

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Mathematics (Cont'd)											
MATH2822	Mathematical methods for actuarial science II	6	Pass in MATH1821 Mathematical methods for actuarial science I	Y	Y	2	May	---	Dr J T Chan, Mathematics	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	
MATH3001	Development of mathematical ideas	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis	N	N	---	---	---	TBC, Mathematics		
MATH3002	Mathematics seminar	6	Pass in MATH2012 Fundamental concepts of mathematics, MATH2101 Linear algebra I, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis	Y	Y	2	May	12	Dr T W Ng, Mathematics		
MATH3301	Algebra I	6	Pass in MATH2101 Linear algebra I and MATH2102 Linear algebra II	Y	Y	1	Dec	---	Prof J T Yu, Mathematics	2012 Major in Mathematics 2012 Major in Mathematics/Physics 2013 Major in Mathematics 2013 Major in Mathematics/Physics	
MATH3303	Matrix theory and its applications	6	Pass in MATH2101 Linear algebra I and MATH2102 Linear algebra II	Y	Y	1	Dec	---	Dr Y K Lau, Mathematics		
MATH3304	Introduction to number theory	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis; and Pass in MATH3301 Algebra I, or already enrolled in this course.	Y	Y	2	May	---	Dr Y K Lau, Mathematics		
MATH3401	Analysis I	6	Pass in MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis	Y	Y	1	Dec	---	Prof W S Cheung, Mathematics	2012 Major in Mathematics 2012 Major in Mathematics/Physics 2013 Major in Mathematics 2013 Major in Mathematics/Physics	
MATH3403	Functions of a complex variable	6	Pass in MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis	Y	Y	1	Dec	---	Prof N Mok, Mathematics	2012 Major in Mathematics 2013 Major in Mathematics	
MATH3405	Differential equations	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	2	May	---	Prof J H Lu, Mathematics		
MATH3408	Computational methods and differential equations with applications	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	2	May	---	Dr C W Wong, Mathematics		2012 Major in Environmental Science 2012 Minor in Computational & Financial Mathematics 2013 Major in Environmental Science 2013 Minor in Computational & Financial Mathematics

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Department of Mathematics (Cont'd)											
MATH3600	Discrete mathematics	6	Pass in (MATH1013 University mathematics II and any 1 of Level 2 MATH courses) or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics and any 1 of level 2 MATH courses) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	1	Dec	---	Prof W Zang, Mathematics		
MATH3601	Numerical analysis	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	1	Dec	---	Dr K H Chan, Mathematics	2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics	
MATH3603	Probability theory	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	1	Dec	---	Dr G Han, Mathematics		2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics
MATH3888	Directed studies in mathematics	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis	N	Y	---	---	---	Prof J H Lu, Mathematics		
MATH3901	Operations research I	6	Pass in MATH2101 Linear algebra I or MATH2102 Linear algebra II or equivalent	Y	Y	1	Dec	---	Prof S C K Chu, Mathematics		
MATH3904	Introduction to optimization	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	2	May	---	Prof W Zang, Mathematics		2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics
MATH3905	Queueing theory and simulation	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	2	May	---	Dr W K Ching, Mathematics		
MATH3906	Financial calculus	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	1	Dec	---	Dr S P Yung, Mathematics	2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics	

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Department of Mathematics (Cont'd)											
MATH3911	Game theory and strategy	6	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)	Y	Y	2	May	---	Dr K H Law, Mathematics		2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics
MATH3943	Network models in operations research	6	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus; and Pass in MATH3901 Operations research I, or already enrolled in this course	Y	Y	2	May	---	Prof S C K Chu, Mathematics		
MATH4302	Algebra II	6	Pass in MATH3301 Algebra I	Y	Y	2	May	---	Prof J T Yu, Mathematics		
MATH4402	Analysis II	6	Pass in MATH3401 Analysis I	Y	Y	2	May	---	Dr P P W Wong, Mathematics		
MATH4404	Functional analysis	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis and MATH3401 Analysis I	Y	Y	2	May	---	Dr C W Wong, Mathematics		
MATH4406	Introduction to partial differential equations	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2241 Introduction to mathematical analysis; and Pass in MATH3405 Differential equations, or already enrolled in this course	Y	Y	1	Dec	---	Dr S Wu, Mathematics		
MATH4501	Geometry	6	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II and MATH3401 Analysis I	Y	Y	1	Dec	---	Dr P P W Wong, Mathematics	2012 Major in Mathematics/Physics 2013 Major in Mathematics/Physics	
MATH4511	Introduction to differentiable manifolds	6	Pass in MATH4402 Analysis II and MATH4501 Geometry, or already enrolled in these courses	Y	Y	2	May	---	Dr P P W Wong, Mathematics		
MATH4602	Scientific computing	6	Pass in MATH3601 Numerical analysis	Y	N	2	May	---	Dr W K Ching, Mathematics		2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics
MATH4902	Operations research II	6	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus; and Pass in MATH3901 Operations research I, or already enrolled in this course	Y	N	2	May	---	Prof S C K Chu, Mathematics		
MATH4907	Numerical methods for financial calculus	6	Pass in MATH3906 Financial calculus	Y	Y	2	May	---	Dr C W Wong, Mathematics		2012 Minor in Computational & Financial Mathematics 2013 Minor in Computational & Financial Mathematics
MATH4988	Mathematics internship	6	Students are expected to have satisfactorily completed their Year 3 study.	N	Y	---	---	---	Dr T W Ng, Mathematics		
MATH4999	Mathematics project	12	Pass in MATH3301 Algebra I and MATH3401 Analysis I	N	Y	---	---	---	Prof J H Lu, Mathematics		
MATH6501	Topics in algebra	6	Pass in MATH4302 Algebra II	Y	Y	2	May	---	Prof J T Yu, Mathematics		
MATH6502	Topics in applied discrete mathematics	6	Pass in MATH3301 Algebra I and MATH3600 Discrete mathematics	N	Y	---	---	---	TBC, Mathematics		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Mathematics (Cont'd)											
MATH6503	Topics in mathematical programming and optimization	6	Pass in MATH3901 Operations research I, MATH3904 Introduction to optimization and MATH4902 Operations research II	Y	N	1	Dec	---	Prof W Zang, Mathematics		
MATH6504	Geometric topology	6	Pass in MATH3301 Algebra I and MATH3401 Analysis I	Y	Y	2	May	---	Dr Z Hua, Mathematics		
MATH6505	Real analysis	6	Pass in MATH3401 Analysis I	Y	Y	2	May	---	Prof K M Tsang, Mathematics		
Department of Physics											
PHYS1050	Physics for engineering students	6	Level 3 or above in HKDSE Physics or Combined Science with Physics components or equivalent (This course is exclusive for Engineering students.)	Y	Y	1, 2	Dec, May	---	Prof M H Xie, Physics		
PHYS1055	How things work	6	NIL	Y	Y	2	May	---	Dr M K Yip, Physics		
PHYS1056	Weather and climate	6	NIL	Y	Y	1	Dec	---	Dr K M Lee, Physics		
PHYS1057	Kitchen science	6	NIL	N	N	---	---	---	Prof A B Djurisic, Physics		
PHYS1150	Problem solving in physics	6	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course.	Y	Y	2	May	---	Dr K M Lee, Physics	2012 Major in Physics 2013 Major in Physics	
PHYS1240	Physics by inquiry	6	NIL Not for students with level 3 or above in HKDSE Physics; and Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course; and Not for students who have passed in PHYS1250 Fundamental physics or already enrolled in this course.	Y	Y	1	Dec	---	Dr J C S Pun, Physics		
PHYS1250	Fundamental physics	6	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course; Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Dr M K Yip, Physics	2012 Major in Astronomy 2012 Major in Mathematics/Physics 2012 Major in Physics 2012 Minor in Astronomy 2012 Minor in Physics 2013 Major in Astronomy 2013 Major in Mathematics/Physics 2013 Major in Physics 2013 Minor in Astronomy 2013 Minor in Physics	
PHYS1650	Nature of the universe	6	NIL	Y	Y	1, 2	Dec, May	---	Dr K M Lee, Physics	2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy	

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Physics (Cont'd)											
PHYS2055	Introduction to relativity	6	Pass in PHYS1250 Fundamental physics or PHYS1150 Problem solving in physics or PHYS1050 Physics for engineering students	Y	Y	2	May	---	Dr K M Lee, Physics		
PHYS2150	Methods in physics I	6	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations	Y	Y	1	Dec	---	Dr F K Chow, Physics		
PHYS2155	Methods in physics II	6	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations	Y	Y	2	May	---	Dr F C C Ling, Physics		
PHYS2250	Introductory mechanics	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	1, 2	Dec, May	---	Dr M K Yip, Physics	2012 Major in Astronomy 2012 Major in Mathematics/Physics 2012 Major in Physics 2012 Minor in Physics 2013 Major in Astronomy 2013 Major in Mathematics/Physics 2013 Major in Physics 2013 Minor in Physics	
PHYS2255	Introductory electricity and magnetism	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	2	May	---	Dr J C S Pun, Physics	2012 Major in Astronomy 2012 Major in Physics 2013 Major in Astronomy 2013 Major in Physics	
PHYS2260	Heat and waves	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	1	Dec	---	Dr F C C Ling, Physics	2012 Major in Physics 2013 Major in Physics	
PHYS2265	Modern physics	6	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students	Y	Y	1, 2	Dec, May	---	Dr F K Chow, Physics	2012 Major in Astronomy 2012 Major in Mathematics/Physics 2012 Major in Physics 2012 Minor in Astronomy 2012 Minor in Physics 2013 Major in Astronomy 2013 Major in Mathematics/Physics 2013 Major in Physics 2013 Minor in Astronomy 2013 Minor in Physics	
PHYS2850	Atomic and nuclear physics	6	Pass in PHYS2265 Modern physics	Y	Y	2	May	---	Dr S Z Zhang, Physics		
PHYS3150	Theoretical physics	6	Pass in PHYS2250 Introductory mechanics or PHYS2255 Introductory electricity and magnetism or PHYS2265 Modern physics; and (PHYS2150 Methods in physics I and PHYS2155 Methods in physics II) or (MATH2101 Linear algebra I and MATH2211 Multivariable calculus)	N	Y	---	---	---	TBC, Physics		

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Physics (Cont'd)											
PHYS3350	Classical mechanics	6	Pass in PHYS2250 Introductory mechanics	N	Y	---	---	---	TBC, Physics	2012 Major in Mathematics/Physics 2012 Major in Physics 2013 Major in Mathematics/Physics 2013 Major in Physics	
PHYS3351	Quantum mechanics	6	Pass in PHYS2265 Modern physics	N	Y	---	---	---	TBC, Physics	2012 Major in Mathematics/Physics 2012 Major in Physics 2013 Major in Mathematics/Physics 2013 Major in Physics	
PHYS3450	Electromagnetism	6	Pass in PHYS2255 Introductory electricity and magnetism	N	Y	---	---	---	TBC, Physics	2012 Major in Physics 2013 Major in Physics	
PHYS3550	Statistical mechanics & thermodynamics	6	Pass in PHYS2260 Heat and waves	N	Y	---	---	---	TBC, Physics	2012 Major in Physics 2013 Major in Physics	
PHYS3551	Introductory solid state physics	6	Pass in PHYS2255 Introductory electricity and magnetism; and PHYS2260 Heat and waves; and PHYS2265 Modern physics	N	Y	---	---	---	TBC, Physics		
PHYS3650	Observational astronomy	6	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2255 Introductory electricity and magnetism or PHYS2265 Modern physics)	N	Y	---	---	---	TBC, Physics	2012 Major in Astronomy 2013 Major in Astronomy	2012 Minor in Astronomy 2013 Minor in Astronomy
PHYS3651	The physical universe	6	Pass in PHYS1650 Nature of the universe and (PHYS2250 Introductory mechanics or PHYS2255 Introductory electricity and magnetism or PHYS2265 Modern physics)	N	Y	---	---	---	TBC, Physics	2012 Major in Astronomy 2013 Major in Astronomy	2012 Minor in Astronomy 2013 Minor in Astronomy
PHYS3652	Principles of astronomy	6	Pass in PHYS2250 Introductory mechanics or PHYS2255 Introductory electricity and magnetism	N	Y	---	---	---	TBC, Physics	2012 Major in Astronomy 2013 Major in Astronomy	2012 Minor in Astronomy 2013 Minor in Astronomy
PHYS3750	Laser and spectroscopy	6	Pass in PHYS3351 Quantum mechanics and PHYS3850 Waves and optics; and Pass in PHYS3551 Introductory solid state physics, or already enrolled in this course.	N	Y	---	---	---	TBC, Physics		
PHYS3751	Physics of nanomaterials	6	Pass in PHYS3351 Quantum mechanics, and Pass in PHYS3551 Introductory solid state physics, or already enrolled in this course.	N	Y	---	---	---	TBC, Physics		
PHYS3850	Waves and optics	6	Pass in PHYS2255 Introductory electricity and magnetism; and PHYS2260 Heat and waves	N	Y	---	---	---	TBC, Physics		
PHYS3950	Directed studies in physics	6	Pass in any two of the following courses: PHYS2250 Introductory mechanics, PHYS2255 Introductory electricity and magnetism, PHYS2260 Heat and waves, PHYS2265 Modern physics	N	Y	---	---	---	TBC, Physics		

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Department of Physics (Cont'd)											
PHYS4150	Computational physics	6	Pass in any three of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics & thermodynamics	N	N	---	---	---	TBC, Physics		
PHYS4151	Data analysis and modeling in physics	6	Pass in (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations); and Any one of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics & thermodynamics.	N	N	---	---	---	Prof H F Chau, Physics		
PHYS4350	Advanced classical mechanics	6	Pass in PHYS3350 Classical mechanics and (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations)	N	N	---	---	---	TBC, Physics		
PHYS4351	Advanced quantum mechanics	6	Pass in PHYS3351 Quantum mechanics or (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations)	N	N	---	---	---	TBC, Physics	2012 Major in Mathematics/Physics 2013 Major in Mathematics/Physics	
PHYS4450	Advanced electromagnetism	6	Pass in PHYS3450 Electromagnetism; and PHYS2265 Modern physics; and (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations)	N	N	---	---	---	TBC, Physics		
PHYS4550	Advanced statistical mechanics and thermodynamics	6	Pass in PHYS3550 Statistical mechanics & thermodynamics; and (PHYS3150 Theoretical physics or MATH3301 Algebra I or MATH3401 Analysis I or MATH3403 Functions of a complex variable or MATH3405 Differential equations)	N	N	---	---	---	TBC, Physics		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
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Department of Physics (Cont'd)											
PHYS4650	Stellar physics	6	Pass in PHYS3351 Quantum mechanics or PHYS3450 Electromagnetism or PHYS3550 Statistical mechanics & thermodynamics or PHYS3651 The physical universe	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
PHYS4651	Selected topics in astrophysics	6	Pass in PHYS3351 Quantum mechanics; and PHYS3450 Electromagnetism; and PHYS3550 Statistical mechanics & thermodynamics	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
PHYS4652	Planetary science	6	Pass in PHYS3350 Classical mechanics or PHYS3550 Statistical mechanics & thermodynamics	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
PHYS4653	Cosmology	6	Pass in PHYS3651 The physical universe or PHYS3652 Principles of astronomy	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
PHYS4654	General relativity	6	Pass in PHYS2055 Introduction to relativity; and PHYS3350 Classical mechanics; and PHYS3351 Quantum mechanics; and PHYS3450 Electromagnetism	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
PHYS4655	Interstellar medium	6	Pass in PHYS3351 Quantum mechanics; and PHYS3550 Statistical mechanics & thermodynamics; and PHYS3652 Principles of astronomy	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
PHYS4750	Experimental physics	6	To be confirmed	N	N	---	---	---	TBC, Physics		
PHYS4950	Physics project	6	Pass in any three of the following courses: PHYS3350 Classical mechanics, PHYS3351 Quantum mechanics, PHYS3450 Electromagnetism, PHYS3550 Statistical mechanics & thermodynamics	N	N	---	---	---	TBC, Physics		
PHYS4952	Research methods in physics	6	Pass in PHYS2250 Introductory mechanics; and PHYS2255 Introductory electricity and magnetism; and PHYS2260 Heat and waves; and PHYS2265 Modern physics	N	N	---	---	---	TBC, Physics		
PHYS4988	Physics internship	6	Students are expected to have satisfactorily completed their Year 3 study.	N	Y	---	---	---	TBC, Physics		
PHYS6350	Graduate classical mechanics	6	To be confirmed	N	N	---	---	---	TBC, Physics		
PHYS6351	Graduate quantum mechanics	6	To be confirmed	N	N	---	---	---	TBC, Physics		
PHYS6450	Graduate electromagnetism	6	To be confirmed	N	N	---	---	---	TBC, Physics		

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Physics (Cont'd)											
PHYS6550	Graduate statistical mechanics and thermodynamics	6	To be confirmed	N	N	---	---	---	TBC, Physics		
PHYS6551	Solid state physics	6	To be confirmed	N	N	---	---	---	TBC, Physics		
PHYS6650	Stellar atmospheres	6	To be confirmed	N	N	---	---	---	TBC, Physics		2012 Major in Astronomy 2012 Minor in Astronomy 2013 Major in Astronomy 2013 Minor in Astronomy
ENVS3006	Environmental radiation	6	Pass in PHYS2265 Modern physics or CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	N	Y	---	---	---	Dr J K C Leung, Physics		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
ENVS3010	Sustainable energy and environment	6	Pass in PHYS2260 Heat and waves or CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis	N	N	---	---	---	Prof A B Djurisic, Physics		2012 Major in Environmental Science 2012 Minor in Environmental Science 2013 Major in Environmental Science 2013 Minor in Environmental Science
Faculty of Science											
SCNC1111	Scientific method and reasoning	6	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)	Y	Y	1, 2	Dec, May	---	Dr N K Tsing, Mathematics	2012 Major in Astronomy 2012 Major in Biochemistry 2012 Major in Biological Sciences 2012 Major in Chemistry 2012 Major in Earth System Science 2012 Major in Ecology & Biodiversity 2012 Major in Environmental Science 2012 Major in Food & Nutritional Science 2012 Major in Geology 2012 Major in Mathematics 2012 Major in Mathematics/Physics 2012 Major in Molecular Biology & Biotechnology 2012 Major in Physics 2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Astronomy 2013 Major in Biochemistry 2013 Major in Biological Sciences 2013 Major in Chemistry 2013 Major in Earth System Science 2013 Major in Ecology & Biodiversity 2013 Major in Environmental Science 2013 Major in Food & Nutritional Science 2013 Major in Geology 2013 Major in Mathematics 2013 Major in Mathematics/Physics 2013 Major in Molecular Biology & Biotechnology 2013 Major in Physics 2013 Major in Risk Management 2013 Major in Statistics	

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Faculty of Science (Cont'd)											
SCNC1112	Fundamentals of modern science	6	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)	Y	Y	1, 2	Dec, May	---	Dr J C S Pun, Physics	2012 Major in Astronomy 2012 Major in Biochemistry 2012 Major in Biological Sciences 2012 Major in Chemistry 2012 Major in Earth System Science 2012 Major in Ecology & Biodiversity 2012 Major in Environmental Science 2012 Major in Food & Nutritional Science 2012 Major in Geology 2012 Major in Mathematics 2012 Major in Mathematics/Physics 2012 Major in Molecular Biology & Biotechnology 2012 Major in Physics 2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Astronomy 2013 Major in Biochemistry 2013 Major in Biological Sciences 2013 Major in Chemistry 2013 Major in Earth System Science 2013 Major in Ecology & Biodiversity 2013 Major in Environmental Science 2013 Major in Food & Nutritional Science 2013 Major in Geology 2013 Major in Mathematics 2013 Major in Mathematics/Physics 2013 Major in Molecular Biology & Biotechnology 2013 Major in Physics 2013 Major in Risk Management 2013 Major in Statistics	
SCNC2121	Sustainable food production	6	Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will also need to pass an interview in order to be enrolled in the course.	Y	Y	S	No exam	32	Dr H S El-Nezami, Biological Sciences		
SCNC2122	Marine life sience: a North East Pacific perspective	6	Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will need to pass an interview in order to be enrolled in the course.	Y	Y	S	No exam	32	Dr T Vengatesen, Biological Sciences		
Department of Statistics and Actuarial Science											
STAT1600	Statistics: ideas and concepts	6	NIL	Y	Y	1, 2	Dec, May	---	Dr E A L Li, Statistics and Actuarial Science	2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics	
STAT1601	Elementary statistical methods	6	Level 2 or above in HKDSE Mathematics or equivalent; and Not for students with Level 2 or above in HKDSE Mathematics Extended Module 1 or 2; and Not for students who have passed or already enrolled in any of the following courses: STAT2901 Probability and statistics: foundations of actuarial science, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, ECON1280 Analysis of economic data	Y	Y	1, 2	Dec, May	---	Mrs G M Jing, Statistics and Actuarial Science		2012 Major in Environmental Science 2012 Minor in Risk Management 2012 Minor in Statistics 2013 Major in Environmental Science 2013 Minor in Risk Management 2013 Minor in Statistics

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT1602	Business statistics	6	NIL Not for students who have passed or already enrolled in any of the following courses: STAT1601 Elementary statistical methods, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science, ECON1280 Analysis of economic data (This course is exclusive for School of Business students.)	Y	Y	1, 2	Dec, May	---	Dr R W L Wong, Statistics and Actuarial Science		2012 Minor in Risk Management 2012 Minor in Statistics 2013 Minor in Risk Management 2013 Minor in Statistics
STAT1603	Introductory statistics	6	(Level 2 or above in HKDSE Mathematics Extended Module 1 or 2 or equivalent) or (Pass in MATH1011 University Mathematics I, or already enrolled in this course); and Not for students who have passed or already enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science	Y	Y	1	Dec	---	Dr E K F Lam, Statistics and Actuarial Science		2012 Major in Environmental Science 2012 Minor in Risk Management 2012 Minor in Statistics 2013 Major in Environmental Science 2013 Minor in Risk Management 2013 Minor in Statistics
STAT2601	Probability and statistics I	6	Pass in MATH1013 University mathematics II, or already enrolled in this course; or Pass in MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics; and Not for students who have passed in STAT1603 Introductory statistics, or already enrolled in this course; Not for students who have passed in STAT2901 Probability and statistics: foundations of actuarial science, or already enrolled in this course; and Not for BSc(ActuarSc) students.	Y	Y	1, 2	Dec, May	---	Dr K P Wat, Statistics and Actuarial Science	2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics	2012 Minor in Actuarial Studies 2012 Minor in Risk Management 2012 Minor in Statistics 2013 Minor in Actuarial Studies 2013 Minor in Risk Management 2013 Minor in Statistics
STAT2602	Probability and statistics II	6	Pass in STAT2601 Probability and statistics I	Y	Y	1, 2	Dec, May	---	Dr K S Chong, Statistics and Actuarial Science	2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics	2012 Minor in Actuarial Studies 2012 Minor in Risk Management 2012 Minor in Statistics 2013 Minor in Actuarial Studies 2013 Minor in Risk Management 2013 Minor in Statistics
STAT2603	Data management with SAS	6	Pass in STAT1600 Statistics: ideas and concepts, or already enrolled in this course	Y	Y	1, 2	Dec, May	---	Dr C W Kwan, Statistics and Actuarial Science	2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics	2012 Minor in Risk Management 2012 Minor in Statistics 2013 Minor in Risk Management 2013 Minor in Statistics

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				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT2605	Introduction to demographic and socio-economic statistics	6	(Level 2 or above in HKDSE Mathematics or Level 2 or above in HKDSE Mathematics Exended Module 1 or 2 or equvialent); and Pass in or already enrolled in any of these courses: BIOL2102 Biostatistics, ECON1280 Analysis of economic data, STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science	Y	Y	2	May	---	Ms L M S Kwan, Statistics and Actuarial Science		2012 Minor in Actuarial Studies 2012 Minor in Statistics 2013 Minor in Actuarial Studies 2013 Minor in Statistics
STAT2901	Probability and statistics: foundations of actuarial science	6	(Pass in MATH1821 Mathematical methods for actuarial science I (for BSc(ActuarSc) students) or already enrolled in this course) or (Pass in MATH1013 University mathematics II or already enrolled in this course (for students outside the BSc(ActuarSc) programme); and Not for students who have passed or enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics	Y	Y	2	May	---	Dr Y K Chung, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
STAT2902	Financial mathematics	6	Pass in STAT2901 Probability and statistics: foundations of actuarial science or already enrolled in this course; and Not for students who have passed in STAT3615 Practical mathematics for investment, or already enrolled in this course.	Y	Y	2	May	---	Prof K C Yuen, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	
STAT3600	Linear statistical analysis	6	Pass in STAT2602 Probability and statistics II; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Prof T W K Fung, Statistics and Actuarial Science	2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics	2012 Minor in Statistics 2013 Minor in Statistics
STAT3602	Statistical inference	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models	Y	Y	1	Dec	---	Prof S M S Lee, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2012 Major in Statistics 2012 Minor in Statistics 2013 BSc in Actuarial Science 2013 Major in Statistics 2013 Minor in Statistics
STAT3603	Probability modelling	6	Pass in STAT2601 Probability and statistics I; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3903 Stochastic models, or have already enrolled in this course.	Y	Y	1	Dec	---	Dr K S Chong, Statistics and Actuarial Science		2012 Major in Risk Management 2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Risk Management 2013 Major in Statistics 2013 Minor in Statistics

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Department of Statistics & Actuarial Science (Cont'd)											
STAT3604	Design and analysis of experiments	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3611 Computer-aided data analysis	Y	Y	2	May	---	Dr G Li, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics
STAT3605	Quality control and management	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science or STAT3902 Statistical models	Y	Y	2	May	---	Dr K S Chong, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics
STAT3606	Business logistics	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science: and Not for students who have passed MATH3901 Operations research I, or have already enrolled in this course.	Y	Y	1	Dec	---	Ms O T K Choi, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics
STAT3607	Statistics in clinical medicine and bio-medical research	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models	Y	Y	2	May	---	Dr G Yin, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics
STAT3608	Statistical genetics	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models	Y	Y	2	May	---	Prof T W K Fung, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics
STAT3609	The statistics of investment risk	6	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3611 Computer-aided data analysis or STAT3614 Business forecasting; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course; and Not for BSc(Actuarial Science) students	Y	Y	1	Dec	---	Dr K P Wat, Statistics and Actuarial Science	2012 Major in Risk Management 2013 Major in Risk Management	2012 Minor in Risk Management 2013 Minor in Risk Management

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT3610	Risk management and insurance	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science. (Not available to Actuarial Science students)	Y	Y	2	May	---	Dr R W L Wong, Statistics and Actuarial Science		2012 Major in Risk Management 2012 Minor in Risk Management 2013 Major in Risk Management 2013 Minor in Risk Management
STAT3611	Computer-aided data analysis	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or (STAT1603 Introductory statistics and any University level 2 course); and Not for students who have passed in or have already enrolled in any of these courses: STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science, STAT3616 Advanced SAS programming	N	Y	---	---	---	Dr E K F Lam, Statistics and Actuarial Science		2012 Major in Environmental Science 2012 Minor in Risk Management 2012 Minor in Statistics 2013 Major in Environmental Science 2013 Minor in Risk Management 2013 Minor in Statistics
STAT3612	Data mining	6	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3902 Statistical models	Y	Y	2	No exam	48	Dr G C S Lui, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2012 Major in Risk Management 2012 Major in Statistics 2012 Minor in Risk Management 2012 Minor in Statistics 2013 BSc in Actuarial Science 2013 Major in Risk Management 2013 Major in Statistics 2013 Minor in Risk Management 2013 Minor in Statistics
STAT3613	Marketing engineering	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science	Y	Y	1	Dec	---	Dr C W Kwan, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics

Course Code	Title	Credit	Pre-requisite	Available in 2013-2014	Available in 2014-2015	Semester offered in 2013-2014 (0=year long, 1=1st sem, 2=2nd sem, S=summer)	Exam held in 2013-2014	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as a required course): Compulsory Course (Must Take)	Major / Minor (The Major/Minor that this course appears as a required course): Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT3614	Business forecasting	6	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or (STAT1603 Introductory statistics and any University level 2 course); and Not for students who have passed or already enrolled in any of these courses: STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science, STAT3907 Linear models and forecasting, STAT4601 Time-series analysis, ECON2280 Introductory econometrics.	N	Y	---	---	---	Dr R W L Wong, Statistics and Actuarial Science		2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics
STAT3615	Practical mathematics for investment	6	Pass in (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science: and Not for students who have passed in STAT2902 Financial mathematics, or have already enrolled in this course.	Y	Y	2	May	---	Dr E C K Cheung, Statistics and Actuarial Science	2012 Major in Risk Management 2013 Major in Risk Management	2012 Minor in Actuarial Studies 2012 Minor in Risk Management 2013 Minor in Actuarial Studies 2013 Minor in Risk Management
STAT3616	Advanced SAS programming	6	Pass in STAT2603 Data management with SAS	N	Y	---	---	96	Prof K W Ng, Statistics and Actuarial Science	2012 Major in Statistics 2013 Major in Statistics	2012 BSc in Actuarial Science 2012 Minor in Statistics 2013 BSc in Actuarial Science 2013 Minor in Statistics
STAT3617	Sample survey methods	6	Pass or already enrolled in: BIOL2102 Biostatistics, or (ECON1280 Analysis of economic data and any University level 2 course), or (STAT1601 Elementary statistical methods and any University level 2 course), or (STAT1602 Business statistics and any University level 2 course), or STAT2601 Probability and statistics I, or (STAT1603 Introductory statistics and any University level 2 course), or STAT2901 Probability and statistics: foundations of actuarial science.	Y	Y	2	May	---	Ms O T K Choi, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics

Course Code	Title	Credit	Pre-requisite	Available in 2013-2014	Available in 2014-2015	Semester offered in 2013-2014 (0=year long, 1=1st sem, 2=2nd sem, S=summer)	Exam held in 2013-2014	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as a required course): Compulsory Course (Must Take)	Major / Minor: Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT3618	Derivatives and risk management	6	Pass in STAT3615 Practical mathematics for investment; and Not for BSc(Actuarial Science) students; and Not for students who have passed in STAT3910 Financial economics I, or have already enrolled in this course; and Not for students who have passed in STAT3905 Introduction to financial derivatives, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.	N	Y	---	---	8	Dr R W L Wong, Statistics and Actuarial Science		2012 Major in Risk Management 2012 Minor in Risk Management 2013 Major in Risk Management 2013 Minor in Risk Management
STAT3619	Essential IT skills for statistical and risk analysts	0	Students are expected to have satisfactorily completed their Year 2 or above study.	N	Y	---	---	48	Dr C W Kwan, Statistics and Actuarial Science		
STAT3620	Modern nonparametric statistics	6	Pass in STAT2602 Probability and statistics II	N	Y	---	---	---	Dr P L H Yu, Statistics and Actuarial Science		2012 Major in Statistics 2012 Minor in Statistics 2013 Major in Statistics 2013 Minor in Statistics
STAT3901	Life contingencies	6	(Pass in STAT2601 Probability and statistics II and STAT3615 Practical mathematics for investment) or (Pass in STAT2902 Financial mathematics and (Pass in STAT3902 Statistical models, or already enrolled in this course)) or (Pass in STAT2602 Probability and statistics II and STAT2902 Financial mathematics)	Y	Y	1	Dec	---	Dr E C K Cheung, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
STAT3902	Statistical models	6	Pass in STAT2901 Probability and statistics: foundations of actuarial science; and For BSc(Actuarial Science) students only.	Y	Y	1	Dec	---	Dr G Tian, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	
STAT3903	Stochastic models	6	For BSc(Actuarial Science) students only; and Pass in STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3603 Probability modelling, or have already enrolled in this course.	Y	Y	2	May	---	Dr K S Chong, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	

Course Code	Title	Credit	Pre-requisite	Available in 2013-2014	Available in 2014-2015	Semester offered in 2013-2014 (0=year long, 1=1st sem, 2=2nd sem, S=summer)	Exam held in 2013-2014	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as a required course): Compulsory Course (Must Take)	Major / Minor: Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT3904	Corporate finance for actuarial science	6	[(Pass in ACCT1101 Introduction to accounting and STAT2902 Financial mathematics) or (Pass in STAT3610 Risk management and insurance and STAT3615 Practical mathematics for investment)]; and Not for students who have passed in FINA1310 Corporate finance, or have already enrolled in this course.	Y	Y	2	May	---	Dr J K Woo, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
STAT3905	Introduction to financial derivatives	6	Pass in STAT2902 Financial mathematics; and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.	Y	Y	1	Dec	---	Dr E C K Cheung, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	
STAT3906	Risk theory I	6	Pass in STAT3903 Stochastic models, or already enrolled in this course; or Pass in STAT3603 Probability modelling or MATH3603 Probability theory	Y	Y	2	May	---	Dr K C Cheung, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
STAT3907	Linear models and forecasting	6	(Pass in STAT2602 Probability and statistics II; or Pass in STAT3902 Statistical models, or already enrolled in this course); and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT3600 Linear statistical analysis, or have already enrolled in this course; and Not for students who have passed in STAT4601 Time-series analysis, or have already enrolled in this course; and Not for students who have passed in ECON2280 Introductory econometrics, or have already enrolled in this course.	Y	Y	2	May	---	Dr E A L Li, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	
STAT3908	Credibility theory and loss distributions	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3906 Risk theory	Y	Y	1	Dec	---	Dr K C Cheung, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
STAT3909	Advanced life contingencies	6	Pass in STAT3901 Life contingencies, or already enrolled in this course; and For BSc(Actuarial Science) students only.	Y	Y	2	May	---	Dr L F K Ng, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	

Course Code	Title	Credit	Pre-requisite	Available in 2013-2014	Available in 2014-2015	Semester offered in 2013-2014 (0=year long, 1=1st sem, 2=2nd sem, S=summer)	Exam held in 2013-2014	Quota	Course Coordinator (TBC = To be confirmed)	Major / Minor (The Major/Minor that this course appears as a required course): Compulsory Course (Must Take)	Major / Minor: Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT3910	Financial economics I	6	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.	Y	Y	1	Dec	---	Prof H L Yang, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Minor in Actuarial Studies 2013 Minor in Actuarial Studies
STAT3911	Financial economics II	6	Pass in MATH3603 Probability theory or STAT3903 Stochastic models or STAT3910 Financial economics I	Y	Y	2	May	---	Prof H L Yang, Statistics and Actuarial Science	2012 BSc in Actuarial Science 2013 BSc in Actuarial Science	2012 Major in Risk Management 2012 Minor in Actuarial Studies 2013 Major in Risk Management 2013 Minor in Actuarial Studies
STAT3951	Advanced contingencies	6	Pass in STAT3909 Advanced life contingencies; and For BSc(Actuarial Science) students only.	Y	Y	1	Dec	---	Prof H L Yang, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT3952	Investment and asset management	6	Pass in STAT3901 Life contingencies; and For BSc(Actuarial Science) students only; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course.	N	Y	---	---	---	TBC, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT3953	Fundamentals of actuarial practice	6	Pass in STAT3909 Advanced life contingencies; and For BSc(Actuarial Science) students only.	Y	Y	1	No exam	---	Dr L F K Ng, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT3954	Current topics in actuarial science	6	(Pass in STAT3901 Life contingencies, or already enrolled in this course; or Pass in STAT3909 Advanced life contingencies, or already enrolled in this course); and For BSc(Actuarial Science) students only.	N	Y	---	---	---	Prof W K Li, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT3955	Survival analysis	6	Pass in STAT3902 Statistical models, or already enrolled in this course; or Pass in STAT3600 Linear statistical analysis or STAT3901 Life contingencies	Y	Y	2	May	---	Dr E K F Lam, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2012 Major in Statistics 2012 Minor in Statistics 2013 BSc in Actuarial Science 2013 Major in Statistics 2013 Minor in Statistics
STAT3956	Pension funds and pension mathematics	6	Pass in STAT3909 Advanced life contingencies	Y	Y	1	Dec	---	Dr G Ma, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT4601	Time-series analysis	6	Pass in STAT3600 Linear statistical analysis; and Not for students who have passed in STAT3614 Business forecasting, or have already enrolled in this course; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.	N	Y	---	---	---	TBC, Statistics and Actuarial Science	2012 Major in Risk Management 2012 Major in Statistics 2013 Major in Risk Management 2013 Major in Statistics	2012 Minor in Risk Management 2012 Minor in Statistics 2013 Minor in Risk Management 2013 Minor in Statistics

Course Code	Title	Credit	Pre-requisite	Available in 2013-2014	Available in 2014-2015	Semester offered in 2013-2014 0=year long 1=1st sem 2=2nd sem S=summer	Exam held in 2013-2014	Quota	Course Coordinator TBC = To be confirmed	Major / Minor (The Major/Minor that this course appears as a required course) Compulsory Course (Must Take)	Major / Minor Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT4602	Multivariate data analysis	6	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting	Y	Y	2	May	3	Prof T W K Fung, Statistics and Actuarial Science	2012 Major in Statistics 2013 Major in Statistics	2012 BSc in Actuarial Science 2012 Minor in Statistics 2013 BSc in Actuarial Science 2013 Minor in Statistics
STAT4603	Current topics in risk management	6	Pass in STAT4601 Time-series analysis	N	Y	---	---	---	TBC, Statistics and Actuarial Science		2012 Major in Risk Management 2012 Minor in Risk Management 2013 Major in Risk Management 2013 Minor in Risk Management
STAT4606	Risk management and basel accords in banking and finance	6	Pass in STAT3910 Financial economics I or STAT3905 Introduction to financial derivatives or STAT3618 Derivatives and risk management or (FINA2322 Derivatives and any University level 3 course).	Y	Y	2	May	---	Mr P K Y Pang, Statistics and Actuarial Science		2012 Major in Risk Management 2012 Minor in Risk Management 2013 Major in Risk Management 2013 Minor in Risk Management
STAT4607	Credit risk analysis	6	Pass or already enrolled in STAT3910 Financial economics I or STAT3618 Derivatives and risk management or STAT3905 Introduction to financial derivatives or (FINA2322 Derivatives and any University level 3 course)	Y	Y	2	May	---	Dr K P Wat, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2012 Major in Risk Management 2012 Minor in Risk Management 2013 BSc in Actuarial Science 2013 Major in Risk Management 2013 Minor in Risk Management
STAT4608	Market risk analysis	6	(Pass in STAT3907 Linear models and forecasting and STAT3910 Financial economics I); or [Pass in STAT4601 Time-series analysis and (FINA2320 Investments and portfolio analysis or STAT3609 The statistics of investment risk)]	N	Y	---	---	---	Dr Z Zhang, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2012 Major in Risk Management 2012 Minor in Risk Management 2013 BSc in Actuarial Science 2013 Major in Risk Management 2013 Minor in Risk Management
STAT4671	Directed studies in statistics	6	Major in Statistics or Risk Management; and Consent of Major Coordinator; and Pass in 18 credits from: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT2602 Probability and statistics II, STAT2603 Data management with SAS, STAT1603 Introductory statistics, STAT2605 Introduction to demographic and socio-economic statistics, STAT2901 Probability and statistics: foundations of actuarial science, STAT2902 Financial mathematics: and Not for students who have already enrolled in STAT4672 Statistics project in this academic year.	N	Y	---	---	30	Prof S M S Lee, Statistics and Actuarial Science		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Department of Statistics & Actuarial Science (Cont'd)											
STAT4672	Statistics project	12	Pass in STAT3600 Linear statistical analysis; and Pass or already enrolled in at least one of the following courses: STAT3616 Advanced SAS programming, STAT3911 Financial economics II, STAT4601 Time-series analysis, STAT4602 Multivariate data analysis; and Not for students who have already enrolled in STAT4671 Directed studies in statistics in this academic year.	N	Y	---	---	15	Prof S M S Lee, Statistics and Actuarial Science		
STAT4901	Risk theory II	6	Pass in STAT3906 Risk theory I	N	N	---	---	---	Dr J K Woo, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT4902	Selected topics in actuarial science	6	Pass in STAT3906 Risk theory I	N	N	---	---	---	TBC, Statistics and Actuarial Science		2012 BSc in Actuarial Science 2013 BSc in Actuarial Science
STAT4971	Project in statistics and actuarial science	6	Pass in STAT3902 Statistical models and STAT3907 Linear models and forecasting; and Pass or already enrolled in at least one of the following courses: STAT3616 Advanced SAS programming, STAT3911 Financial economics II, STAT4601 Time-series analysis, STAT4602 Multivariate data analysis; and For BSc(Actuarial Science) students only.	N	Y	---	---	---	Prof S M S Lee, Statistics and Actuarial Science		
STAT4972	Internship in actuarial science	6	Pass in STAT3901 Life contingencies; and For BSc(Actuarial Science) students only	N	Y	---	---	---	Dr L F K Ng, Statistics and Actuarial Science		
STAT4988	Statistics internship	6	Students are expected to have satisfactorily completed their Year 2 study.	N	Y	---	---	---	Dr P L H Yu, Statistics and Actuarial Science		
STAT6109	Research methods in statistics	6	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting	N	Y	---	---	---	Prof S M S Lee, Statistics and Actuarial Science		
STAT6110	Advanced probability	6	Pass in STAT3603 Probability modelling or STAT3903 Stochastic models	N	Y	---	---	---	Prof Y Lam, Statistics and Actuarial Science		
STAT6111	Computational statistics	6	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting	N	Y	---	---	---	Dr G Tian, Statistics and Actuarial Science		
STAT6114	Advanced statistical modelling	6	Pass in STAT3600 Linear statistical analysis	N	Y	---	---	---	Dr J F Yao, Statistics and Actuarial Science		
STAT6115	Advanced quantitative risk management and finance	6	Pass in STAT4608 Market risk analysis	N	Y	---	---	---	Prof W K Li, Statistics and Actuarial Science		

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2013-2014	Exam held in 2013-2014	Quota	Course Coordinator	Major / Minor (The Major/Minor that this course appears as a required course)	
				2013-2014	2014-2015	0=year long 1=1st sem 2=2nd sem S=summer			TBC = To be confirmed	Compulsory Course (Must Take)	Core Course (With Choices)
Common Core Courses *											
CCCH9020	Science and Technology: Lessons from China	6	NIL	Y	Y	2	May	120	Prof L S Chan, Earth Sciences		
CCGL9016	Feeding the World	6	NIL	Y	Y	1	No exam	156	Prof H Corke, Biological Sciences		
CCCH9020	Science and Technology: Lessons from China	6	NIL	Y	Y	2	May	120	Prof L S Chan, Earth Sciences		
CCGL9016	Feeding the World	6	NIL	Y	Y	1	No exam	120	Prof H Corke, Biological Sciences		
CCGL9017	Food: Technology, Trade and Culture	6	NIL	Y	Y	2	May	120	Prof H Corke, Biological Sciences		
CCGL9033	Weapons of Mass Destruction: Science, Proliferation and Terrorism	6	NIL	Y	Y	1, 2	No exam	120	Dr K H Lemke, Earth Sciences		
CCST9011	Biotechnology - Science and Impacts	6	NIL	Y	Y	1	No exam	120	Prof F C C Leung, Biological Sciences		
CCST9012	Our Place in the Universe	6	NIL	Y	Y	2	May	120	Prof S Kwok, Faculty		
CCST9013	Our Living Environment	6	NIL	Y	Y	2	No exam	120	Dr S C Chang, Earth Sciences		
CCST9014	Science and Music	6	NIL	Y	Y	1	No exam	120	Prof H F Chau, Physics		
CCST9017	Hidden Order in Daily Life: A Mathematical Perspective	6	NIL	Y	Y	1	No exam	120	Dr T W Ng, Mathematics		
CCST9018	Origin and Evolution of Life	6	NIL	Y	Y	2	No exam	120	Dr K H Lemke, Earth Sciences		
CCST9019	Understanding Climate Change	6	NIL	Y	Y	1	No exam	120	Dr Z H Liu, Earth Sciences		
CCST9021	Hong Kong: Our Marine Heritage	6	NIL	Y	Y	2	No exam	120	Prof K M Y Leung, Biological Sciences		
CCST9022	How the Mass Media Depicts Science, Technology and the Natural World	6	NIL	Y	Y	2	No exam	120	Prof H F Chau, Physics		
CCST9023	The Oceans: Science and Society	6	NIL	Y	Y	2	No exam	120	Dr S C Chang, Earth Sciences		
CCST9026	Scientific Revolutions and their Impact on Modern Societies	6	NIL	Y	Y	1	No exam	120	Prof K S Cheng, Physics		
CCST9028	Science and Technology: Facts and Fallacies	6	NIL	Y	Y	1	Dec	120	Prof A B Djurisic, Physics		
CCST9030	Forensic Science: Unmasking Evidence, Mysteries and Crimes	6	NIL	Y	Y	1, 2	No exam	120	Prof D L Phillips, Chemistry		
CCST9036	Material World: Past, Present, and Future	6	NIL	Y	Y	2	No exam	120	Prof W K Chan, Chemistry		
CCST9037	Mathematics: A Cultural Heritage	6	NIL	Y	Y	2	No exam	120	Dr N K Tsing, Mathematics		
CCST9038	Science and Science Fiction	6	NIL	Y	Y	1	No exam	120	Prof A B Djurisic, Physics		
CCST9039	Statistics and Our Society	6	NIL	Y	Y	2	May	120	Dr K C Cheung, Statistics and Actuarial Science		
CCST9043	Time's Arrow	6	NIL	Y	Y	2	May	120	Dr Y L Li, Earth Sciences		
CCST9045	The Science and Lore of Culinary Culture	6	NIL	Y	Y	2	No exam	120	Prof G H Chen, Chemistry		
CCST9046	The Science of Mind-body-health Relationship	6	NIL	Y	Y	1	Dec	120	Dr H S El-Nezami, Biological Sciences		

* Please refer to http://commoncore.hku.hk for the details of the common core courses.

SECTION IV

Equivalency of HKDSE and other qualifications

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) Further Mathematics (AL)		Calculus AB or BC	

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

Remarks:

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

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

SECTION V

Science Majors on offer in 2013/14

SCIENCE

SECTION V Science Majors on offer in 2013/14

Majors offered by Science Faculty

Majors (15)

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

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

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

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

(1) identify and describe astrophysical phenomena with their professional knowledge
(by means of coursework and tutorial classes in the curriculum)
(2) have developed their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature
(by means of coursework, tutorial classes, and frequent opportunities in field activities in the curriculum)
(3) analyze astrophysical problems qualitatively and quantitatively, and recognize moral and ethical issues related to the discipline
(by means of coursework, tutorial classes and research-based projects in the curriculum)
(4) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)
(5) apply scientific and quantitative methods in tackling problems in research or real-world setting
(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Minor in Astronomy

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

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

2. Advanced level courses (42 credits)

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

Plus at least 12 credits selected from the following courses:

PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS6650	Stellar atmospheres (6)

Plus at least 12 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3950	Junior physics project (6)
PHYS4950	
PHYS4952	
PHYS4988	Physics internship (6)

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

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

(1) identify and describe astrophysical phenomena with their professional knowledge
(by means of coursework and tutorial classes in the curriculum)
(2) have developed their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature
(by means of coursework, tutorial classes, and frequent opportunities in field activities in the curriculum)
(3) analyze astrophysical problems qualitatively and quantitatively, and recognize moral and ethical issues related to the discipline
(by means of coursework, tutorial classes and research-based projects in the curriculum)
(4) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)
(5) apply scientific and quantitative methods in tackling problems in research or real-world setting
(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Minor in Astronomy

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

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

2. Advanced level courses (42 credits)

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

Plus at least 12 credits selected from the following courses:

PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS6650	Stellar atmospheres (6)

Plus at least 12 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3950	Junior physics project (6)
PHYS4950	
PHYS4952	
PHYS4988	Physics internship (6)

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

Major Title — Major in Biochemistry

Offered to students admitted to Year 1 in — **2013**

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

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

(1) describe the principles of biomolecular structure, metabolism, molecular interactions, molecular processes and their regulation, genetics and systems biology critical to contemporary biochemistry and molecular biology
(by means of coursework and experiential learning)
(2) apply biochemical, bioinformatics and molecular genetics technologies for new observations, measurements and analyses; and to design experiments that bring discovery and insight into the unknown
(by means of laboratory-based and research project-based learning)
(3) interpret and communicate scientific data and literature using appropriate scientific language
(by means of literature-based coursework and debate)
(4) work effectively as a team and synergize with their colleagues in a supportive manner
(by means of group-based learning and by group-based problem solving)
(5) recognize the interconnections of biochemistry with other disciplines in science, medicine and engineering, humanities and ethics, which are relevant for diverse working environment in the society
(by means of multidisciplinary-based research projects, internship and debate)

Impermissible Combination:
Minor in Biochemistry

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
CHEM1042	General chemistry (6)
BIOC2600	Basic biochemistry (6)
CHEM2441	Organic chemistry I (6)
CHEM2541	Physical chemistry I (6)

2. Advanced level courses (42 credits)

BIOC3601	Basic Metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular

	biology (6)
BIOL3401	Molecular biology (6)
BIOC4610	Advanced biochemistry (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

Plus at least 12 credits selected from the following courses:

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOC3607

BIOC4614

BIOC4988

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

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

(1) describe the principles of biomolecular structure, metabolism, molecular interactions, molecular processes and their regulation, genetics and systems biology critical to contemporary biochemistry and molecular biology
(by means of coursework and experiential learning)
(2) apply biochemical, bioinformatics and molecular genetics technologies for new observations, measurements and analyses; and to design experiments that bring discovery and insight into the unknown
(by means of laboratory-based and research project-based learning)
(3) interpret and communicate scientific data and literature using appropriate scientific language
(by means of literature-based coursework and debate)
(4) work effectively as a team and synergize with their colleagues in a supportive manner
(by means of group-based learning and by group-based problem solving)
(5) recognize the interconnections of biochemistry with other disciplines in science, medicine and engineering, humanities and ethics, which are relevant for diverse working environment in the society
(by means of multidisciplinary-based research projects, internship and debate)

Impermissible Combination:
Minor in Biochemistry

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
CHEM1042	General chemistry (6)
BIOC2600	Basic biochemistry (6)
CHEM2441	Organic chemistry I (6)
CHEM2541	Physical chemistry I (6)

2. Advanced level courses (42 credits)

BIOC3601	Basic Metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular

	biology (6)
BIOL3401	Molecular biology (6)
BIOC4610	Advanced biochemistry (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

Plus at least 12 credits selected from the following courses:

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOC3607

BIOC4614

BIOC4988

Notes:

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

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

(1) understand concepts underpinning advances in cell biology and genetics, physiology and systems biology, diversity of life and environmental biology, and applied biology
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) evaluate diverse threads of enquiry in science, and identify the value of datasets and written output
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) interpret scientific data from a range of sources and explain trends observed
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) demonstrate independent and critical thinking and appreciate moral and ethical issues related to biological sciences
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(5) communicate in a professional capacity with educators, business, media and the scientific community
(by means of coursework, tutorial classes, project-based and presentation opportunities in the curriculum)
(6) be prepared to enter employment as professional scientists, educators and managers
(by means of coursework, tutorial classes, laboratory-based, project-based and capstone learning in the curriculum)

Impermissible Combination:
Major in Ecology & Biodiversity
Major in Food & Nutritional Science
Major in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

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

2. Advanced level courses (at least 42 credits)

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

(A) Genetics and cell biology

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

(B) Physiology and systems biology

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

(C) Diversity of life and environmental biology

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

(D) Applied biology

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

(1) understand concepts underpinning advances in cell biology and genetics, physiology and systems biology, diversity of life and environmental biology, and applied biology
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) evaluate diverse threads of enquiry in science, and identify the value of datasets and written output
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) interpret scientific data from a range of sources and explain trends observed
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) demonstrate independent and critical thinking and appreciate moral and ethical issues related to biological sciences
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(5) communicate in a professional capacity with educators, business, media and the scientific community
(by means of coursework, tutorial classes, project-based and presentation opportunities in the curriculum)
(6) be prepared to enter employment as professional scientists, educators and managers
(by means of coursework, tutorial classes, laboratory-based, project-based and capstone learning in the curriculum)

Impermissible Combination:
Major in Ecology & Biodiversity
Major in Food & Nutritional Science
Major in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

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

2. Advanced level courses (at least 42 credits)

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

(A) Genetics and cell biology

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

(B) Physiology and systems biology

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

(C) Diversity of life and environmental biology

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

(D) Applied biology

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

(1) demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry
(by means of coursework, laboratory-based and/or research-based learning in the curriculum)
(2) demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems
(by means of coursework, laboratory-based and/or research-based learning in the curriculum)
(3) have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world
(by means of coursework, laboratory-based and/or research-based learning in the curriculum)
(4) have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions
(by requiring of no less than 100 hours of laboratory classes in the curriculum)
(5) demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member
(by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)
(6) gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills
(by arrangement for student internship opportunities or directed studies of no less than three weeks with chemistry-related companies or research laboratories)

Impermissible Combination:
Minor in Chemistry

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

CHEM1042	General chemistry (6)
CHEM2241	Analytical chemistry I (6)
CHEM2341	Inorganic chemistry I (6)
CHEM2441	Organic chemistry I (6)
CHEM2541	Physical chemistry I (6)

2. Advanced level courses (48 credits)

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

Plus at least 12 credits selected from the following 18 credits of courses in two different areas:

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

Plus at least 6 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level, excluding CHEM3144 Directed studies in chemistry, CHEM4146 Chemistry literacy and research, CHEM4988 Chemistry internship and CHEM4941 HKUtopia: capstone experience for chemistry undergraduates), subject to pre-requisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

CHEM3144

CHEM4141

CHEM4146

CHEM4941

CHEM4988

Notes:

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

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

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

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-

credit advanced level course in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

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

(1) demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry
(by means of coursework, laboratory-based and/or research-based learning in the curriculum)
(2) demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems
(by means of coursework, laboratory-based and/or research-based learning in the curriculum)
(3) have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world
(by means of coursework, laboratory-based and/or research-based learning in the curriculum)
(4) have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions
(by requiring of no less than 100 hours of laboratory classes in the curriculum)
(5) demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member
(by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)
(6) gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills
(by arrangement for student internship opportunities or directed studies of no less than three weeks with chemistry-related companies or research laboratories)

Impermissible Combination:
Minor in Chemistry

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

CHEM1042	General chemistry (6)
CHEM2241	Analytical chemistry I (6)
CHEM2341	Inorganic chemistry I (6)
CHEM2441	Organic chemistry I (6)
CHEM2541	Physical chemistry I (6)

2. Advanced level courses (48 credits)

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

Plus at least 12 credits selected from the following 18 credits of courses in two different areas:

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

Plus at least 6 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level, excluding CHEM3144 Directed studies in chemistry, CHEM4146 Chemistry literacy and research, CHEM4988 Chemistry internship and CHEM4941 HKUtopia: capstone experience for chemistry undergraduates), subject to pre-requisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

CHEM3144

CHEM4141

CHEM4146

CHEM4941

CHEM4988

Notes:

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

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

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

4. Capstone requirement for BEd&BSc degree students is different. Students are required to take an additional 6-

credit advanced level course in the major to replace the capstone requirement of this Major. Students should consult the Faculty of Education for details.

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

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

(1) describe the key concepts of the Earth System components and processes
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) have acquired the ability to observe, describe, measure and analyze principal phenomena of earth processes and the interactions between different earth components
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) provide expertise to maintain geological environments and prevent severe perturbations due to resource exploitation and water disposal
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) equip with the knowledge and skills to better predict and deal with geological and related hazards such as earthquakes, landslides, tsunamis, floods and volcanic eruptions, and recognize and appraise the related ethical issues
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(5) identify real life problems pertaining to the physical environment and find solutions to those problems
(by means capstone learning experience in the form of internship, field learning, and project-based learning in the curriculum)
(6) work with other students and possess an adequate level of communication skills
(by means of group project learning and presentation opportunities in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

BIOL1309	Evolutionary diversity (6)
EASC1401	Blue planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)

2. Advanced level courses (42 credits)

EASC3405	Environmental remote sensing (6)
EASC3411	Solid earth, ocean, atmosphere interactions (6)
EASC4403	Biogeochemical cycles (6)
EASC4404	Earth system history (6)

Plus at least 18 credits selected from the following courses:

EASC3400	
EASC3403	Sedimentary environments (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4400	
EASC4408	Special topics in earth sciences (6)

3. Capstone requirement (6 credits)

EASC4405

Notes:

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

Remarks:

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

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

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

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

(1) describe the key concepts of the Earth System components and processes
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) have acquired the ability to observe, describe, measure and analyze principal phenomena of earth processes and the interactions between different earth components
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) provide expertise to maintain geological environments and prevent severe perturbations due to resource exploitation and water disposal
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) equip with the knowledge and skills to better predict and deal with geological and related hazards such as earthquakes, landslides, tsunamis, floods and volcanic eruptions, and recognize and appraise the related ethical issues
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(5) identify real life problems pertaining to the physical environment and find solutions to those problems
(by means capstone learning experience in the form of internship, field learning, and project-based learning in the curriculum)
(6) work with other students and possess an adequate level of communication skills
(by means of group project learning and presentation opportunities in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

BIOL1309	Evolutionary diversity (6)
EASC1401	Blue planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)

2. Advanced level courses (42 credits)

EASC3405	Environmental remote sensing (6)
EASC3411	Solid earth, ocean, atmosphere interactions (6)
EASC4403	Biogeochemical cycles (6)
EASC4404	Earth system history (6)

Plus at least 18 credits selected from the following courses:

EASC3400	
EASC3403	Sedimentary environments (6)
EASC3406	Reconstruction of past climate (6)
EASC3408	Geophysics (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4400	
EASC4408	Special topics in earth sciences (6)

3. Capstone requirement (6 credits)

EASC4405

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

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

(1) understand and appreciate the major living and non-living components of the regional and global environment, and how they interact; identify threats to them; and know how these threats can be mitigated
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(2) understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to understand, study, manage and protect that diversity, and appraise the related moral and ethical issues
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(3) have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(4) use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(5) demonstrate original, independent and critical thinking, with mastery of a range of communication skills
(by means of coursework, project-based and presentation opportunities in the curriculum)
(6) have the skill and knowledge to pursue postgraduate ecological research or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China
(by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)
(7) be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems
(by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)

Impermissible Combination:
Major in Biological Sciences
Minor in Ecology & Biodiversity

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

BIOL1110	From molecules to cells (6)

BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (48 credits)

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

Plus at least 36 credits selected from the following courses:

BIOL3109	Environmental microbiology (6)
BIOL3301	Marine biology (6)
BIOL3304	Fish biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4305	

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major

disciplines. If this is approved, a 6-credit advanced level course in the second major must be taken to fulfill the credit requirement of the capstone experience.

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

(1) understand and appreciate the major living and non-living components of the regional and global environment, and how they interact; identify threats to them; and know how these threats can be mitigated
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(2) understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to understand, study, manage and protect that diversity, and appraise the related moral and ethical issues
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(3) have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(4) use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet
(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)
(5) demonstrate original, independent and critical thinking, with mastery of a range of communication skills
(by means of coursework, project-based and presentation opportunities in the curriculum)
(6) have the skill and knowledge to pursue postgraduate ecological research or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China
(by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)
(7) be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems
(by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)

Impermissible Combination:
Major in Biological Sciences
Minor in Ecology & Biodiversity

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

BIOL1110	From molecules to cells (6)

BIOL1309	Evolutionary diversity (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (48 credits)

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

Plus at least 36 credits selected from the following courses:

BIOL3109	Environmental microbiology (6)
BIOL3301	Marine biology (6)
BIOL3304	Fish biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4305	

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major

disciplines. If this is approved, a 6-credit advanced level course in the second major must be taken to fulfill the credit requirement of the capstone experience.

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

(1) identify and describe different components of the environmental systems and key issues in environmental science
(by means of lectures, coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments
(by means of lectures, coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems
(by means of lectures, coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) gain an advanced level of skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods and appreciation of the related ethical issues
(by means of laboratory-based, project-based, presentation opportunities and capstone learning in the curriculum)

Impermissible Combination:
Minor in Environmental Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

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

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

CHEM1042	General chemistry (6)	
EASC1020	Introduction to climate science (6)	
EASC1401	Blue planet (6)	
ENVS1301	Environmental life science (6)	
STAT1601	Elementary statistical methods (6)	May take either STAT1601 or STAT1603 to fulfill this 36

		credits requirement, but not both.
STAT1603	Introductory statistics (6)	May take either STAT1601 or STAT1603 to fulfill this 36 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
CHEM2041	Principles of chemistry (6)	

2. Advanced level courses (42 credits)

ENVS3004	Environment, society and economics (6)

Plus at least 36 credits selected from the following courses:

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

ENVS3018

ENVS4015

ENVS4016

ENVS4988

Notes:
1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

(1) identify and describe different components of the environmental systems and key issues in environmental science
(by means of lectures, coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments
(by means of lectures, coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems
(by means of lectures, coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) gain an advanced level of skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods and appreciation of the related ethical issues
(by means of laboratory-based, project-based, presentation opportunities and capstone learning in the curriculum)

Impermissible Combination:
Minor in Environmental Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

ENVS1401	Introduction to environmental science (6)	
STAT1601	Elementary statistical methods (6)	May take either STAT1601 or STAT1603 to fulfill this 36 credits requirement, but not both.
STAT1603	Introductory statistics (6)	May take either STAT1601 or STAT1603 to fulfill this 36 credits requirement, but not both.

Plus at least 12 credits selected from the following courses (Level 1):

CHEM1042	General chemistry (6)	
EASC1020	Introduction to climate science (6)	

EASC1401	Blue planet (6)
ENVS1301	Environmental life science (6)

Plus at least 12 credits selected from the following courses (Level 2):

BIOL2102	Biostatistics (6)
CHEM2041	Principles of chemistry (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (42 credits)

ENVS3004	Environment, society and economics (6)

Plus at least 36 credits selected from the following courses:

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

ENVS3018

ENVS4015

ENVS4016

ENVS4988

Notes:

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

Remarks:

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

Major Title	Major in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2013**

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

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

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

(1) understand the science underpinning food and nutrition as applied to diet and health, and to commercial food production
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) analyze controversial food related issues such as GM foods, nutritional labeling and food security
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) understand ethical perspectives and practice in all areas of food product development, food safety and public health nutrition, and appreciate and identify the need for ethical standards and professional codes of conduct
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) apply and disseminate scientific knowledge obtained from food, nutrition and related biosciences for the understanding of the influences of nutrition in health and disease, using a range of formats and approaches
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(5) apply independent thinking and the principles of scientific enquiry to conduct a small research project to test a food- and/or nutrition-related hypothesis
(by means of coursework, tutorial classes, laboratory-based and project-based learning in the curriculum)
(6) demonstrate communication and teamwork skills necessary to working in a multi-disciplinary environment
(by means of coursework and group-project learning in the curriculum)

Impermissible Combination:
Major in Biological Sciences
Minor in Food & Nutritional Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)

BIOL2220	Principles of biochemistry (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (42 credits)

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

Plus at least 24 credits selected from the following courses:

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

6. Students who wish to specialize in a certain area may choose to emphasize selection of courses from the following lists:
(a) Food Science and Technology: BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3209 Food and nutrient analysis; BIOL3210 Grain production and utilization; BIOL4205 Food processing and engineering; BIOL4207 Meat and dairy sciences; BIOL4209 Functional foods; BIOL4210 Food product development; BIOL4411 Plant and food biotechnology.
(b) Nutrition and Health Science: BIOL3204 Nutrition and the life cycle, BIOL3205 Human physiology; BIOL3206 Clinical nutrition; BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3211 Nutrigenomics; BIOL4201 Public health nutrition.

7. Students who may wish to pursue postgraduate study in dietetics are strongly advised to consult their academic and course selection advisors regarding additional courses in Physiology and Biochemistry.

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

Major Title	Major in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2012**

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

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

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

(1) understand the science underpinning food and nutrition as applied to diet and health, and to commercial food production
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) analyze controversial food related issues such as GM foods, nutritional labeling and food security
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) understand ethical perspectives and practice in all areas of food product development, food safety and public health nutrition, and appreciate and identify the need for ethical standards and professional codes of conduct
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) apply and disseminate scientific knowledge obtained from food, nutrition and related biosciences for the understanding of the influences of nutrition in health and disease, using a range of formats and approaches
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(5) apply independent thinking and the principles of scientific enquiry to conduct a small research project to test a food- and/or nutrition-related hypothesis
(by means of coursework, tutorial classes, laboratory-based and project-based learning in the curriculum)
(6) demonstrate communication and teamwork skills necessary to working in a multi-disciplinary environment
(by means of coursework and group-project learning in the curriculum)

Impermissible Combination:
Major in Biological Sciences
Minor in Food & Nutritional Science

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2102	Biostatistics (6)
BIOL2103	Biological sciences laboratory course (6)

BIOL2220	Principles of biochemistry (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (42 credits)

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

Plus at least 24 credits selected from the following courses:

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

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

6. Students who wish to specialize in a certain area may choose to emphasize selection of courses from the following lists:
(a) Food Science and Technology: BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3209 Food and nutrient analysis; BIOL3210 Grain production and utilization; BIOL4205 Food processing and engineering; BIOL4207 Meat and dairy sciences; BIOL4209 Functional foods; BIOL4210 Food product development; BIOL4411 Plant and food biotechnology.
(b) Nutrition and Health Science: BIOL3204 Nutrition and the life cycle, BIOL3205 Human physiology; BIOL3206 Clinical nutrition; BIOL3207 Food and nutritional toxicology; BIOL3208 Food safety and quality management; BIOL3211 Nutrigenomics; BIOL4201 Public health nutrition.

7. Students who may wish to pursue postgraduate study in dietetics are strongly advised to consult their academic and course selection advisors regarding additional courses in Physiology and Biochemistry.

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

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

Objectives:
Geology concerns with the scientific study of the Earth's structure, processes, material and history. Geologists apply knowledge of chemistry, biology, physics and mathematics to solve Earth problems. The Geology Major aims to give students a sound foundation of the geological sciences and enable them to pursue postgraduate studies or careers in the geosciences. The curriculum emphasizes the development of knowledge and skills, and practical experience in the field. The core courses are designed to give students a well-rounded understanding of the geological disciplines including petrology, paleontology, geophysics, geochemistry, geochronology and the applications of geological knowledge to resource development, natural hazard management, and geotechnical and environmental engineering. Students who wish to become a professional geologist may take additional designated courses designed to meet the pathway for accreditation as a chartered geologist.

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

(1) describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources
(by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)
(2) have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues
(by means of both local and overseas residential field learning experience)
(3) communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources
(by means of capstone, project-based learning and presentation opportunities in the curriculum)
(4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession
(by means of internship opportunities in the curriculum)
(5) work with others in an effective manner and have learned to accept and appreciate different cultures
(by means of group project learning, field learning experience in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2406	Geochemistry (6)
EASC2407	Mineralogy (6)

2. Advanced level courses (48 credits)

EASC3402	Petrology (6)
EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)

EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC4406	Earth dynamics (6)

Plus at least 12 credits selected from the following courses:

EASC3400	
EASC3406	Reconstruction of past climate (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4400	
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)

3. Capstone requirement (6 credits)

EASC4401

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

Objectives:
Geology concerns with the scientific study of the Earth's structure, processes, material and history. Geologists apply knowledge of chemistry, biology, physics and mathematics to solve Earth problems. The Geology Major aims to give students a sound foundation of the geological sciences and enable them to pursue postgraduate studies or careers in the geosciences. The curriculum emphasizes the development of knowledge and skills, and practical experience in the field. The core courses are designed to give students a well-rounded understanding of the geological disciplines including petrology, paleontology, geophysics, geochemistry, geochronology and the applications of geological knowledge to resource development, natural hazard management, and geotechnical and environmental engineering. Students who wish to become a professional geologist may take additional designated courses designed to meet the pathway for accreditation as a chartered geologist.

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

(1) describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources
(by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)
(2) have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues
(by means of both local and overseas residential field learning experience)
(3) communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources
(by means of capstone, project-based learning and presentation opportunities in the curriculum)
(4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession
(by means of internship opportunities in the curriculum)
(5) work with others in an effective manner and have learned to accept and appreciate different cultures
(by means of group project learning, field learning experience in the curriculum)

Impermissible Combination:
Minor in Earth Sciences

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)
EASC2402	Field methods (6)
EASC2406	Geochemistry (6)
EASC2407	Mineralogy (6)

2. Advanced level courses (48 credits)

EASC3402	Petrology (6)
EASC3403	Sedimentary environments (6)
EASC3404	Structural geology (6)

EASC3408	Geophysics (6)
EASC3409	Igneous and metamorphic petrogenesis (6)
EASC4406	Earth dynamics (6)

Plus at least 12 credits selected from the following courses:

EASC3400	
EASC3406	Reconstruction of past climate (6)
EASC3410	Hydrogeology (6)
EASC3412	Earth resources (6)
EASC3413	Engineering geology (6)
EASC3414	Soil and rock mechanics (6)
ENVS3007	Natural hazards and mitigation (6)
EASC4400	
EASC4407	Regional geology (6)
EASC4408	Special topics in earth sciences (6)

3. Capstone requirement (6 credits)

EASC4401

Notes:

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

Remarks:

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

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

Objectives:
The Major in Mathematics provides students with a solid and comprehensive undergraduate education in the subject. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems. Core courses in the curriculum emphasize fundamental knowledge and concepts in Mathematics and elective courses provide training in both pure and applied aspects of Mathematics. Throughout the curriculum there is also emphasis on experiential learning through guided studies, projects, seminars and summer internships. With the diversity of courses offered in the major, various specializations are available. These will lead to careers in a wide range of sectors including education, economics and finance, logistics, management, research and further studies.

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

(1) describe and present fundamental concepts in mathematics
(by means of coursework and learning activities in the major or minor curriculum)
(2) apply mathematical theory and techniques to different areas of Sciences, and appraise the related ethical issues
(by means of coursework and learning activities in the major or minor curriculum)
(3) communicate in mathematical language and present scientific arguments
(by means of coursework, seminars, guided studies and projects)
(4) collaborate and work with other students in an effective manner
(by means of guided studies, projects and seminars)
(5) appreciate the beauty and power of mathematics
(by means of guided studies, projects and seminars)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics
Minor in Mathematics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2012	Fundamental concepts of mathematics (6)
MATH2101	Linear algebra I (6)
MATH2102	Linear algebra II (6)
MATH2211	Multivariable calculus (6)
MATH2241	Introduction to mathematical analysis (6)

2. Advanced level courses (42 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)
MATH3403	Functions of a complex variable (6)

Plus at least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH6XXX level), at least 12 credits of which should be from MATH4XXX or MATH6XXX level, excluding MATH4988 Mathematics internship, subject to pre-requisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH4988	
MATH4999	Mathematics project (12)

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

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

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

4. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

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

Objectives:
The Major in Mathematics provides students with a solid and comprehensive undergraduate education in the subject. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems. Core courses in the curriculum emphasize fundamental knowledge and concepts in Mathematics and elective courses provide training in both pure and applied aspects of Mathematics. Throughout the curriculum there is also emphasis on experiential learning through guided studies, projects, seminars and summer internships. With the diversity of courses offered in the major, various specializations are available. These will lead to careers in a wide range of sectors including education, economics and finance, logistics, management, research and further studies.

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

(1) describe and present fundamental concepts in mathematics
(by means of coursework and learning activities in the major or minor curriculum)
(2) apply mathematical theory and techniques to different areas of Sciences, and appraise the related ethical issues
(by means of coursework and learning activities in the major or minor curriculum)
(3) communicate in mathematical language and present scientific arguments
(by means of coursework, seminars, guided studies and projects)
(4) collaborate and work with other students in an effective manner
(by means of guided studies, projects and seminars)
(5) appreciate the beauty and power of mathematics
(by means of guided studies, projects and seminars)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics
Minor in Mathematics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

MATH1013	University mathematics II (6)
MATH2012	Fundamental concepts of mathematics (6)
MATH2101	Linear algebra I (6)
MATH2102	Linear algebra II (6)
MATH2211	Multivariable calculus (6)
MATH2241	Introduction to mathematical analysis (6)

2. Advanced level courses (42 credits)

MATH3301	Algebra I (6)
MATH3401	Analysis I (6)
MATH3403	Functions of a complex variable (6)

Plus at least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH6XXX level), at least 12 credits of which should be from MATH4XXX or MATH6XXX level, excluding MATH4988 Mathematics internship, subject to pre-requisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH4988	
MATH4999	Mathematics project (12)

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

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

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

4. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

Major Title	Major in Mathematics/Physics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Mathematics/Physics aims to provide students with a solid foundation in both physics and mathematics. This major is catered especially for students interested in the more theoretical aspects of physics. It covers a wide range of core areas in both disciplines which form the blocks of fundamental knowledge for further specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics, electrodynamics, linear algebra, mathematical analysis, abstract algebra, complex variables, differential equations, modern differential geometry, etc. A large selection of elective courses is provided for students to pursue a broad spectrum of professional knowledge in mathematical and theoretical physics. Analytical thinking, quantitative reasoning and innovative ideas are fostered through the effective design of courses and research projects. The curriculum emphasizes experiential learning through internships, field studies and research projects supervised by experts. With the comprehensive training received, graduates are expected to be well-prepared for further studies and to pursue careers in many fields of science and engineering.

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

(1) identify and describe physical systems with a rigorous representation using their professional knowledge
(by means of coursework and tutorial classes in the curriculum)
(2) have developed their scientific intuition, abilities and techniques to tackle physical problems with intellectual rigor theoretically
(by means of coursework, tutorial classes and assessments in the curriculum)
(3) apply mathematical theory and techniques to analyze physical problems qualitatively and quantitatively, and appraise the related ethical issues
(by means of coursework, tutorial classes and research-based projects in the curriculum)
(4) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)
(5) apply scientific and quantitative methods in tackling problems in research or real-world setting
(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics
Major in Physics
Minor in Mathematics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

MATH1013	University mathematics II (6)
PHYS1250	Fundamental physics (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

MATH3301	Algebra I (6)

MATH3401	Analysis I (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
MATH4501	Geometry (6)
PHYS4351	Advanced quantum mechanics (6)

Plus at least 6 credits of advanced level Mathematics or Physics courses (MATH3XXX or MATH4XXX or MATH6XXX or PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3888	
PHYS3950	Junior physics project (6)
MATH4999	Mathematics project (12)
PHYS4950	
PHYS4952	
PHYS4988	Physics internship (6)

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

6. (a) Students must have level 3 or above in HKDSE Physics or HKDSE Combined Science with Physics component or equivalent to take this major. Students who do not fufill this requirement are advised to take PHYS1240 Physics by inquiry; and
(b) Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fufill this requirement are advised to take MATH1011 University mathematics I.

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

Major Title	Major in Mathematics/Physics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Mathematics/Physics aims to provide students with a solid foundation in both physics and mathematics. This major is catered especially for students interested in the more theoretical aspects of physics. It covers a wide range of core areas in both disciplines which form the blocks of fundamental knowledge for further specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics, electrodynamics, linear algebra, mathematical analysis, abstract algebra, complex variables, differential equations, modern differential geometry, etc. A large selection of elective courses is provided for students to pursue a broad spectrum of professional knowledge in mathematical and theoretical physics. Analytical thinking, quantitative reasoning and innovative ideas are fostered through the effective design of courses and research projects. The curriculum emphasizes experiential learning through internships, field studies and research projects supervised by experts. With the comprehensive training received, graduates are expected to be well-prepared for further studies and to pursue careers in many fields of science and engineering.

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

(1) identify and describe physical systems with a rigorous representation using their professional knowledge
(by means of coursework and tutorial classes in the curriculum)
(2) have developed their scientific intuition, abilities and techniques to tackle physical problems with intellectual rigor theoretically
(by means of coursework, tutorial classes and assessments in the curriculum)
(3) apply mathematical theory and techniques to analyze physical problems qualitatively and quantitatively, and appraise the related ethical issues
(by means of coursework, tutorial classes and research-based projects in the curriculum)
(4) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)
(5) apply scientific and quantitative methods in tackling problems in research or real-world setting
(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics
Major in Physics
Minor in Mathematics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

MATH1013	University mathematics II (6)
PHYS1250	Fundamental physics (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

MATH3301	Algebra I (6)

MATH3401	Analysis I (6)
PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
MATH4501	Geometry (6)
PHYS4351	Advanced quantum mechanics (6)

Plus at least 6 credits of advanced level Mathematics or Physics courses (MATH3XXX or MATH4XXX or MATH6XXX or PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

MATH3888	
PHYS3950	Junior physics project (6)
MATH4999	Mathematics project (12)
PHYS4950	
PHYS4952	
PHYS4988	Physics internship (6)

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

6. (a) Students must have level 3 or above in HKDSE Physics or HKDSE Combined Science with Physics component or equivalent to take this major. Students who do not fufill this requirement are advised to take PHYS1240 Physics by inquiry; and
(b) Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take this major. Students who do not fufill this requirement are advised to take MATH1011 University mathematics I.

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

Major Title	Major in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2013**

Objectives:
Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major offers specialized training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop variousessential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

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

(1) describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology
(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
(2) apply laboratory techniques essential to modern molecular science
(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
(3) communicate in written and oral communication skills and collaborate with other students effectively
(by means of coursework, research-based learning and presentation opportunities in the curriculum)
(4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues
(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
(5) gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment
(by means of coursework, laboratory-based and experiential learning in the curriculum)

Impermissible Combination:
Major in Biological Sciences
Minor in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 30 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 30 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	

BIOL2306	Ecology and evolution (6)

2. Advanced level courses (48 credits)

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

Plus at least 18 credits selected from the following courses:

BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3405	Molecular microbiology (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3407	Fermentation technology (6)
BIOL3408	Genetics (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4409	General virology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major

disciplines. If this is approved, a 6-credit advanced level course in the second major must be taken to fulfill the credit requirement of the capstone experience.

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

Major Title	Major in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2012**

Objectives:
Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major offers specialized training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop variousessential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

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

(1) describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology
(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
(2) apply laboratory techniques essential to modern molecular science
(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
(3) communicate in written and oral communication skills and collaborate with other students effectively
(by means of coursework, research-based learning and presentation opportunities in the curriculum)
(4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues
(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
(5) gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment
(by means of coursework, laboratory-based and experiential learning in the curriculum)

Impermissible Combination:
Major in Biological Sciences
Minor in Molecular Biology & Biotechnology

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 30 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 30 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	

BIOL2306	Ecology and evolution (6)

2. Advanced level courses (48 credits)

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

Plus at least 18 credits selected from the following courses:

BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3405	Molecular microbiology (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3407	Fermentation technology (6)
BIOL3408	Genetics (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4409	General virology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3112

BIOL3113

BIOL4113

BIOL4988

Notes:

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

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

3. Students are not required to take Capstone if this Science major is taken as a second major on the condition that the capstone experience in the first major requires the integration or application of knowledge from both major

disciplines. If this is approved, a 6-credit advanced level course in the second major must be taken to fulfill the credit requirement of the capstone experience.

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

Objectives:
The Major in Physics aims to provide students with a solid foundation on the subject. Core courses form the blocks of fundamental knowledge to pursue learning in specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics and electrodynamics. A large selection of elective courses is provided for students to pursue a wide range of topics from the very small scale (i.e. subatomic particles) to the large scale (i.e. cosmology). Students will attain professional knowledge in physics, research experience and the training of analytical thinking and quantitative reasoning during their studies. Graduates are expected to have acquired the broad training which can equip them well for further studies in multiple science and technology disciplines and to work in their specialized area.

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

(1) identify and describe physical systems with their professional knowledge
(by means of coursework and tutorial classes in the curriculum)
(2) have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature
(by means of coursework, tutorial classes and laboratory works in the curriculum)
(3) analyze problems qualitatively and quantitatively, and appraise the related ethical issues
(by means of coursework, tutorial classes and research-based projects in the curriculum)
(4) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)
(5) apply scientific and quantitative methods in tackling problems in research or real-word setting
(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

PHYS1150	Problem solving in physics (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2260	Heat and waves (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)

Plus at least 18 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3950	Junior physics project (6)
PHYS4950	
PHYS4952	
PHYS4988	Physics internship (6)

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

Objectives:
The Major in Physics aims to provide students with a solid foundation on the subject. Core courses form the blocks of fundamental knowledge to pursue learning in specializations, e.g. quantum mechanics, statistical mechanics, classical mechanics and electrodynamics. A large selection of elective courses is provided for students to pursue a wide range of topics from the very small scale (i.e. subatomic particles) to the large scale (i.e. cosmology). Students will attain professional knowledge in physics, research experience and the training of analytical thinking and quantitative reasoning during their studies. Graduates are expected to have acquired the broad training which can equip them well for further studies in multiple science and technology disciplines and to work in their specialized area.

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

(1) identify and describe physical systems with their professional knowledge
(by means of coursework and tutorial classes in the curriculum)
(2) have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature
(by means of coursework, tutorial classes and laboratory works in the curriculum)
(3) analyze problems qualitatively and quantitatively, and appraise the related ethical issues
(by means of coursework, tutorial classes and research-based projects in the curriculum)
(4) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)
(5) apply scientific and quantitative methods in tackling problems in research or real-word setting
(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)

Impermissible Combination:
Major in Mathematics/Physics
Minor in Physics

Required courses (96 credits)

1. Introductory level courses (48 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (36 credits)

PHYS1150	Problem solving in physics (6)
PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2255	Introductory electricity and magnetism (6)
PHYS2260	Heat and waves (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (42 credits)

PHYS3350	Classical mechanics (6)
PHYS3351	Quantum mechanics (6)
PHYS3450	Electromagnetism (6)
PHYS3550	Statistical mechanics & thermodynamics (6)

Plus at least 18 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

PHYS3950	Junior physics project (6)
PHYS4950	
PHYS4952	
PHYS4988	Physics internship (6)

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

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

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

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

5. Courses at the advanced level and capstone requirements are subject to change.

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

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

Major Title	Major in Risk Management
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Major in Risk Management aims to provide students with the skills and expertise in the theory and methodology behind the scientific process of risk management, with application to actuarial science, finance and other related areas of interest. It is designed to provide solid training in the concepts of the risk management process, statistical models and methods of risk management, and good risk management practice. Core courses in the curriculum emphasize fundamental concepts and nature of risk assessment, risk management and governance from different standpoints while elective courses provide either training in specific Risk Management disciplines or an extension of knowledge aiming to give students more modeling, technical and analytical skills in risk management, including data mining, stochastic calculus, and financial time series modeling.

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

(1) identify and categorize the various risks faced by an organization and be able to demonstrate a critical understanding of generic risk management issues and techniques
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(2) analyze and assess risk management situations, and be able to deal with qualitative as well as quantitative aspects appropriate to the situation
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(3) critically evaluate and make effective use of models and techniques for risk assessment and management, and appraise the related ethical issues
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(4) make informed risk management decisions, employ any techniques necessary to acquire and interpret relevant data and information from different sources and the factors that influence their perceptions of risk identification, risk reduction, risk mitigation and risk transfer
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(5) communicate and collaborate with people effectively on risk management issues
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)
(6) gain insights into current advances in risk management through either project or industrial training
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Statistics
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

STAT3600	Linear statistical analysis (6)
STAT3609	The statistics of investment risk (6)

STAT3615	Practical mathematics for investment (6)
STAT4601	Time-series analysis (6)

Plus at least 24 credits selected from the following courses:

STAT3603	Probability modelling (6)
STAT3610	Risk management and insurance (6)
STAT3612	Data mining (6)
STAT3618	Derivatives and risk management (6)
STAT3911	Financial economics II (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT4671

STAT4672

STAT4988

Notes:

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

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

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

4. Courses at the advanced level and capstone requirements are subject to change.

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

Remarks:

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

Major Title	Major in Risk Management
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Major in Risk Management aims to provide students with the skills and expertise in the theory and methodology behind the scientific process of risk management, with application to actuarial science, finance and other related areas of interest. It is designed to provide solid training in the concepts of the risk management process, statistical models and methods of risk management, and good risk management practice. Core courses in the curriculum emphasize fundamental concepts and nature of risk assessment, risk management and governance from different standpoints while elective courses provide either training in specific Risk Management disciplines or an extension of knowledge aiming to give students more modeling, technical and analytical skills in risk management, including data mining, stochastic calculus, and financial time series modeling.

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

(1) identify and categorize the various risks faced by an organization and be able to demonstrate a critical understanding of generic risk management issues and techniques
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(2) analyze and assess risk management situations, and be able to deal with qualitative as well as quantitative aspects appropriate to the situation
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(3) critically evaluate and make effective use of models and techniques for risk assessment and management, and appraise the related ethical issues
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(4) make informed risk management decisions, employ any techniques necessary to acquire and interpret relevant data and information from different sources and the factors that influence their perceptions of risk identification, risk reduction, risk mitigation and risk transfer
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(5) communicate and collaborate with people effectively on risk management issues
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)
(6) gain insights into current advances in risk management through either project or industrial training
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Statistics
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

STAT3600	Linear statistical analysis (6)
STAT3609	The statistics of investment risk (6)

STAT3615	Practical mathematics for investment (6)
STAT4601	Time-series analysis (6)

Plus at least 24 credits selected from the following courses:

STAT3603	Probability modelling (6)
STAT3610	Risk management and insurance (6)
STAT3612	Data mining (6)
STAT3618	Derivatives and risk management (6)
STAT3911	Financial economics II (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT4671

STAT4672

STAT4988

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

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

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

4. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

Objectives:
The Major in Statistics focuses on the study of statistics, a scientific discipline characterized by the development and applications of analytical and quantitative tools which involve logical thinking, problem formulation, probability reasoning and intensive data analyses. The programme aims to equip students with powerful mathematical, analytical and computational skills, which are in great demand in practical areas where data are obtained for the purpose of extracting information in support of decision making. It gives students a strong background in statistical concepts, and provides broad and solid training in applied statistical methodologies. The curriculum is constantly revised to meet a steadily rising demand for specialist statisticians or quantitative analysts in government, business, finance, industry, as well as in research and teaching in local and overseas institutions.

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

(1) receive solid training in probability and statistics, gain insight into their underlying theory and be acquainted with their state-of-the-art applications in the modern world
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(2) conduct meticulous data analyses, supported by rigorous statistical reasoning, to make informed decisions in the face of uncertainty that arises in all sorts of institutions and companies, and appraise the related ethical issues
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(3) equip with hands-on experience in data analysis using commercial statistical software, and be competent for data-analytic jobs which require advanced computational skills
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(4) be highly motivated to explore cross-disciplinary applications of statistics in a broad variety of academic or professional areas including, in particular, mathematics, natural sciences, economics, finance, business, risk management, actuarial work, social sciences and engineering
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(5) communicate and collaborate with people effectively on probability and statistical issues
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)
(6) through the understanding and application of statistical concepts and techniques, gain confidence to meet challenges posed by increasingly complicated real-life problems encountered in the modern era in a creative and rational manner
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

STAT3600	Linear statistical analysis (6)

STAT3616	Advanced SAS programming (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Plus at least 24 credits from Lists A and B, among which at least 6 credits from List A:

List A:

STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)
STAT3604	Design and analysis of experiments (6)
STAT3620	Modern nonparametric statistics (6)

List B:

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3617	Sample survey methods (6)
STAT3955	Survival analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT4671

STAT4672

STAT4988

Notes:

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

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

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

4. Courses at the advanced level and capstone requirements are subject to change.

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

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

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

Objectives:
The Major in Statistics focuses on the study of statistics, a scientific discipline characterized by the development and applications of analytical and quantitative tools which involve logical thinking, problem formulation, probability reasoning and intensive data analyses. The programme aims to equip students with powerful mathematical, analytical and computational skills, which are in great demand in practical areas where data are obtained for the purpose of extracting information in support of decision making. It gives students a strong background in statistical concepts, and provides broad and solid training in applied statistical methodologies. The curriculum is constantly revised to meet a steadily rising demand for specialist statisticians or quantitative analysts in government, business, finance, industry, as well as in research and teaching in local and overseas institutions.

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

(1) receive solid training in probability and statistics, gain insight into their underlying theory and be acquainted with their state-of-the-art applications in the modern world
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(2) conduct meticulous data analyses, supported by rigorous statistical reasoning, to make informed decisions in the face of uncertainty that arises in all sorts of institutions and companies, and appraise the related ethical issues
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(3) equip with hands-on experience in data analysis using commercial statistical software, and be competent for data-analytic jobs which require advanced computational skills
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(4) be highly motivated to explore cross-disciplinary applications of statistics in a broad variety of academic or professional areas including, in particular, mathematics, natural sciences, economics, finance, business, risk management, actuarial work, social sciences and engineering
(by means of coursework, tutorial classes and/or project-based learning in the curriculum)
(5) communicate and collaborate with people effectively on probability and statistical issues
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)
(6) through the understanding and application of statistical concepts and techniques, gain confidence to meet challenges posed by increasingly complicated real-life problems encountered in the modern era in a creative and rational manner
(by means of coursework, tutorial classes, project-based and/or capstone learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Minor in Risk Management
Minor in Statistics

Required courses (96 credits)

1. Introductory level courses (42 credits)

Science Foundation Courses (12 credits)

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

Disciplinary Courses (30 credits)

MATH1013	University mathematics II (6)
STAT1600	Statistics: ideas and concepts (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (48 credits)

STAT3600	Linear statistical analysis (6)

STAT3616	Advanced SAS programming (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Plus at least 24 credits from Lists A and B, among which at least 6 credits from List A:

List A:

STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)
STAT3604	Design and analysis of experiments (6)
STAT3620	Modern nonparametric statistics (6)

List B:

STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)
STAT3608	Statistical genetics (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3617	Sample survey methods (6)
STAT3955	Survival analysis (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

STAT4671

STAT4672

STAT4988

Notes:

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

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

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

4. Courses at the advanced level and capstone requirements are subject to change.

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

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

SECTION VI

Science Minors on offer in 2013/14

SCIENCE

SECTION VI   Science Minors on offer in 2013/14

Minors offered by Science Faculty

Minors (16)

Actuarial Studies
Astronomy
Biochemistry
Chemistry
Computational & Financial Mathematics
Earth Sciences
Ecology & Biodiversity
Environmental Science
Food & Nutritional Science
Marine Biology
Mathematics
Molecular Biology & Biotechnology
Physics
Plant Science
Risk Management
Statistics

Minor Title	Minor in Actuarial Studies
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Actuarial Studies aims to provide interested students with an introduction to the basic concepts and methodologies in Actuarial Science. The minor curriculum is designed particularly for students from different majors to enhance their interests in Actuarial Science and to strengthen their confidence and potential in solving mathematical, financial, economical and investment-related problems.

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

(1) understand and apply the methods used by actuaries to solve problems of insurance, investment, pension, financial risk management and demography
(by means of coursework and tutorial classes and/or research-based project in the curriculum)
(2) develop and apply problem-solving skills appropriate to the level of the preliminary education component specified by international actuarial bodies such as the Society of Actuaries
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combination:
Bachelor of Science in Actuarial Science

Required courses (42 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

FINA1310	Corporate finance (6)
MATH1013	University mathematics II (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2605	Demographic and socio-economic statistics (6)
STAT2901	Probability and statistics: foundations of actuarial science (6)

2. Advanced level courses (30 credits)

At least 30 credits selected from the following courses:

STAT3615	Practical mathematics for investment (6)
STAT3901	Life contingencies (6)
STAT3904	Corporate finance for actuarial science (6)
STAT3906	Risk theory I (6)
STAT3908	Credibility theory and loss distributions (6)
STAT3910	Financial economics I (6)
STAT3911	Financial economics II (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Actuarial Studies
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Actuarial Studies aims to provide interested students with an introduction to the basic concepts and methodologies in Actuarial Science. The minor curriculum is designed particularly for students from different majors to enhance their interests in Actuarial Science and to strengthen their confidence and potential in solving mathematical, financial, economical and investment-related problems.

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

(1) understand and apply the methods used by actuaries to solve problems of insurance, investment, pension, financial risk management and demography
(by means of coursework and tutorial classes and/or research-based project in the curriculum)
(2) develop and apply problem-solving skills appropriate to the level of the preliminary education component specified by international actuarial bodies such as the Society of Actuaries
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combination:
Bachelor of Science in Actuarial Science

Required courses (42 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

FINA1310	Corporate finance (6)
MATH1013	University mathematics II (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)
STAT2605	Demographic and socio-economic statistics (6)
STAT2901	Probability and statistics: foundations of actuarial science (6)

2. Advanced level courses (30 credits)

At least 30 credits selected from the following courses:

STAT3615	Practical mathematics for investment (6)
STAT3901	Life contingencies (6)
STAT3904	Corporate finance for actuarial science (6)
STAT3906	Risk theory I (6)
STAT3908	Credibility theory and loss distributions (6)
STAT3910	Financial economics I (6)
STAT3911	Financial economics II (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
The Minor in Astronomy is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses to allow them to pursue their interests in the subject and to establish connections between the field of astronomy and other science disciplines.

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

(1) identify and describe astrophysical phenomena with fundamental knowledge in physics
(by means of coursework and tutorial classes in the curriculum)
(2) develop their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature
(by means of coursework, tutorial classes, and opportunities of field activities in the curriculum)
(3) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Astronomy

Required courses (42 credits)

1. Introductory level courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS6650	Stellar atmospheres (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

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

Objectives:
The Minor in Astronomy is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses to allow them to pursue their interests in the subject and to establish connections between the field of astronomy and other science disciplines.

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

(1) identify and describe astrophysical phenomena with fundamental knowledge in physics
(by means of coursework and tutorial classes in the curriculum)
(2) develop their scientific intuition, abilities and techniques to tackle astrophysical problems either theoretical or observational in nature
(by means of coursework, tutorial classes, and opportunities of field activities in the curriculum)
(3) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Astronomy

Required courses (42 credits)

1. Introductory level courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS1650	Nature of the universe (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

PHYS3650	Observational astronomy (6)
PHYS3651	The physical universe (6)
PHYS3652	Principles of astronomy (6)
PHYS4650	Stellar physics (6)
PHYS4651	Selected topics in astrophysics (6)
PHYS4652	Planetary science (6)
PHYS4653	Cosmology (6)
PHYS4654	General relativity (6)
PHYS4655	Interstellar medium (6)
PHYS6650	Stellar atmospheres (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

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

Objectives:
The Minor in Biochemistry is designed to provide students from all backgrounds with a multidisciplinary perspective on contemporary biochemistry and molecular biology. This minor curriculum incorporates significant flexibility to allow students to select courses that will complement the individual student's Major.

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

(1) describe the fundamentals of biochemistry and molecular biology, and apply biochemical knowledge appropriately and effectively
(by means of coursework and laboratory-based learning in the curriculum)
(2) integrate knowledge regarding the structure and function of biological molecules and how they come together to form the systems that make up life
(by means of coursework and laboratory-based learning in the curriculum)
(3) develop a general interest in biochemistry and recognize the inter-relationship of biochemistry with other disciplines
(by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Biochemistry

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
BIOC2600	Basic biochemistry (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

BIOC3601	Basic Metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOC3607	
BIOL3202	Nutritional biochemistry (6)
BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOC4610	Advanced biochemistry (6)
BIOC4612	Molecular biology of the gene (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

BIOL4417	'Omics' and systems biology (6)
CHEM4444	Chemical Biology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
The Minor in Biochemistry is designed to provide students from all backgrounds with a multidisciplinary perspective on contemporary biochemistry and molecular biology. This minor curriculum incorporates significant flexibility to allow students to select courses that will complement the individual student's Major.

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

(1) describe the fundamentals of biochemistry and molecular biology, and apply biochemical knowledge appropriately and effectively
(by means of coursework and laboratory-based learning in the curriculum)
(2) integrate knowledge regarding the structure and function of biological molecules and how they come together to form the systems that make up life
(by means of coursework and laboratory-based learning in the curriculum)
(3) develop a general interest in biochemistry and recognize the inter-relationship of biochemistry with other disciplines
(by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Biochemistry

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOC1600	Perspectives in biochemistry (6)
BIOL1110	From molecules to cells (6)
BIOC2600	Basic biochemistry (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

BIOC3601	Basic Metabolism (6)
BIOC3604	Essential techniques in biochemistry and molecular biology (6)
BIOC3605	Sequence bioinformatics (6)
BIOC3606	Molecular medicine (6)
BIOC3607	
BIOL3202	Nutritional biochemistry (6)
BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOC4610	Advanced biochemistry (6)
BIOC4612	Molecular biology of the gene (6)
BIOC4613	Advanced techniques in biochemistry & molecular biology (6)

BIOL4417	'Omics' and systems biology (6)
CHEM4444	Chemical Biology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
The Minor in Chemistry aims to provide students with fundamental knowledge and skills of chemistry. The minor curriculum is flexible. Students of different majors in science and other disciplines will be able to select courses that complement their major areas of study as well as enhance their knowledge in chemistry.

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

(1) understand and apply the basic concepts of chemistry
(by means of coursework and laboratory-based learning in the curriculum)
(2) apply chemistry concepts in other subjects
(by means of coursework and laboratory-based learning in the curriculum)
(3) transfer the basic concepts to complement their major area of study
(by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Chemistry

Required courses (42 credits)

1. Introductory level courses (18 credits)

CHEM1042	General chemistry (6)	

Plus at least 12 credits selected from the following courses:

CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2442	Fundamentals of organic chemistry (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2541	Physical chemistry I (6)	

2. Advanced level courses (24 credits)

At least 24 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level), subject to prerequisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

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

Objectives:
The Minor in Chemistry aims to provide students with fundamental knowledge and skills of chemistry. The minor curriculum is flexible. Students of different majors in science and other disciplines will be able to select courses that complement their major areas of study as well as enhance their knowledge in chemistry.

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

(1) understand and apply the basic concepts of chemistry
(by means of coursework and laboratory-based learning in the curriculum)
(2) apply chemistry concepts in other subjects
(by means of coursework and laboratory-based learning in the curriculum)
(3) transfer the basic concepts to complement their major area of study
(by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Chemistry

Required courses (42 credits)

1. Introductory level courses (18 credits)

CHEM1042	General chemistry (6)	

Plus at least 12 credits selected from the following courses:

CHEM2041	Principles of chemistry (6)	
CHEM2241	Analytical chemistry I (6)	
CHEM2341	Inorganic chemistry I (6)	
CHEM2441	Organic chemistry I (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2442	Fundamentals of organic chemistry (6)	CHEM2441 and CHEM2442 are mutually exclusive.
CHEM2541	Physical chemistry I (6)	

2. Advanced level courses (24 credits)

At least 24 credits of advanced level Chemistry courses (CHEM3XXX or CHEM4XXX level), subject to prerequisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Minor Title	Minor in Computational & Financial Mathematics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Computational & Financial Mathematics provides students with fundamental knowledge in both computational mathematics and financial mathematics. It is specifically designed for students who are interested in the above subjects and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving and skills to tackle novel situations and ill-defined problems. It is particularly useful for solving mathematical problems arising from computational sciences and financial industry.

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

(1) understand and describe fundamental concepts in computational and financial mathematics
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) apply mathematical methods and analysis to real life problems
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(3) communicate and discuss scientific issues related to mathematics
(by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Minor in Mathematics

Required courses (42 credits)

1. Introductory level courses (18 credits) (note 4)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (24 credits)

MATH3601	Numerical analysis (6)
MATH3906	Financial calculus (6)

Plus at least 12 credits selected from the following courses:

MATH3408	Computational methods and differential equations with applications (6)
MATH3603	Probability theory (6)
MATH3904	Introduction to optimization (6)
MATH3911	Game theory and strategy (6)
MATH4602	Scientific computing (6)
MATH4907	Numerical methods for financial calculus (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

3. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take

this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

4. Students having completed the two courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits Introductory Level Courses requirement of Computational & Financial Mathematics Minor. Such students should, however, take at least 30 credits of advanced courses in order to fulfil the credit requirement of the Minor.

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

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

Minor Title	Minor in Computational & Financial Mathematics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Computational & Financial Mathematics provides students with fundamental knowledge in both computational mathematics and financial mathematics. It is specifically designed for students who are interested in the above subjects and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving and skills to tackle novel situations and ill-defined problems. It is particularly useful for solving mathematical problems arising from computational sciences and financial industry.

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

(1) understand and describe fundamental concepts in computational and financial mathematics
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) apply mathematical methods and analysis to real life problems
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(3) communicate and discuss scientific issues related to mathematics
(by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Minor in Mathematics

Required courses (42 credits)

1. Introductory level courses (18 credits) (note 4)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (24 credits)

MATH3601	Numerical analysis (6)
MATH3906	Financial calculus (6)

Plus at least 12 credits selected from the following courses:

MATH3408	Computational methods and differential equations with applications (6)
MATH3603	Probability theory (6)
MATH3904	Introduction to optimization (6)
MATH3911	Game theory and strategy (6)
MATH4602	Scientific computing (6)
MATH4907	Numerical methods for financial calculus (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

3. Students must have level 2 or above in HKDSE Extended Module 1 or 2 of Mathematics or equivalent to take

this major. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I.

4. Students having completed the two courses MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits Introductory Level Courses requirement of Computational & Financial Mathematics Minor. Such students should, however, take at least 30 credits of advanced courses in order to fulfil the credit requirement of the Minor.

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

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

Minor Title	Minor in Earth Sciences
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Earth Sciences aims to provide interested students with an introduction to the fundamental structure, process and history of the Earth. The minor curriculum is designed particularly to provide students from different majors the flexibility to select courses to enhance their interests in Earth Sciences or to complement their major of study.

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

(1) understand and describe the methods used by the Earth scientists to study the Earth systems
(by means to coursework, tutorial classes and field-based learning in the curriculum)
(2) understand and describe the basic nomenclature used in Earth Sciences
(by means to coursework, tutorial classes and field-based learning in the curriculum)
(3) discuss and comment critically issues related to the Earth Sciences in media reports
(by means to coursework, tutorial classes and field-based learning in the curriculum)

Impermissible Combination:
Major in Earth System Science
Major in Geology

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

EASC1401	Blue planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)

2. Advanced level courses (24 credits)

At least 24 credits of advanced level Earth Sciences courses (EASC3XXX or EASC4XXX level), subject to prerequisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Earth Sciences
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Earth Sciences aims to provide interested students with an introduction to the fundamental structure, process and history of the Earth. The minor curriculum is designed particularly to provide students from different majors the flexibility to select courses to enhance their interests in Earth Sciences or to complement their major of study.

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

(1) understand and describe the methods used by the Earth scientists to study the Earth systems
(by means to coursework, tutorial classes and field-based learning in the curriculum)
(2) understand and describe the basic nomenclature used in Earth Sciences
(by means to coursework, tutorial classes and field-based learning in the curriculum)
(3) discuss and comment critically issues related to the Earth Sciences in media reports
(by means to coursework, tutorial classes and field-based learning in the curriculum)

Impermissible Combination:
Major in Earth System Science
Major in Geology

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

EASC1401	Blue planet (6)
EASC1402	Principles of geology (6)
EASC2401	Fluid/solid interactions in earth processes (6)

2. Advanced level courses (24 credits)

At least 24 credits of advanced level Earth Sciences courses (EASC3XXX or EASC4XXX level), subject to prerequisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
This Minor in Ecology & Biodiversity is an ideal introduction to the natural world, the species and ecosystems it comprises and the biological rules it follows. It aims to allow students to learn about general ecological principles and the local flora and fauna of the region, and the conservation challenges that will need to be addressed in a rapidly-changing world. Students will be able to build upon this basic knowledge developed at the introductory level by selecting from among a wide range of courses that offer learning opportunities through practical and field work, as well as traditional and virtual teaching, in more specialized areas of ecology and biodiversity.

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

(1) appreciate and describe the importance of ecology and biodiversity, and the importance of the variety of life to humans
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) understand and describe the impacts of environmental change and the causes and consequences of biodiversity loss
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) appreciate and describe the ecological principles underlying different policies and plans for biodiversity conservation and sustainable development in Hong Kong and elsewhere
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Ecology & Biodiversity

Required courses (36 credits)

1. Introductory level courses (12 credits)

BIOL1309	Evolutionary diversity (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)
BIOL3304	Fish biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4305	

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
This Minor in Ecology & Biodiversity is an ideal introduction to the natural world, the species and ecosystems it comprises and the biological rules it follows. It aims to allow students to learn about general ecological principles and the local flora and fauna of the region, and the conservation challenges that will need to be addressed in a rapidly-changing world. Students will be able to build upon this basic knowledge developed at the introductory level by selecting from among a wide range of courses that offer learning opportunities through practical and field work, as well as traditional and virtual teaching, in more specialized areas of ecology and biodiversity.

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

(1) appreciate and describe the importance of ecology and biodiversity, and the importance of the variety of life to humans
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) understand and describe the impacts of environmental change and the causes and consequences of biodiversity loss
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) appreciate and describe the ecological principles underlying different policies and plans for biodiversity conservation and sustainable development in Hong Kong and elsewhere
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Ecology & Biodiversity

Required courses (36 credits)

1. Introductory level courses (12 credits)

BIOL1309	Evolutionary diversity (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

BIOL3301	Marine biology (6)
BIOL3302	Systematics and phylogenetics (6)
BIOL3303	Conservation ecology (6)
BIOL3304	Fish biology (6)
BIOL3313	Freshwater ecology (6)
BIOL3314	Plant structure and evolution (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3319	Terrestrial ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)
BIOL4302	Environmental impact assessment (6)
BIOL4303	Animal behaviour (6)
BIOL4305	

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course

appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
The Minor in Environmental Science aims to provide students with an introduction to some complex environmental issues. Students will gain ecological and physical knowledge of the environment, become literate in issues related to environmental sustainability, monitoring and management, and be able to explore interdisciplinary solutions to these problems. This training will help student understand certain aspects of the environment and possible ways to solving environmental problems which will be useful to students to enhance their career prospects.

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

(1) identify and describe different components of the environmental systems and key issues in environmental science
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) gain skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods
(by means of laboratory-based, project-based, presentation opportunities and capstone learning in the curriculum)

Impermissible Combination:
Major in Environmental Science

Required courses (42 credits)

1. Introductory level courses (18 credits)

ENVS1401	Introduction to environmental science (6)

Plus at least 12 credits selected from the following courses (Level 1 & 2):

CHEM1042	General chemistry (6)
CHEM2041	Principles of chemistry (6)
EASC1020	Introduction to climate science (6)
EASC1401	Blue planet (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS1301	Environmental life science (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (24 credits)

ENVS3004	Environment, society and economics (6)

Plus at least 18 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
BIOL4302	Environmental impact assessment (6)
CHEM3141	Environmental chemistry (6)

CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban Ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Objectives:
The Minor in Environmental Science aims to provide students with an introduction to some complex environmental issues. Students will gain ecological and physical knowledge of the environment, become literate in issues related to environmental sustainability, monitoring and management, and be able to explore interdisciplinary solutions to these problems. This training will help student understand certain aspects of the environment and possible ways to solving environmental problems which will be useful to students to enhance their career prospects.

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

(1) identify and describe different components of the environmental systems and key issues in environmental science
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) observe, describe, measure and analyze physical, biological and chemical characteristics of natural and man-made environments
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) appropriately use and critically analyze a range of forms and sources of environmental data, and assess environmental problems
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) gain skills in scientific inquiry and effective communication of global environmental problems, issues of resource management, policies and management methods
(by means of laboratory-based, project-based, presentation opportunities and capstone learning in the curriculum)

Impermissible Combination:
Major in Environmental Science

Required courses (42 credits)

1. Introductory level courses (18 credits)

ENVS1401	Introduction to environmental science (6)

Plus at least 6 credits selected from the following courses (Level 1):

CHEM1042	General chemistry (6)
EASC1401	Blue planet (6)
ENVS1301	Environmental life science (6)

Plus at least 6 credits selected from the following courses (Level 2):

BIOL2102	Biostatistics (6)
CHEM2041	Principles of chemistry (6)
EASC2404	Introduction to atmosphere and hydrosphere (6)
ENVS2001	Environmental field and lab course (6)
ENVS2002	Environmental data analysis (6)

2. Advanced level courses (24 credits)

ENVS3004	Environment, society and economics (6)

Plus at least 18 credits selected from the following courses:

BIOL3110	Environmental toxicology (6)
BIOL3303	Conservation ecology (6)
BIOL4302	Environmental impact assessment (6)

CHEM3141	Environmental chemistry (6)
CHEM3241	Analytical chemistry II: chemical instrumentation (6)
CHEM3242	Food and water analysis (6)
EASC3020	Global change: anthropogenic impacts (6)
EASC3405	Environmental remote sensing (6)
ENVS3006	Environmental radiation (6)
ENVS3007	Natural hazards and mitigation (6)
ENVS3010	Sustainable energy and environment (6)
ENVS3019	Urban Ecology (6)
ENVS3020	Global change ecology (6)
ENVS3042	Pollution (6)
ENVS3313	Environmental oceanography (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Food and Nutritional Science aims to provide a comprehensive education in food, nutrition and related sociological and technological topics, enabling graduates to develop their interest in food and nutrition and have a wide range of employment and progression options.

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

(1) demonstrate broad knowledge in the field of food and nutritional science
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) recognize and describe the health risks associated with food and specific nutrients, and discuss how to prevent these risks
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) understand and describe ethical perspectives and practice in food product development, food safety and public health nutrition
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) synthesize and summarize information from a wide range of sources and draw reasoned conclusions with particular reference to food and nutritional sciences and related global and commercial issues
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Food & Nutritional Science

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)
BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)
BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)

BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Food & Nutritional Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Food and Nutritional Science aims to provide a comprehensive education in food, nutrition and related sociological and technological topics, enabling graduates to develop their interest in food and nutrition and have a wide range of employment and progression options.

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

(1) demonstrate broad knowledge in the field of food and nutritional science
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(2) recognize and describe the health risks associated with food and specific nutrients, and discuss how to prevent these risks
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(3) understand and describe ethical perspectives and practice in food product development, food safety and public health nutrition
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)
(4) synthesize and summarize information from a wide range of sources and draw reasoned conclusions with particular reference to food and nutritional sciences and related global and commercial issues
(by means of coursework, tutorial classes and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Food & Nutritional Science

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1201	Introduction to food and nutrition (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

BIOL3201	Food chemistry (6)
BIOL3202	Nutritional biochemistry (6)
BIOL3203	Food microbiology (6)
BIOL3204	Nutrition and the life cycle (6)
BIOL3205	Human physiology (6)
BIOL3206	Clinical nutrition (6)
BIOL3207	Food and nutritional toxicology (6)
BIOL3208	Food safety and quality management (6)
BIOL3209	Food and nutrient analysis (6)
BIOL3210	Grain production and utilization (6)
BIOL3211	Nutrigenomics (6)
BIOL4201	Public health nutrition (6)
BIOL4204	Diet, brain function and behavior (6)

BIOL4205	Food processing and engineering (6)
BIOL4207	Meat and dairy sciences (6)
BIOL4209	Functional foods (6)
BIOL4210	Food product development (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Marine Biology
Offered to students admitted to Year 1 in	**2013**

Objectives:
The field of marine biology has become increasingly popular as interest in and awareness of our marine environment grows. Hong Kong already has strong cultural and historical links with the sea as well as a strong economic and societal interest in natural marine resources. This Minor aims to introduce students to the field of marine biology from species, habitat and ecosystem levels, ranging from the deep ocean to intertidal environments, and from both theoretical and practical perspectives. Material will be global and include organisms and their physical, behavioral and physiological adaptations to the marine environment, as well as techniques for marine study, Major marine issues will be covered including benefits derived from the marine environment and possible implications of climate change for marine systems. Particularly relevant examples from Hong Kong and the Southeast Asia region will be highlighted. This minor will provide students from diverse backgrounds (e.g.business, engineering and social science) an excellent opportunity to enter into a career or research in marine environment-related fields such as coastal ecosystem management, fisheries, marine environmental protection, marine resource management, etc.

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

(1) appreciate the requirements and constraints to life in different marine environments
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(2) gain a comprehensive foundation for pursuing marine-orientated studies
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(3) have a general insight into an ecosystem that covers two-thirds of the planet and supports the only remaining natural resource harvested on a large scale
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(4) understand the major marine issues both locally and globally
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(5) appreciate the possible implications of climate change on marine systems
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)
ENVS1301	Environmental life science (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

BIOL3301	Marine biology (6)
ENVS3313	Environmental oceanography (6)

Plus at least 12 credits selected from the following courses:

BIOL3303	Conservation ecology (6)
BIOL3304	Fish biology (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Marine Biology
Offered to students admitted to Year 1 in	**2012**

Objectives:
The field of marine biology has become increasingly popular as interest in and awareness of our marine environment grows. Hong Kong already has strong cultural and historical links with the sea as well as a strong economic and societal interest in natural marine resources. This Minor aims to introduce students to the field of marine biology from species, habitat and ecosystem levels, ranging from the deep ocean to intertidal environments, and from both theoretical and practical perspectives. Material will be global and include organisms and their physical, behavioral and physiological adaptations to the marine environment, as well as techniques for marine study, Major marine issues will be covered including benefits derived from the marine environment and possible implications of climate change for marine systems. Particularly relevant examples from Hong Kong and the Southeast Asia region will be highlighted. This minor will provide students from diverse backgrounds (e.g.business, engineering and social science) an excellent opportunity to enter into a career or research in marine environment-related fields such as coastal ecosystem management, fisheries, marine environmental protection, marine resource management, etc.

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

(1) appreciate the requirements and constraints to life in different marine environments
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(2) gain a comprehensive foundation for pursuing marine-orientated studies
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(3) have a general insight into an ecosystem that covers two-thirds of the planet and supports the only remaining natural resource harvested on a large scale
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(4) understand the major marine issues both locally and globally
(by means of coursework, labtoratory-based, and tutorial classes and project-based learning in the curriculum)
(5) appreciate the possible implications of climate change on marine systems
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)
ENVS1301	Environmental life science (6)
BIOL2306	Ecology and evolution (6)

2. Advanced level courses (24 credits)

BIOL3301	Marine biology (6)
ENVS3313	Environmental oceanography (6)

Plus at least 12 credits selected from the following courses:

BIOL3303	Conservation ecology (6)
BIOL3304	Fish biology (6)
BIOL3318	Experimental intertidal ecology (6)
BIOL3320	The biology of marine mammals (6)
BIOL4301	Fish and fisheries (6)

Notes:

1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

Remarks:

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

Minor Title	Minor in Mathematics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Mathematics provides students with fundamental knowledge in the subject. It is specifically designed for students who are interested in the subject and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems.

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

(1) understand and describe fundamental concepts of mathematics
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) apply mathematical methods and analysis to real life problems
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(3) communicate and discuss scientific issues related to mathematics.
(by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics

Required courses (36 credits)

1. Introductory level courses (18 credits) (note 5)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (18 credits)

At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH6XXX level), subject to pre-requisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

4. If students would like to take more courses in analysis such as MATH3401 (Analysis I), they are advised to take the introductory course MATH2241 Introduction to mathematical analysis first.

5. Students having completed the two courses MATH1821 Mathematical methods for actuarial Science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits introductory level courses requirement of Mathematics minor. Such students should, however, take at least 24 credits of advanced courses in order to fulfil the credit requirement of the minor.

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

Remarks:

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

Minor Title	Minor in Mathematics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Mathematics provides students with fundamental knowledge in the subject. It is specifically designed for students who are interested in the subject and those whose majors require sophisticated mathematical skills. It aims to nurture quantitative reasoning, logical, analytical and critical thinking, innovative imagination, meticulous care to work, ability to conceptualize, skills for problem-solving, and capability to tackle novel situations and ill-defined problems.

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

(1) understand and describe fundamental concepts of mathematics
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) apply mathematical methods and analysis to real life problems
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(3) communicate and discuss scientific issues related to mathematics.
(by means of coursework, tutorial classes and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics
Major in Mathematics/Physics
Minor in Computational & Financial Mathematics

Required courses (36 credits)

1. Introductory level courses (18 credits) (note 5)

MATH1013	University mathematics II (6)
MATH2101	Linear algebra I (6)
MATH2211	Multivariable calculus (6)

2. Advanced level courses (18 credits)

At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH6XXX level), subject to pre-requisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

4. If students would like to take more courses in analysis such as MATH3401 (Analysis I), they are advised to take the introductory course MATH2241 Introduction to mathematical analysis first.

5. Students having completed the two courses MATH1821 Mathematical methods for actuarial Science I and MATH2822 Mathematical methods for actuarial science II are deemed to have satisfied the 18 credits introductory level courses requirement of Mathematics minor. Such students should, however, take at least 24 credits of advanced courses in order to fulfil the credit requirement of the minor.

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

Remarks:

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

Minor Title	Minor in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Molecular Biology & Biotechnology aims to provide students with a fundamental understanding of molecular biology and biotechnology which are relevant to many other disciplines of study and our daily life. Students will learn the principles underlying current molecular and cell biology advances, and biotechnological applications and will become literate in biotechnology business and advancements.

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

(1) develop and apply basic technical and knowledge-based skills in molecular and cell biology, and biotechnology
(by means of coursework and laboratory-based learning in the curriculum)
(2) develop and apply skills of critical inquiry, teamwork, and effective communication
(by means of group projects, tutorial classes and presentation opportunities in the curriculum)
(3) understand and describe the issues and concerns fundamental to the field
(by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Molecular Biology & Biotechnology

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2306	Ecology and evolution (6)	

2. Advanced level courses (24 credits)

BIOL3401	Molecular biology (6)

Plus at least 18 credits selected from the following courses:

BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3407	Fermentation technology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Molecular Biology & Biotechnology
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Molecular Biology & Biotechnology aims to provide students with a fundamental understanding of molecular biology and biotechnology which are relevant to many other disciplines of study and our daily life. Students will learn the principles underlying current molecular and cell biology advances, and biotechnological applications and will become literate in biotechnology business and advancements.

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

(1) develop and apply basic technical and knowledge-based skills in molecular and cell biology, and biotechnology (by means of coursework and laboratory-based learning in the curriculum)
(2) develop and apply skills of critical inquiry, teamwork, and effective communication
(by means of group projects, tutorial classes and presentation opportunities in the curriculum)
(3) understand and describe the issues and concerns fundamental to the field
(by means of coursework and laboratory-based learning in the curriculum)

Impermissible Combination:
Major in Molecular Biology & Biotechnology

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)	
BIOL2220	Principles of biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOC2600	Basic biochemistry (6)	May take either BIOL2220 or BIOC2600 to fulfill this 12 credits requirement, but not both.
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2306	Ecology and evolution (6)	

2. Advanced level courses (24 credits)

BIOL3401	Molecular biology (6)

Plus at least 18 credits selected from the following courses:

BIOL3402	Cell biology and cell technology (6)
BIOL3403	Immunology (6)
BIOL3407	Fermentation technology (6)
BIOL3409	Business aspects of biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4402	Microbial biotechnology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Physics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Physics is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses which provides them to pursue a wide range of topics from the very small scale of nanomaterials to the large scale of astrophysics.

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

(1) identify and describe physical systems with fundamental knowledge in physics
(by means of coursework and tutorial classes in the curriculum)
(2) analyze some physics problems qualitatively and quantitatively
(by means of coursework, tutorial classes and laboratory works in the curriculum)
(3) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics/Physics
Major in Physics

Required courses (42 credits)

1. Introductory level courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

At least 24 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Minor Title	Minor in Physics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Physics is intended to provide interested students with a fundamental outlook on the subject. Students would acquire a taste of the subject through a large selection of elective courses which provides them to pursue a wide range of topics from the very small scale of nanomaterials to the large scale of astrophysics.

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

(1) identify and describe physical systems with fundamental knowledge in physics
(by means of coursework and tutorial classes in the curriculum)
(2) analyze some physics problems qualitatively and quantitatively
(by means of coursework, tutorial classes and laboratory works in the curriculum)
(3) communicate and collaborate with people effectively in scientific issues
(by means of group projects, tutorial sessions and presentation opportunities in the curriculum)

Impermissible Combination:
Major in Mathematics/Physics
Major in Physics

Required courses (42 credits)

1. Introductory level courses (18 credits)

PHYS1250	Fundamental physics (6)
PHYS2250	Introductory mechanics (6)
PHYS2265	Modern physics (6)

2. Advanced level courses (24 credits)

At least 24 credits of advanced level Physics courses (PHYS3XXX or PHYS4XXX or PHYS6XXX level), subject to prerequisite requirements.

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

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

Minor Title	Minor in Plant Science
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Plant Science is offered to students who are fascinated by the diversity and beauty of plants and the molecular mechanisms underlying their growth and development. Knowledge in plant science is essential for tackling daily-life issues such as the production of high-quality food, utilization of plant products as biofuels and extraction of beneficial phytochemicals. Recent advances in plant genetic engineering have also allowed scientists to manipulate plant growth and development for nutritional and environmental benefits. This minor aims to provide broad training in the biology of plants from the molecular to the organism level as well as the agricultural and nutritional applications of plants and plant-derived products.

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

(1) appreciate plants as an important part in our culture and their functions and roles in food, nutrition, and environment
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
(2) understand and describe the fundamental concepts of plant evolution, anatomy, biochemistry, physiology and biotechnology
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
(3) acquire necessary academic and practical skills for careers in government agencies, secondary school teaching and postgraduate research in different disciplines of plant science
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

BIOL3107	Plant physiology (6)
BIOL3210	Grain production and utilization (6)
BIOL3314	Plant structure and evolution (6)
BIOL3408	Genetics (6)
BIOL4209	Functional foods (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Plant Science
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Plant Science is offered to students who are fascinated by the diversity and beauty of plants and the molecular mechanisms underlying their growth and development. Knowledge in plant science is essential for tackling daily-life issues such as the production of high-quality food, utilization of plant products as biofuels and extraction of beneficial phytochemicals. Recent advances in plant genetic engineering have also allowed scientists to manipulate plant growth and development for nutritional and environmental benefits. This minor aims to provide broad training in the biology of plants from the molecular to the organism level as well as the agricultural and nutritional applications of plants and plant-derived products.

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

(1) appreciate plants as an important part in our culture and their functions and roles in food, nutrition, and environment
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
(2) understand and describe the fundamental concepts of plant evolution, anatomy, biochemistry, physiology and biotechnology
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)
(3) acquire necessary academic and practical skills for careers in government agencies, secondary school teaching and postgraduate research in different disciplines of plant science
(by means of coursework, labtoratory-based, and tutorial class and project-based learning in the curriculum)

Impermissible Combination:
NIL

Required courses (36 credits)

1. Introductory level courses (12 credits)

At least 12 credits selected from the following courses:

BIOL1110	From molecules to cells (6)
BIOL1309	Evolutionary diversity (6)
BIOL2103	Biological sciences laboratory course (6)
BIOL2220	Principles of biochemistry (6)

2. Advanced level courses (24 credits)

At least 24 credits selected from the following courses:

BIOL3107	Plant physiology (6)
BIOL3210	Grain production and utilization (6)
BIOL3314	Plant structure and evolution (6)
BIOL3408	Genetics (6)
BIOL4209	Functional foods (6)
BIOL4411	Plant and food biotechnology (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Risk Management
Offered to students admitted to Year 1 in	**2013**

Objectives:
The Minor in Risk Management aims to provide interested students with basic concepts of risk management and fundamental skills of employing various statistical techniques for managing risk. The minor curriculum is particularly designed for students from different majors to enhance their interests in Risk Management or to complement their major of study.

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

(1) acquire basic understanding and identify the generic risk management issues and techniques
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) apply elementary methods and models for risk assessment and management
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(3) acquire and interpret relevant data and information for risk management
(by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (42 credits)

1. Introductory level courses (12 credits)

At least 6 credits selected from the following courses:

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

Plus at least 6 credits selected from the following courses:

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (30 credits)

At least 30 credits selected from the following courses:

STAT3609	The statistics of investment risk (6)
STAT3610	Risk management and insurance (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3614	Business forecasting (6)
STAT3615	Practical mathematics for investment (6)
STAT3618	Derivatives and risk management (6)
STAT4601	Time-series analysis (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and

	finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Risk Management
Offered to students admitted to Year 1 in	**2012**

Objectives:
The Minor in Risk Management aims to provide interested students with basic concepts of risk management and fundamental skills of employing various statistical techniques for managing risk. The minor curriculum is particularly designed for students from different majors to enhance their interests in Risk Management or to complement their major of study.

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

(1) acquire basic understanding and identify the generic risk management issues and techniques
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) apply elementary methods and models for risk assessment and management
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(3) acquire and interpret relevant data and information for risk management
(by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Major in Statistics
Minor in Statistics

Required courses (42 credits)

1. Introductory level courses (12 credits)

At least 6 credits selected from the following courses:

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

Plus at least 6 credits selected from the following courses:

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)

2. Advanced level courses (30 credits)

At least 30 credits selected from the following courses:

STAT3609	The statistics of investment risk (6)
STAT3610	Risk management and insurance (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3614	Business forecasting (6)
STAT3615	Practical mathematics for investment (6)
STAT3618	Derivatives and risk management (6)
STAT4601	Time-series analysis (6)
STAT4603	Current topics in risk management (6)
STAT4606	Risk management and Basel Accords in banking and

	finance (6)
STAT4607	Credit risk analysis (6)
STAT4608	Market risk analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Statistics
Offered to students admitted to Year 1 in	**2013**

Objectives:
The curriculum of the Minor in Statistics is structured specifically to cater for the general need of non-statistical disciplines and provide basic training in statistical methodologies and their applications to practical problems. It aims to provide students with a strong and rigorous sense of quantitative reasoning that has become an indispensable skill in nearly all disciplines.

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

(1) acquire basic statistical knowledge alongside their major disciplines, with emphases on correct applications of statistical methods and insightful interpretations of statistical findings
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) equip with computational skills essential to conducting complete data analyses
(by means of coursework, tutorial classes, project-based learning and presentation opportunities in the curriculum)
(3) participate proactively in large-scale, multi-disciplinary studies, determine objective findings, and provide guidance on all aspects of data collection and analyses
(by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Major in Statistics
Minor in Risk Management

Required courses (42 credits)

1. Introductory level courses (12 credits)

At least 6 credits selected from the following courses:

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

Plus at least 6 credits selected from the following courses:

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)
STAT2605	Demographic and socio-economic statistics (6)

2. Advanced level courses (30 credits)

At least 30 credits selected from the following courses:

STAT3600	Linear statistical analysis (6)
STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)
STAT3604	Design and analysis of experiments (6)
STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)

STAT3608	Statistical genetics (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3614	Business forecasting (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3620	Modern nonparametric statistics (6)
STAT3955	Survival analysis (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

Minor Title	Minor in Statistics
Offered to students admitted to Year 1 in	**2012**

Objectives:
The curriculum of the Minor in Statistics is structured specifically to cater for the general need of non-statistical disciplines and provide basic training in statistical methodologies and their applications to practical problems. It aims to provide students with a strong and rigorous sense of quantitative reasoning that has become an indispensable skill in nearly all disciplines.

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

(1) acquire basic statistical knowledge alongside their major disciplines, with emphases on correct applications of statistical methods and insightful interpretations of statistical findings
(by means of coursework, tutorial classes and project-based learning in the curriculum)
(2) equip with computational skills essential to conducting complete data analyses
(by means of coursework, tutorial classes, project-based learning and presentation opportunities in the curriculum)
(3) participate proactively in large-scale, multi-disciplinary studies, determine objective findings, and provide guidance on all aspects of data collection and analyses
(by means of coursework, tutorial classes and project-based learning in the curriculum)

Impermissible Combination:
Major in Risk Management
Major in Statistics
Minor in Risk Management

Required courses (42 credits)

1. Introductory level courses (12 credits)

At least 6 credits selected from the following courses:

STAT1601	Elementary statistical methods (6)
STAT1602	Business statistics (6)
STAT1603	Introductory statistics (6)
STAT2601	Probability and statistics I (6)

Plus at least 6 credits selected from the following courses:

STAT2602	Probability and statistics II (6)
STAT2603	Data management with SAS (6)
STAT2605	Demographic and socio-economic statistics (6)

2. Advanced level courses (30 credits)

At least 30 credits selected from the following courses:

STAT3600	Linear statistical analysis (6)
STAT3602	Statistical inference (6)
STAT3603	Probability modelling (6)
STAT3604	Design and analysis of experiments (6)
STAT3605	Quality control and management (6)
STAT3606	Business logistics (6)
STAT3607	Statistics in clinical medicine and bio-medical research (6)

STAT3608	Statistical genetics (6)
STAT3611	Computer-aided data analysis (6)
STAT3612	Data mining (6)
STAT3613	Marketing engineering (6)
STAT3614	Business forecasting (6)
STAT3616	Advanced SAS programming (6)
STAT3617	Sample survey methods (6)
STAT3620	Modern nonparametric statistics (6)
STAT3955	Survival analysis (6)
STAT4601	Time-series analysis (6)
STAT4602	Multivariate data analysis (6)

Notes:
1. Double counting of credits is not permissible for major-minor or double-minors combinations. For a course appears as a core course ("must take") in the major-minor or double-minors, students have to make up the credits by taking replacement course in the minor. For details, please refer to "Students taking double Majors, Major-Minor or double Minors with overlapping course requirements" in the BSc syllabuses.

2. Courses at the advanced level are subject to change.

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

SECTION VII

Students taking double Majors,

Major-Minor or double Minors with overlapping course requirements

SCIENCE

SECTION VII Students taking double Majors, Major-Minor or double Minors with overlapping course requirements

1. Double-counting of courses up to a maximum of 24 credits is permissible when a student with a science major opts to undertake a second major in science.

2. The double-counted courses must include SCNC1111 Scientific method and reasoning (6 credits) and SCNC1112 Fundamentals of modern science (6 credits). Additional credits to be double-counted must be for courses required (‘must take’) by both majors.

3. For cases with 24 or less double-counted credits, the student must make up an equivalent number of credits by taking other courses offered by any Faculty.

4. If more than 24 credits (including SCNC1111 & SCNC1112) are listed as required courses (“must take”) in both the first and second majors undertaken by a student, the student must make up the number of credits above the 24 permissible by taking replacement course(s) in the second major. The replacement course(s) must have the same prefix and at the same or higher level as the double-counted course(s).

5. Double counting of credits is not permissible for major–minor or double-minors combinations. When a course is required (“must take”) both by the major and minor or by both minors, the student must take a replacement course for the minor. The replacement course must have the same prefix and at the same or higher level as the course to be replaced.

6. For situations 4 and 5 above, students have to complete the form “Application for Taking a Replacement Course for the Course Required in Two Different Majors/Minors.”

SECTION VIII

Course Descriptions of BSc and Language Courses on offer in 2013-14

SCIENCE

BIOC1600 Perspectives in biochemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Biochemistry	**Quota**	---
Course Co-ordinator	Dr J Tanner, Biochemistry *(jatanner@hku.hk)*		
Teachers Involved	Dr S Bevan, Biochemistry Dr L Y L Cheng, Biochemistry Dr J Tanner, Biochemistry Dr B C W Wong, Biochemistry		
Course Objectives	- Teach students a biochemical perspective on each of the Basic Sciences focusing on concepts fundamental to the learning of Biochemistry. - Promote deep learning of course material through an integrated programme of practical and collaborative tasks. - Inspire students with a view of the great discoveries and future challenges for Biochemistry. - Help students make the transition from school to university by developing their teamwork, independent study skills and confidence to communicate within a Biochemistry learning environment.		
Course Contents & Topics	A Biochemical Perspective on the Basic Sciences A. Chemistry for Biochemistry The elements and bonding (from carbon to Coenzyme A); Resonance and orbital theory (a focus on the electron); Structure and conformation (thinking in 3 dimensions); Isomerism (from mirrors to thalidomide); Water (the universal biochemical solvent) & buffer; Quantitation in chemistry (who was Avogadro anyway?). B. Biology for Biochemistry The basic building blocks of life (proteins, DNA, lipids, carbohydrate); The Central Dogma of Molecular Biology; Evolution (considering molecular evolution); Origins of life (the chicken-egg paradox of proteins and DNA) C. Physics and Mathematics for Biochemistry Thermodynamics from a Biological Perspective; Introduction to molecular recognition and binding (DNA melting); Statistics for biochemistry (applied statistics for what you really need to know); Thinking numbers (exponentials, logs and the limits of life). D. Inspiring Biochemistry The protein (from Perutz to the frontier of proteomics); The gene (from the double helix to the human genome project and how it failed to live up to its expectations); Vitamins and disease (stories of scientific discovery motivated by human suffering); Synthetic biology (a cure to the world's energy problems or misplaced trust in dangerous technology); The challenges of modern-day genetics (will we ever really understand individuality; Drugs-successes, failures, and perhaps the most challenging business on earth.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the basics of biomolecular structure from a chemical perspective, thereby integrating the basic sciences of biology, chemistry and physics into a biochemical perspective. 2. Apply knowledge of biomolecular structure to review major discoveries and contemporary issues in molecular biology. 3. Interpret scientific data and discuss major issues in biochemistry using the scientific literature. 4. Demonstrate skills in working and collaborating together with colleagues in practicals and in presentation of scientific ideas. 5. Relate how biochemistry intersects with the three basic sciences of biology, chemistry and physics, and recognize the transition from school to university level study.		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 3 or above in HKDSE Biology, Chemistry, or Combined Science with Biology or Chemistry component, or equivalent		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			
Course Type	Lecture-based course		
Course Teaching & Learning Activities			

Grade Descriptors:

A	Exceptionally good performance demonstrating comprehensive understanding of the subject matter; critical insight into use of scientific data and the scientific literature; superior presentation and group collaboration skills.
B	Good performance demonstrating full understanding of the subject matter; coherent insight into use of scientific data and the scientific literature; good presentation and group collaboration skills.
C	Satisfactory performance demonstrating adequate understanding of the subject matter; some insight into use of scientific data and the scientific literature; some presentation and group collaboration skills.
D	Limited performance demonstrating some understanding of basic subject matter; some ability to use scientific data and the scientific literature; limited presentation and group collaboration skills.
Fail	Poor understanding of subject matter; with little to no insight into use of scientific data; no understanding of the scientific literature and unable to present or collaborate.

Course Teaching & Learning Activities:

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Group work		6
Project work		6
Reading / Self study		70
Assessment		10

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		30
	Assignments	including practical writeups	40
	Project reports	group communication project	30
Required/recommended reading and online materials	TBC		

BIOC2600 Basic biochemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Biochemistry	**Quota**	300
Course Co-ordinator	Prof D K Y Shum, Biochemistry *(shumdkhk@hku.hk)*		
Teachers Involved	Prof D K Y Shum, Biochemistry Dr J Tanner, Biochemistry Dr Z Cheung, Biochemistry		
Course Objectives	This course is designed to present an overview of biochemistry of fundamental importance to the life process. We aim to develop appreciation of the basics in biochemistry as a common ground for science and non-science students to progress into their areas of specialization. Students intending to pursue further studies in Biochemistry and Molecular Biology will find this course particularly helpful.		
Course Contents & Topics	Structure and functions of carbohydrates, lipids, nucleic acids, amino acids and proteins; enzymes and co-enzymes; basic bioenergetics; key metabolic processes in a living cell; bioregulaotry mechanisms		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Relate structures to functions of biomolecules. 2. Explain the functions of key metabolic processes. 3. Explain the significance of biological regulation.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells; and Not for students who have passed in BIOL2220 Principles of biochemistry or already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrates thorough and complete mastery of the entire range of knowledge and analytical skills as required for maximal attainment in all the course learning outcomes; excellence in critical thinking towards application of the knowledge in a range of contexts.
B	Demonstrates substantial command of a broad range of knowledge and analytical skills as required for attainment of the majority of course learning outcomes; good evidence of critical thinking towards application of the knowledge in a range of contexts.
C	Demonstrates general but incomplete command of knowledge and analytical skills as required for attainment of adequate course learning outcomes; some evidence critical thinking towards application of the knowledge in a range of contexts.
D	Demonstrates partial but limited command of knowledge and analytical skills as required for attainment of some of the course learning outcomes; limited evidence of critical thinking towards application of the knowledge in a range of contexts.
Fail	Demonstrates little or no evidence of command of knowledge and analytical skills as required for attainment of the course learning outcomes; lacking in critical thinking towards application of the knowledge in a range of contexts.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		60
	Test		20
	Assignments		20
Required/recommended reading and online materials	Nelson DL, Cox MM (2008) Lehninger Principles of Biochemistry, 5th ed. W.H. Freeman, New York. Any other Biochemistry textbooks, e.g. Berg JM, Tymoczko JL, Stryer L (2007) Biochemistry, 6th ed. W.H. Freeman, New York.		

BIOC3604 Essential techniques in biochemistry and molecular biology (6 credits)		**Academic Year**	**2013**

Offering Department	Biochemistry	**Quota**	60
Course Co-ordinator	Dr K M Yao, Biochemistry *(kmyao@hku.hk)*		
Teachers Involved	Prof D K Y Shum, Biochemistry Dr B C W Wong, Biochemistry Dr N S Wong, Biochemistry Dr K M Yao, Biochemistry Dr Z J Zhou, Biochemistry		
Course Objectives	To give students a general overview of different experimental approaches and model systems, and to provide students with hands-on experience in basic biochemical and molecular techniques.		
Course Contents & Topics	Basic concepts in experimental science; writing of lab notebooks; experimental approaches - genetic, biochemical, molecular, genomic and others; methods for isolation and analysis of carbohydrates, proteins, lipids and nucleic acids; subcellular fractionation; enzyme assays and spectrophotometry; basic nucleic acid manipulation - PCR, site-directed mutagenesis, blotting and hybridization, cloning strategies, restriction mapping.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the basic principles of various biochemical and molecular techniques. 2. Describe different experimental approaches for achieving defined experimental aims. 3. Apply different techniques to biochemical and molecular analyses. 4. Write and maintain a scientific laboratory notebook satisfactorily.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of Biochemistry		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Course Type	Lecture with laboratory component course		

Grade Descriptors

A	Demonstrates thorough and extensive knowledge and skills required for attaining all the course learning outcomes. Shows strong analytical ability and logical thinking, with evidence of original thought. Competently conducts laboratory skills and techniques with confidence and can critically appraise data to draw appropriate and insightful conclusions.
B	Demonstrates substantial knowledge and skills required for attaining most of the course learning outcomes. Shows evidence of critical thinking and analytical skills. Conducts laboratory skills and techniques with confidence and can appraise data to draw appropriate conclusions.
C	Demonstrates general but incomplete knowledge and skills required for attaining most of the course learning outcomes. Shows some evidence of critical thinking and analytical skills. Conducts laboratory skills and techniques to a satisfactory level of competence and can sometimes correctly appraise data and draw appropriate conclusions.
D	Demonstrates partial but limited knowledge and skills required for attaining some of the course learning outcomes. Shows limited critical thinking and analytical skills. Displays poor laboratory skills and techniques and is rarely able to use data to draw appropriate conclusions.
Fail	Demonstrates little or no evidence of knowledge and skills required for attaining the course learning outcomes. Lacks analytical ability and logical thinking. Displays ineffective lab skills and techniques and is unable to use data to draw appropriate conclusions.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		12
Laboratory		54
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		50

Required/recommended reading and online materials

Scopes RK (1994) Protein Purification: Principles and Practice. Springer Advanced Texts in Chemistry, Springer-Verlag, New York.
Wilson K, Walker KM (2005) Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press, Cambridge.
Watson JD (1992) Recombinant DNA. Scientific American Books, New York.
Alberts B et al (2007) Molecular Biology of the Cell, 5th ed. Garland Science, New York.

BIOL1110 From molecules to cells (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	169
Course Co-ordinator	Prof B K C Chow, Biological Sciences *(bkcc@hku.hk)*		
Teachers Involved	Prof B K C Chow, Biological Sciences Dr C S C Lo, Biological Sciences Dr K W Y Yuen, Biological Sciences Dr J W Zhang, Biological Sciences		
Course Objectives	This course aims to provide basic conceptual understanding of the biology of molecules and cells to underpin later studies in applied biology, genetics, biochemistry, nutrition, biotechnology, microbiology, plant and animal physiology and developmental biology.		
Course Contents & Topics	An issue-based approach will be adopted to enable students to integrate basic concepts in molecules and cells and to inspire further investigation through the exploration of contemporary biological issues. The course is divided into 4 parts and the following is a list of some of the questions to be asked and discussed: Genes and inheritance: How do children resemble their parents? What is the central dogma of biology? What are the rules of genetic inheritance? What determines gender and sexuality? Why is that children resemble, but not identical to, their parents? What happen if some genes are non-functional or mutated? Metabolism and Health: How are diets related to good health? Do all humans have the same dietary requirements? Why can't we live without plants? Cells and cell division: What are the common features in a cell? How do cells communicate and assemble themselves to form tissues and organs? What is a cell cycle and how it is regulated? What happens if cell-cycle control system goes wrong? How newly formed cells commit themselves for differentiation? Genetic engineering and modern biology: To what extent can genes be modified? Is gene therapy the future of medicines? Is genetically modified food safe for consumption? What are the Genome Projects and why have they been important?		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the relationships between genes in a genome and the inherited phenotypes expressed in a living organism. 2. Learn the underlying principle on how mutation of a gene can lead to the development of a genetic disease. 3. Understand the importance of dietary intake of biomolecules in relationship to good health. 4. Describe various stages in a cell division and that disturbance of this process may result in cancer development. 5. Describe concepts used in genetic engineering. 6. Know some applications of genetic engineering in gene therapy and production of genetically modified food.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding.
D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level.
Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		80
Project reports	group project	20

BIOL1111 Introductory microbiology (6 credits)		Academic Year	2013
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Dr V Dvornyk, Biological Sciences *(dvornyk@hku.hk)*		
Teachers Involved	Dr V Dvornyk, Biological Sciences		
Course Objectives	To introduce students to the diversity and function of microorganisms; and relate this to their importance in the natural environment, disease and public health, food production and spoilage and the biotechnology industry.		
Course Contents & Topics	Evolutionary diversity of bacteria, archaea, eukarya and viruses; Metabolic strategies, cell biology and genetics; Microbial ecology, marine microbiology, terrestrial microbiology; Microbial interactions with animals and plants; The human microbiome; Medical microbiology and immunology; Biotechnology applications; Food spoilage and food fermentations.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the key features of the major microbial phyla and place them in an evolutionary context. 2. Explain the major physiological and genetic processes in prokaryotes and eukaryotic microorganisms and compare the similarities and differences between these two domains. 3. Identify the microorganisms involved and their role in ecological processes, human disease and medicine, food production and spoilage, and biotechnology.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			
	A	(85-100%) Meets the standard of excellence. All criteria are addressed. Organization of ideas and clarity are excellent. Additional reading or research is evident. Ideas show an exceptional understanding of concepts. Arguments are highly persuasive and show excellent judgment and prioritization of issues. Presentation is highly creative and appealing.	
	B	(70-84%) Approaches the standard of excellence. All criteria are addressed. Organization of ideas and clarity are very good. Ideas show a complete understanding of concepts. Arguments are persuasive and prioritize major issues. Presentation is creative and appealing.	
	C	(55-69%) Meets an acceptable standard. All criteria are addressed. Organization of ideas and clarity are sufficient. Ideas show an effective understanding of concepts. Arguments identify major issues. Presentation is appealing but may lack clarity.	
	D	(45-54%) Below acceptable standard. Most criteria are addressed. Organization of ideas and clarity are weak. Ideas show an incomplete understanding of concepts. Arguments are not persuasive. Presentation lacks creativity or is not appealing.	
	Fail	(<45%) Unacceptable. Inability to identify major criteria. Very weak organization of ideas and clarity. Ideas show a lack of understanding of concepts. No coherent argument. Presentation lacks creativity or is unappealing.	
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		24
	Laboratory		24
	Tutorials		6
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		70
	Laboratory reports		30
Required/recommended reading and online materials	Brock Biology of Microorganisms, Pearson Benjamin Cummings, 12th Edition, 2009 [HKU library call number 576.B86].		

BIOL1201 Introduction to food and nutrition (6 credits)		Academic Year	2013
Offering Department	Biological Sciences	**Quota**	110
Course Co-ordinator	Prof N P Shah, Biological Sciences *(npshah@hku.hk)*		
Teachers Involved	Dr E T S Li, Biological Sciences Dr J W F Wan, Biological Sciences Prof N P Shah, Biological Sciences		
Course Objectives	To enable student to appreciate the multidisciplinary nature of the study of Food and Nutrition. From the farmer's field to the dinner table, a basic understanding of food production, processing and storage will be covered. Food safety, food selection behaviour as well as balanced nutrition as part of life style instrumental to good health will be discussed. This is an independent course which can be taken by students from various disciplines. It also prepares students for further studies in Food and Nutritional Science.		

Course Contents & Topics	Topics will include food composition and functional properties of major components; food additives; food hygiene, safety and regulation; determinants of food choice; examples of complex processed foods; healthy eating-concepts and practice; essential nutrients; dietary supplements; fad diets.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the key components of food and be able to discuss their functional properties. 2. Understand the significance of food safety and be able to identify sources of contamination. 3. Understand the concept of a balanced diet. 4. Critically assess and identify quack or fad diets.
Pre-requisites (and Co-requisites and Impermissible combination)	NIL
Offer in 2013 - 2014	Y 1st sem — **Examination** Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show exceptional ability to articulate concepts and integrate knowledge. Demonstrate highly effective organization / writing skills.
B	Demonstrate substantial grasp of the subject matter covered. Show full capacity to use the appropriate concepts and assimilate the materials to solve problems. Demonstrate effective organization / writing skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show ability to apply concepts to solve simple problems. Demonstrate adequate organization / writing skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Misunderstanding of the materials is not uncommon. Ability to apply concepts and solve simple problems is limited. Demonstrate basic organization / writing skills.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Fail to understand concepts and show minimal competence in problem solving. Demonstrate poor organization and writing skills.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	student-centered learning	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Test		20
Assignments		20

Required/recommended reading and online materials	Hotchkiss J.H. & Porter N.N. Food Science. Chapman & Hall, 1995 Fenema O.R. Food Chemistry. Marcel Dekker, 1996 Brown A. Understanding Food : Principles and Preparation. Wadsworth, Cengage Learning, 2011 Whitney E. & Rolfes S.R. Understanding Nutrition. Wadsworth, Cengage Learning, 2011

BIOL1309 Evolutionary diversity (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	105
Course Co-ordinator	Prof R M K Saunders, Biological Sciences *(saunders@hku.hk)*		
Teachers Involved	Prof R M K Saunders, Biological Sciences Prof Y Sadovy, Biological Sciences Dr M Yasuhara, Biological Sciences Dr D Thomson, Biological Sciences		
Course Objectives	To provide students with an introduction to the diversity of plant and animal life. Recent research has resulted in fundamental changes in our understanding of evolutionary history (phylogeny). Current evolutionary trees will be used as the basis for a survey of different groups in phylogenetic sequence, and for understanding how structures, processes and behaviours have changed through time.		
Course Contents & Topics	Introduction to the methodology for reconstructing the sequence of past evolutionary events (cladistics); algae (Rhodophyta, Phaeophyta and Chlorophyta); non-vascular plants (Hepatophyta, Anthocerophyta and Bryophyta); seedless vascular plants (Lycophyta, Psilophyta, Sphenophyta and Pterophyta); seed plants (Cycadophyta, Ginkgophyta, Coniferophyta, Gnetophyta and Anthophyta); invertebrates (Cnidaria, Platyhelminthes, Annelida, Mollusca, Nematoda, Arthropoda and Echinodermata); fish (Chondrichthyes and Actinopterygii); amphibians (Batrachomorpha); reptiles (Anapsida, Lepidosauromorpha and Archosauromorpha); and mammals (Monotremata, Metatheria and Eutheria).		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Interpret phylogenies in order to understand the relatedness of taxonomic groups and the pattern of evolutionary changes in structures, processes and behaviours. 2. Describe the characteristics of different evolutionary lineages of plants and animals and recall the names of the main taxonomic groups. 3. Explain the possible selective advantages of the highlighted structures, processes and behaviours.		

Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining most or all of the course learning outcomes, with extensive use of named examples. Show evidence of significant critical abilities and logical thinking. Apply highly effective presentation skills.
B	Demonstrate substantial command of knowledge required for attaining most of the course learning outcomes, with some use of named examples. Show evidence of critical abilities and logical thinking. Apply effective presentation skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes, with only limited use of named examples. Show evidence of some critical abilities and logical thinking. Apply moderately effective presentation skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes, with insufficient use of named examples. Show evidence of limited critical abilities and logical thinking. Apply limited presentation skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes, without use of named examples. Show little or no evidence of critical abilities and logical thinking. Presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Laboratory reports		30

Required/recommended reading and online materials	P. H. Raven, R. F. Evert & S. E. Eichhorn: Biology of Plants (Freeman & Worth, New York, 2005, 7th ed.) E. E. Ruppert & R. D. Barnes: Invertebrate Zoology (Saunders, 2003, 7th ed.) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL2102 Biostatistics (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	135
Course Co-ordinator	Dr G Panagiotou, Biological Sciences *(gipa@hku.hk)*		
Teachers Involved	Dr G Panagiotou, Biological Sciences		
Course Objectives	To introduce students to experimental design and statistical data analysis at an elementary to intermediate level, with an emphasis on practical applications of statistical methods to experimental and observational data in biology, biochemistry, food and nutritional science, ecology and environmental sciences with biotechnology and biomedical sciences. Students will explore the process by which scientists formulate research questions, set null hypotheses, design experiments, collect data and apply statistics to test the hypotheses.		
Course Contents & Topics	Sampling and experimental design; descriptive statistics; hypothesis testing; analysis of frequency distributions; probability distributions (e.g. Normal, binominal and Poisson) and their applications; testing of goodness of fit and contingency tables; analysis of variance and multiple comparisons; correlation and regression techniques; power analyses; non-parametric methods; introduction to multivariate statistics; use of appropriate computer software packages for data processing, analysis and graphical presentation. To illustrate each statistical method, examples will be drawn from real cases (e.g. genomics, transcriptomics, metabolomics and bioinformatics).		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Formulate biological questions into statistical questions. 2. Design experiments effectively. 3. Make quantitative estimation of biologically meaningful parameters. 4. Use R, EXCEL and SPSS to carry out most of the statistical computations. 5. Understand the assumptions of commonly used statistical methods. 6. Think critically.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC1600 Perspectives in biochemistry or BIOL1110 From molecules to cells or BIOL2306 Ecology and evolution or ENVS1301 Environmental life science		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

	A	Demonstrate thorough grasp of the subject and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective computational skills and techniques for basic statistical analyses. Be able to critically use data and statistical results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject and skills required for attaining at least most of the course learning outcomes. Present evidence of analytical and critical abilities and logical thinking. Apply effective computational skills and techniques for basic statistical analyses. Be able to correctly use data and statistical results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some analytical and critical abilities and logical thinking. Apply moderately effective computational skills and techniques for basic statistical analyses. Demonstrate mostly correct but some erroneous use of data and statistical results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial and limited grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective computational skills and techniques for basic statistical analyses. Demonstrate limited ability to use data and statistical results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the subject and skills required for attaining any of the course learning outcomes. Present evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective computational skills and techniques for basic statistical analyses. Demonstrate misuse of data and statistical results and/or unable to draw appropriate conclusions. Apply minimally effective or ineffective organizational and presentational skills.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	including projects	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		50

Required/recommended reading and online materials	Zar, J. H.: Biostatistical Analysis (Prentice-Hall / Englewood Cliffs, N.J., 1999, 4th edition)
Course Website	http://www.biosch.hku.hk/ecology/lsc

BIOL2103 Biological sciences laboratory course (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	129
Course Co-ordinator	Dr W Y Lui, Biological Sciences *(wylui@hku.hk)*		
Teachers Involved	Dr W Y Lui, Biological Sciences Prof B K C Chow, Biological Sciences Dr A Yan, Biological Sciences		
Course Objectives	The objective is to provide students a comprehensive training in basic laboratory techniques used in modern biological studies. The course will cover a number of techniques used by molecular biologists and microbiologists to conduct scientific research.		
Course Contents & Topics	This course will be divided into three modules and each module will have 3 laboratory sessions. Module one: Nucleic acid analysis DNA & RNA isolation, spectrometry, gel electrophoresis, restriction enzyme analysis and DNA sequence analysis. Module two: Protein analysis Centrifugation, chromatography and SDS-PAGE electrophoresis. Module three: Microbiology Microscopy, observation of microorganisms and staining of bacteria, isolation of pure cultures by streaking and serial dilution, enumeration of microbial cells by Petroff-Hausser counting chamber, and turbidity. Identification and classification of microbes from natural source and statistical analysis.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate knowledge in proper use of simple research equipment. 2. Demonstrate knowledge and understanding of how and why certain techniques are used in a research setting. 3. Master some basic laboratory techniques for carrying out experiments. 4. Understand the different ways that microorganisms were categorized according to their size, shape, colour and response to dye etc. and how they were counted.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL1110 From molecules to cells		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	No Exam

Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Laboratory and workshop course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Laboratory / 11 laboratory sessions (4 hours each) / 44 Tutorials / lecture/tutorials / 18 Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Laboratory reports / including class tests / 100

BIOL2220 Principles of biochemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	100
Course Co-ordinator	Dr C S C Lo, Biological Sciences *(clivelo@hku.hk)*		
Teachers Involved	Dr C S C Lo, Biological Sciences		
Course Objectives	This course is designed to provide undergraduate (non-biochemistry major) an overview of fundamental concepts in biochemistry as well as hands-on experience in biochemical techniques.		
Course Contents & Topics	An introduction to various biomolecules in terms of their structures, functions, syntheses and metabolisms, with emphasis on amino acids, proteins, enzymes, carbohydrates, lipids and nucleic acids. The correlations between their biochemical properties and their roles in various life processes will be illustrated.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the key structural features of carbohydrates, proteins, lipids and nucleotides. 2. Understand the basic enzyme kinetic properties. 3. Explain how the common sugars, fatty acids and amino acids are metabolized and synthesized in living cells.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL1110 From molecules to cells; and Not for students who have passed in BIOC2600 Basic biochemistry or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Integration of the full range of appropriate theories, principles, evidence and techniques **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. General integration of theories, principles, evidence and techniques **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Some partial integration of theories, principles, evidence and techniques **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited integration of theories, principles, evidence and techniques **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Little or no or inapt integration of theories, principles, evidence and techniques		

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 24 Laboratory / 3 laboratory sessions / 24 Tutorials / / 12 Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 60 Test / / 30 Laboratory reports / / 10
Required/recommended reading and online materials	L.A. Moran, H.R. Horton, K.G. Scrimgeour, M.D. Perry: Principles of Biochemistry 5th edition (Pearson International Edition)

BIOL2306 Ecology and evolution (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	200
Course Co-ordinator	Prof D Dudgeon, Biological Sciences *(ddudgeon@hku.hk)*		
Teachers Involved	Prof D Dudgeon, Biological Sciences Prof G A Williams (Field course component only), Biological Sciences		
Course Objectives	The interaction between organisms and their environment is addressed using an issue-based approach in order to explains how the ecology of plants and animals has been shaped by evolution through interactions with their living and non-living environment. The course also demonstrates how we can understand and explain the significance of what we see in nature using scientific methods. A field course component provides the opportunity to investigate how the environment influences community composition, biodiversity and adaptive radiation in a variety of habitats.		
Course Contents & Topics	The environment influences organisms profoundly. It affects their present-day ecology (determining where they live and how many can survive there) and, through natural selection acting over past generations, influences their form and adaptations. Present day human-induced changes to the environment are also responsible for endangering species and degrading their habitats. This introductory course introduces some basic scientific principles of ecology and evolution, showing how they are linked to the environment by physiological tolerances and evolutionary adaptation which, in turn, lead to specialization and generate biodiversity. Individuals and their interactions will be a major focus of the course together with discussion of population dynamics, community structuring, life histories, and niche dynamics. The principles of ecology and evolution resulting from interaction with the environment will also be demonstrated by describing the origins of modern humans, including our fossil record and relationship to other primates, and the main ecological transformations caused by humans and their environmental impacts. The course will conclude with an account of the importance of biodiversity, and the factors that threaten it globally. Lectures are complemented by a 5-day residential field course during the Reading Week when students visit a variety of Hong Kong habitats to study their biodiversity, community composition and the relationship between organisms and their environment		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand how scientific methods (hypotheses, experiments, comparisons) are used to investigate ecological and evolutionary processes. 2. Understand the basic mechanism of natural selection, and how interactions with the environment lead to adaptation and generate biodiversity. 3. Understand that ecology and behaviour can be interpreted in the light of selective pressures from the environment upon individual organisms. 4. Understand the ecological factors influencing evolution, using the human evolutionary tree as an example. 5. Understand the community ecology and biodiversity of selected Hong Kong habitats, and typical adaptations of organisms found there.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL1309 Evolutionary diversity or BIOL1110 From molecules to cells		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Evidence of complete or near-complete understanding and a thorough grasp of the subject as demonstrated by attainment of all learning outcomes, and excellent use of named (organism) examples, including local species and habitats. Show excellent organizational, presentational and/or analytical skills and fieldwork techniques. Excellent or outstanding (for A+) work relative to what is required at degree level. **B**: Evidence of substantial understanding and a good grasp of the subject as demonstrated by attainment of the majority of learning outcomes, and use of named (organism) examples, including local species and habitats. Show good organizational, presentational and/or analytical skills and fieldwork techniques. Work more than sufficient for what is required at degree level. **C**: Evidence of general understanding with an adequate (but incomplete) grasp of the subject, as demonstrated by general but incomplete attainment of most of the learning outcomes, with limited use of named (organism) examples.		

		Show fair organizational, analytical, presentational and/or analytical skills and fieldwork techniques. Work sufficient for what is required for degree level.
	D	Evidence of retention of a minimum of relevant information and incomplete understanding of the subject (i.e. knowledge is very incomplete), as demonstrated by partial but limited attainment of learning outcomes. Insufficient familiarity with fieldwork techniques, habitats or organisms. Work merely (for D+) or barely (D) adequate for what is required at degree level.
	Fail	Evidence of poor or inadequate knowledge and understanding of the subject such that the majority of learning outcomes cannot be attained. Little or no evidence of familiarity with fieldwork techniques, habitats or organisms. Work fails to reach degree level.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures	24 hours lectures, plus 10 hours of lectures during residential field course	34
Laboratory	at least 36 hours field and laboratory work, as groups and individuals	36
Reading / Self study	during the semester in the form of internet tutorials, assigned reading and a laboratory workshop	80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments		10
Laboratory reports		20
Project report	project work	10

Required/recommended reading and online materials	Boyd, R. & Silk, J.B. (1997) How Humans Evolved (4th Edition). Norton, NY. (5th Edition e-book available in HKU library.) Stiling, P. (2002) Ecology: Theories and Applications (4th Edition). Prentice Hall, Singapore. An up-to-date list of references to the primary scientific literature, background reading and/or internet resources relevant to each lecture will be provided on the course website.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	A compulsory 5-day residential field component during the reading week. Details of the location and cost of the residential field course, which will be held in the Reading week of semester 1, will be made available at the start of the semester. Cost per head in 2013-2014 was $780 (not refundable).

BIOL3105 Animal physiology and environmental adaptation (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	35
Course Co-ordinator	Prof A O L Wong, Biological Sciences *(olwong@hku.hk)*		
Teachers Involved	Prof A O L Wong, Biological Sciences Prof A S T Wong, Biological Sciences Dr W Y Lui, Biological Sciences		
Course Objectives	The course covers the major aspects of animal physiology for environmental adaptation in terrestrial & aquatic habitats. Stress will be given to the functional interactions between animals and the environment, especially on the mechanisms by which animals obtain resources for survival from the environment, detect environmental changes via sensory structures, and respond to adversities in the environment by altering their body forms & functions.		
Course Contents & Topics	Basic concepts of animal adaptation to environmental changes/extreme environment; Modification of energy metabolism according to oxygen availability; Different models of gaseous exchange for aquatic, inter-tidal, and terrestrial habitats; Cross-adaptation to different environment: air-breathing fish vs diving adaptations in mammals; Visual signals & differential levels of photoreception from protozoa to mammals; Background adaptation: functions & mechanisms for color presentation; Sound wave as environmental signals: functions & mechanisms of detection in aquatic & terrestrial habitats; Echo sounding in bats for navigation without visual signals; Behavioral, morphological & physiological adaptations in hostile environment: extreme hot vs freezing cold; salinity changes in aquatic habitats & water availability in terrestrial habitats on osmoregulation, water balance & nitrogenous metabolism.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Have a broad understanding on functional interactions between animals and their environment. 2. Appreciate the role of the environment in shaping the evolution of animal structures & functions. 3. Comprehend a wide range of physiological adaptations (both structurally & functionally) in coping with environmental stress.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course		

Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding.
D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level.
Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments		25

Required/recommended reading and online materials

(1) E. N. Marieb (2012) Essentials of Human Anatomy & Physiology. Benjamin Cummings.
(2) C. L. Stanfield (2011) Principles of Human Physiology, Benjamin Cummings.
(3) R. W. Hill, G. A. Wyse & M. Anderson (2008) Animal Physiology, Sinauer Associate, Inc., Sunderland
(4) C. D. Myoyes & P. M. Schulte (2008) Principles of Animal Physiology. Benjamin Cummings.

Additional Course Information

Refer to the Website of School of Biological Sciences.
This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3107 Plant physiology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr W K Yip, Biological Sciences *(wkyip@hku.hk)*		
Teachers Involved	Dr W K Yip, Biological Sciences		
Course Objectives	To give an understanding of plant processes such as plant growth and development and their regulatory mechanisms.		
Course Contents & Topics	Discovery, assay, chemical nature, mechanism, structure-activity relationships, physiological effects, and signal transduction of plant hormones. Hormonal transport. Selected topics on plant growth and development including photo-morphogenesis, seed germination, dormancy, apical dominance, fruit ripening, leaf abscission, and plant defense.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the study of plant biology using mutants in model plant Arabidopsis. 2. Understand biotechnological opportunities by manipulating plant gene expression. 3. Understand the regulation of plant growth and development by various plant hormones.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	In written examination: Exceptionally good organization and presentation, the discussion would be very clearly written and show evidence of originality. In practical sessions: excellent insight in to the practical aims; submit good reports.
B	In written examination: coherent organization and clear presentation, the discussion would be a complete and critical response to questions. In practical sessions: full understanding of the practical aims; submit accurate reports.
C	In written examination and practical sessions: Good in parts, but important points omitted. Might also have defects in presentation or be not very well written. Reasonably competent, but might show misunderstanding of the material:

		significant inaccuracies or errors.
	D	In written examination and practical sessions: Some knowledge of the material is evident, but there are serious deficiencies in understanding, organization, clarity or accuracy. Write-ups that are unduly brief would fall into this category.
	Fail	In written examination and practical sessions: Poor knowledge and understanding of the subject, a lack of coherent and organization, and answers are largely irrelevant.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Laboratory reports		25

Required/recommended reading and online materials	P. J. Davis: Plant Hormones: Physiology, Biochemistry and Molecular Biology (Martinus Nijhoff Publishers, 1995, 2nd ed.) Lecturing materials and journal articles will be posted on WebCT
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3108 Microbial physiology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Dr A Yan, Biological Sciences *(ayan8@hku.hk)*		
Teachers Involved	Dr A Yan, Biological Sciences		
Course Objectives	Microbes are amazing and important entities on earth. Knowledge of microbes is widely applied in food, pharmaceutics, biotechnologies, diseases control, and biogeochemical processes. Microbial Physiology provides molecular basis for understanding of these important processes and applications, and to serve as essential foundations for sub-disciplines of Microbiology, such as environmental, industrial, and medicinal Microbiology. Upon completion, students will acquire fundamental knowledge and methodologies for microbial studies and be able to relate knowledge to various microbial applications.		
Course Contents & Topics	Serving as a fundamental course for the understanding of the world of microorganisms, Microbial Physiology is organized and presented in three themes: 'Microbial Rules', 'Microbial Breath', and 'Microbial Adaption'. Under these three themes, a broad range of highly educational and interesting topics are presented including: 'Microorganisms and their position in the living world', 'Fundamental methodologies for the study of microbes', 'Microbial structures and functions', 'Microbial growth and control', 'Energy Generation', 'Central metabolism', and 'Regulation and control of metabolic Activities'. Topics are taught in a coherent manner with a highly interactive tutorial session following each of the topics such that students will achieve a high quality, stimulating, and problem-based learning experiences.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciate the diversity of microbial metabolisms and the strategies for their adaptive responses. 2. Comprehend the principles underlying the dynamic nature of microbial physiology. 3. Relate knowledge to practical application of microbes in industry and medicine. 4. Develop abilities to read and assess scientific literatures in microbiology area.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills.
C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills.
D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills.
Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures — 36 Tutorials — 12 Project work — 2 Reading / Self study — 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination — 50 Test — mid-term I (20%), mid-term II (20%) — 40 Assignments — 10
Required/recommended reading and online materials	Primary Text Book: Prescott, Harley, and Klein's Microbiology, by Joanne M. Willey, Linda M. Sherwood, and Christopher J. Woolverton, published by McGraw-Hill Supplementary Reading: On-line textbook of Bacteriology: Kenneth Tobar, U. of Wisconsin-Madison, Department of Bacteriology. URL (http://www.textbookofbacteriology.net/)
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3109 Environmental microbiology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr J D Gu, Biological Sciences *(jdgu@hku.hk)*		
Teachers Involved	Dr J D Gu, Biological Sciences		
Course Objectives	To familarize students with the role of various microorganisms in natural process which affect our environment, such as cycling of chemical elements, interactions with plants and animals, and the way in which they carry out biodegradation of environmentally important pollutants. Selective groups of microorganism will be examined in detail for their biochemical processes. Key concepts are illustrated with known examples and cases		
Course Contents & Topics	1. Advanced aspects of microbial diversity, ecology and growth 2. Contribution of microbial metabolism to biogeochemical processes important in cycling of nutrients 3. Microbial interactions with plants and animals 4. Microbial metabolism of organic compounds, metals and man-made polymers 5. Training in laboratory and field microbiological research technique		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand a range of microorganisms in the environment in terms of their roles and function as well as biochemical capability and host range. 2. Know the specific biochemical processes, enzymes involved and reactions carried by selective microorganisms and their distribution in the environment. 3. Apply the appropriate techniques in environmental and microbial research.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject matter. Show very strong analytical and critical abilities and high logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B**: Substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C**: General but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills. **D**: Partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills. **Fail**: Little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.		

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Field work		2
Project work		2
Tutorials		4
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		5
Assignments		10
Laboratory reports		25
Presentation	including report	10

Required/recommended reading and online materials	M.T. Madigan, J. M. Martinko, P.V. Dunlap and D.P. Clark: Brock Biology of Microorganisms (Pearson/Benjamin Cummings, 2009, 12th ed.) R.M. Atlas and R. Bartha: Microbial Ecology: Fundamentals and Applications (Benjamin Cummings, 1998, 4th ed.) References Molecular Biology of the Cell - Fifth Edition by Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (December 2007) R. Mitchell and J.-D. Gu: Environmental Microbiology (Wiley-Blackwell, 2009, 2nd ed.)
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3110 Environmental toxicology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Dr J D Gu, Biological Sciences *(jdgu@hku.hk)*		
Teachers Involved	Dr J D Gu, Biological Sciences Prof R S S Wu, Biological Sciences		
Course Objectives	To introduce students to the basic principles of environmental and ecological toxicology by analysis of the fate of pollutants in lithosphere, hydrosphere, atmosphere and biosphere. Mechanisms of toxicity as dose-response will be analyzed through adsorption, metabolism, toxicity and elimination. Major metabolic processes and enzymes involved will be highlighted. Specific cases of toxicity will be presented and discussed.		
Course Contents & Topics	1. Environmental chemistry of pollutants and their toxicity and factors governing toxic effects, bioaccumulation and biomagnification 2. Partitioning and transformation of environmental pollutants 3. Quantitative toxicology using dose-response approaches 4. Emerging endocrine-disrupting chemicals and carcinogens at molecular levels 5. Elimination of pollutants from the environments 6. Laboratory testing of toxicity and review various adsorption isotherm models		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand fate and distribution of chemicals in various compartments of the ecosystem. 2. Understand toxicity through adsorption, metabolism, elimination and target site and quantitative analysis. 3. Understand mechanism of toxicity from specific pollutants of choice. 4. Understand specific biochemical processes and enzymes involved in pollutants transformation and mineralization. 5. Understand appropriate techniques in environmental cleaning up		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course or ENVS3042 Pollution or CHEM3141 Environmental chemistry		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Thorough grasp of the subject matter. Show very strong analytical and critical abilities and high logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.

	Apply effective organizational and presentational skills.
C	General but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. General but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	laboratory, assignment; and seminar	36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Laboratory reports	student-based assessment includes laboratory report, assignment, presentations or other forms	40

Required/recommended reading and online materials	D.G. Crosby: Environmental Toxicology and Chemistry (Oxford, 1998) W. Stumm, J.J. Morgan: Aquatic Chemistry: Chemical Equlibria and Rates in Natural Waters (Wiley, 1995, 3rd ed.) R. Mitchell and J.-D. Gu: Environmental Microbiology (Wiley-Blackwell, 2009, 2nd ed.)
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3201 Food chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	90
Course Co-ordinator	Dr J C Y Lee, Biological Sciences *(jettylee@hku.hk)*		
Teachers Involved	Dr J C Y Lee, Biological Sciences		
Course Objectives	To provide a basic understanding of chemistry in food systems, and to provide practical training in chemistry related to food science and nutrition.		
Course Contents & Topics	The course will cover the components of food, including water, proteins, carbohydrates and lipids, and minor components such as enzymes, vitamins, minerals, colorants, flavorants and additives. The physical and chemical properties of these important constituents of foods are covered in detail, and form the basis for understanding the reactions which occur during the production, processing, storage and handling of foods, and in understanding the methods used in analyzing foods. A series of laboratory sessions will cover analysis of food components, protein chemistry, lipid oxidation, properties of sugars and starches, enzymatic and non-enzymatic browning reactions, and sensory analysis of foods.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the functions and properties of major and minor food components. 2. Understand the basic chemistry behind food processing. 3. Have integrated their knowledge of biological and chemical principles into a food science and nutrition context.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show extensive knowledge and understanding of the topics covered and can readily apply this knowledge. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial grasp of the subject matter covered. Show thorough knowledge and understanding of the content and a high level of competence in the topics covered and able to apply this knowledge and skills to most situations. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions.

	C	Demonstrate general but incomplete grasp of the subject matter covered. The student has a sound knowledge and understanding of the main areas of content and has achieved an adequate level of competence in the topics covered. Use lab skills and techniques and analysis of data and results to draw moderately appropriate conclusions.
	D	Demonstrate partial but limited grasp, with retention of some relevant information of the subject matter covered. Show a basic knowledge and understanding of the content and has achieved a limited level of competence in the topics covered. Use lab skills and techniques and analysis of data and results to draw appropriate conclusions occasionally.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show elementary knowledge and understanding in few areas of the content and has achieved very limited competence in some of the topics covered. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments		40

Required/recommended reading and online materials

Fennema OR, Food Chemistry (Marcel Dekker 4th Ed, 2008)
Belitz HD, Grosch W, Schieberle, P, Food Chemistry (Springer 4th Ed, 2009)

BIOL3203 Food microbiology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Dr H S El-Nezami, Biological Sciences *(elnezami@hku.hk)*		
Teachers Involved	Dr H S El-Nezami, Biological Sciences		
Course Objectives	This course provides the key concepts and principles of food microbiology with special emphasis on the interaction between microorganisms and food., microbial food spoilage and foodborne diseases will be discussed in detail.		
Course Contents & Topics	Detection and enumeration of microbes in foods, Factors that influence microbes in foods, Spores and their significance, Physical methods of food preservation, Chemical preservation and natural antimicrobials, Foodborne pathogens.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe methods for evaluating microorganisms and their products in foods. 2. Demonstrate an understanding of the causes of food spoilage, and predict response of a microorganism that can spoil a given food. 3. Develop and implement appropriate measures to control the spoilage and pathogenic microorganisms in a food. 4. Demonstrate the ability to work in a team to investigate and solve problems in food microbiology.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures — 24 Laboratory — 24 Tutorials — 12 Reading / Self study — 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination — 40 Assignments / seminars & continuous assessment — 40 Laboratory reports — 20
Required/recommended reading and online materials	Food Microbiology: An Introduction, 2005, Thomas J. Montville and Karl Matthews, American Society for Microbiology (ASM) Press, Washington, DC Food Microbiology: Fundamentals and Frontiers, 2007, Edited by Michael P. Doyle, Larry R. Beuchat, and Thomas J. Montville, 3rd edition, American Society for Microbiology (ASM) Press, Washington, DC

BIOL3207 Food and nutritional toxicology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Dr H S El-Nezami, Biological Sciences *(elnezami@hku.hk)*		
Teachers Involved	Dr H S El-Nezami, Biological Sciences		
Course Objectives	To introduce students to methods used in assessing the toxicity of food contaminants, and to develop their confidence in the handling and interpretation of toxicological data. Students will also be introduced to the basic concepts behind toxicological evaluation, and the criteria for setting guidance values for dietary and nondietary exposure to chemicals. Students will understand the role of biochemical, metabolic and toxicokinetic studies in toxicological evaluation. This course aims to equip students with basic skills in conducting food toxicological studies.		
Course Contents & Topics	Topics include a discussion on exposure and entry routes, fates of toxic substances in the body (toxicokinetics), concepts in experimental toxicology, the dose response relationship, actions of toxic substances, target organ effects, the actions and types of carcinogens. A survey of the health effects of common classes of toxic substances is also presented.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate an understanding of the processes involved in absorption, distribution, metabolism and excretion of toxicants, including an understanding of the toxicokinetic behavior of toxicants in mammals. 2. Demonstrate an understanding of the various effects induced after exposure to toxicants. 3. Demonstrate an understanding of the factors which underlie species differences in response to potential toxicants. 4. Demonstrate the ability to work in a team to investigate and solve toxicological problems of importance in human health.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL3205 Human physiology		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills. **B** — Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills. **C** — Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills. **D** — Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness. **Fail** — Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.		
Course Type	Lecture with laboratory component course		
Course Teaching			

& Learning Activities			
	Activities	**Details**	**No. of Hours**
	Lectures		24
	Laboratory		24
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		40
	Assignments	seminars & continuous assessment	40
	Laboratory reports		20
Required/recommended reading and online materials	S. S. Deshpande: Handbook of Food Toxicology (Marcel Dekker Inc., NY, 2002)		
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.		

BIOL3210 Grain production and utilization (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof H Corke, Biological Sciences *(harold@hku.hk)*		
Teachers Involved	Prof H Corke, Biological Sciences		
Course Objectives	To provide a broad understanding of the utilization and significance of the major grains in the food industry and in human health and nutrition.		
Course Contents & Topics	- Global grain production and consumption - The Green Revolution and its aftermath - International grain trade - Wheat: flour milling, dough rheology, the baking process, baking quality - Wheat: quality of Asian products including steamed bread and noodles - Wheat: small-scale tests for quality - Rice: nutritional quality, consumer preferences, milling, quality, quality testing, products - Maize: products of wet milling, animal feed development - Biofuels focusing on bioethanol - Illustrative business case studies on the grain processing industry will be discussed		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the major production, import, and export patterns that support the global utilization of grain. 2. Understand the technology behind the production of grain-based foods. 3. Understand the scope and nature of professional level quality testing for grain products. 4. Appreciate the constraints to global food sufficiency. 5. Appreciate the ethical issues behind the diversion of grain into meat and biofuel production.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in any level 2 BIOL course		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors		
	A	Demonstrate thorough grasp of the subject matter covered. Show strong analytical and critical abilities and logical thinking, with evidence of creative ability and competence in professional-level problem solving. Critically use lab skills and techniques and analysis of data and results to draw appropriate and insightful conclusions to real-world problems. Demonstrate highly effective team-based organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show evidence of analytical and critical abilities and logical thinking with some evidence of competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw generally appropriate conclusions to real-world problems. Demonstrate effective team-based organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject matter covered. Show some evidence of analytical and critical abilities and logical thinking with limited competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw moderately appropriate but sometimes erroneous conclusions to real-world problems. Demonstrate moderately effective team-based organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject matter covered. Show some evidence of coherent and logical thinking, but lacking competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results to draw sometimes appropriate but often erroneous conclusions to real-world problems. Demonstrate team-based organizational and presentational skills of limited effectiveness.
	Fail	Demonstrate little or no grasp, with retention of little relevant information, of the subject matter covered. Show lack of coherent and logical thinking, and minimal competence in professional-level problem solving. Use lab skills and techniques and analysis of data and results ineffectively, leading generally to inappropriate and usually erroneous conclusions to real-world problems. Demonstrate ineffectiveness team-based organizational and presentational skills.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**

	Lectures		24
	Laboratory		30
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		70
	Project report	including presentation	30
Required/recommended reading and online materials	Encyclopedia of Grain Science, edited by Wrigley CW, Corke H, and Walker CE (2004) 3 Volumes, 1,700 pages. Elsevier, Oxford. (selected chapters only) Other readings to be provided		
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.		

BIOL3211 Nutrigenomics (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	80
Course Co-ordinator	Dr K C Tan-Un, Biological Sciences *(kctanun@hku.hk)*		
Teachers Involved	Dr K C Tan-Un, Biological Sciences		
Course Objectives	Recent advances in the understanding of the human genome have resulted in the emergence of a new science called Nutrigenomics. This course aims to provide students with an understanding of the biochemical mechanisms underpinning the science of nutrition and the relation between genes and diet-related diseases. It explains the role of nutrition at the molecular level and the concepts of nutrigenomics and nutrigenetics.		
Course Contents & Topics	Concepts of nutrigenomics, nutrigenetics, metabolomics and nutritional biochemistry. Regulation of gene expression; Single Nucleotide Polymorphisms and relation to diseases. Overview of lipid metabolism; cholesterol metabolic pathway; hyperlipidaemia, LDL receptor mutations. Relevance of folate, vitamin B12; hyperhomocysteinemia and gene polymorphisms in diseases. Epigenetics, Barker s hypothesis, influence of maternal nutrition in fetal gene expression. Obesity, genetic predisposition, candidate genes like leptin, FTO and other hormones involved in the control of appetite Polyunsaturated fatty acid and their roles in the control of gene expression example lipogenesis and lipid oxidation pathways; Inborn errors of metabolism in the context of genetic mutations and personalized diet therapy		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain the principles of the control of gene expression. 2. Demonstrate understanding of the role of metabolic pathways in relationship to diet, gene expression and disease. 3. Discuss how genetic variations are used to study the role of genes in nutrient-related cellular processes. 4. Explain the relationship between genotype, epigenetics and diet-related diseases. 5. Critically evaluate current theories of personalized nutrition based on individual genetic variation.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors		
	A	Demonstrate thorough grasp of the subject matter covered. Show extensive ability of knowledge integration and problem solving skills. Show excellent ability to critically analyze and interpret complex scientific data and draw appropriate conclusions. Demonstrate highly effective organization and writing skills.
	B	Demonstrate substantial grasp of the subject matter covered. Show substantial ability of knowledge integration and problem solving skills. Show substantial ability to critically analyze and interpret scientific data and draw appropriate conclusions. Demonstrate effective organization and writing skills.
	C	Demonstrate general and acceptable grasp of the subject matter covered. Show acceptable ability of knowledge integration and problem solving skills. Show moderate ability to analyze and interpret scientific data and draw proper conclusions. Demonstrate moderate organization and writing skills.
	D	Demonstrate marginal grasp of the subject matter covered. Show limited ability on knowledge integration and problem solving skills. Show limited ability to analyse and interpret scientific data. Demonstrate basic organization and writing skills.
	Fail	Demonstrate little or no grasp, with little retention of information of the subject matter covered. Show lack of coherent and logical thinking, and minimal evidence in problem solving. Fail to integrate information and identify problems. Show little or minimal ability to analyze and interpret scientific data and draw conclusions. Demonstrate poor organization and writing skills.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials	student-centered learning	12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final**

			course grade (%)
	Examination		60
	Test		20
	Assignments		20
Required/recommended reading and online materials	Lehninger Principles of Biochemistry Ordovas: Nutrigenetics and Nutrigenomics. Wiley. 2004 Brigelius-Flohe, Joost: Nutritional Genomics. Wiley. 2006. Rimbach, Fuchs, Packer: Nutrigenomics, CRC Press. 2005 Journals in Nutrition, Molecular Biology and Genetics		
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.		

BIOL3301 Marine biology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr M Yasuhara, Biological Sciences *(yasuhara@hku.hk)*		
Teachers Involved	Dr M Yasuhara, Biological Sciences Prof Y Sadovy, Biological Sciences Prof R S S Wu, Biological Sciences Dr V Thiyagarajan, Biological Sciences Dr D M Baker, Biological Sciences		
Course Objectives	To develop a basic understanding and appreciation of the field of marine biology, including the fascinating diversity of marine life, their function, ecology and inter-relationships. Contemporary issues including the benefits we derive from marine biological resources and threats to their long-term sustainability will also be discussed with case studies highlighting key issues.		
Course Contents & Topics	The topics cover: 1. The physical and chemical environments (e.g., light, current, atmospheric -ocean interactions, salinity, temperature, pH, dissolved oxygen, nutrients) and how these may affect the marine biota 2. Important groups of marine organisms (e.g., phytoplankton, zooplankton, benthos, nekton, marine mammals) and marine food web 3. Major marine habitats and ecosystems (e.g., intertidal, benthic, pelagic, deep sea, coral reefs, mangroves) 4. Exploitation of marine biological resources (e.g., fisheries and bioactive compounds) 5. Contemporary issues (e.g. climate change, marine pollution, sustainable use of marine living resources, invasive species)		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate a basic understanding of the diversity and function of marine biota. 2. Recognize the interactions of marine biota and their environments. 3. Appreciate the importance of marine ecosystems and the threats of human activities on their long-term sustainability as well as possible solutions.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2306 Ecology and evolution		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		24
	Field work	field trip, laboratory practical & tutorials	30
	Reading / Self study		100
Assessment Methods			

and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr><tr><td>Examination</td><td></td><td>80</td></tr><tr><td>Assignments</td><td></td><td>20</td></tr></table>
Required/recommended reading and online materials	Levinton, J. S. 2001. Marine Biology; function, biodiversity, ecology 2nd edition. 515 pp. Oxford University Press Nybakken, J.W. and Bertness, M.D., 2004. Marine Biology: An Ecological Approach, 6th Edition, Benjamin Cummings. H. V. Thurman and E. A. Burton: Introductory Oceanography (Prentice Hall, 2001, 9th ed.) J. W. Nybakken: Marine Biology: An Ecological View (Benjamin Cummings, 2000) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL3302 Systematics and phylogenetics (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Prof R M K Saunders, Biological Sciences *(saunders@hku.hk)*		
Teachers Involved	Prof R M K Saunders, Biological Sciences		
Course Objectives	To give students an understanding of the principles of systematics and phylogenetics and an appreciation of current trends and controversies. Systematics forms an invaluable grounding for many fields of biology (including anatomy, ecology, population biology and evolutionary biology), and enables the integration of a wide range of techniques (including anatomy, biochemistry, chemistry, molecular biology, cytology, palaeontology and ethology).		
Course Contents & Topics	Currrent classificatory theories: phenetic systematics (classifications based on overall resemblances) and cladistics (evolutionary reconstruction). The species concept. Sources of taxonomic data: morphology & anatomy, biochemistry, chemistry, molecular biology, cytology, and ethology. Causes of taxonomies complexity: environmental factors; hybridization; breeding systems. Principles of nomenclature. Laboratory sessions will be aimed at illustrating taxonomic procedures and problems; students will not be expected to memorize large numbers of scientific names.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain taxon concepts (with particular reference to species) and show how multivariate statistical methods can be applied below the species level. 2. Describe the principles behind maximum parsimony methods of phylogenetic reconstruction (including sister-group relationships, out-group comparison, homoplasy and the assessment of clade stability). 3. Evaluate the diversity of sources of taxonomic data, and explain the importance of specific data sources. 4. Recognise the main causes of taxonomic complexity, and identify appropriate solutions. 5. Understand the principles of nomenclature in order to interpret the previous application of scientific names are validly publish new names.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining most or all of the course learning outcomes, with evidence of extensive background reading and use of named examples. Show evidence of significant critical abilities and logical thinking. Apply highly effective presentation skills. Demonstrate effective use of data and results to draw appropriate and insightful conclusions. Show evidence of integration of a wide range of appropriate theories, principles, evidence and techniques.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of knowledge required for attaining most of the course learning outcomes, with evidence of some background reading and use of named examples. Show evidence of critical abilities and logical thinking. Apply effective presentation skills. Demonstrate use of data and results to draw appropriate and insightful conclusions. Show evidence of general integration of appropriate theories, principles, evidence and techniques.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes, with evidence of limited background reading and use of named examples. Show evidence of some critical abilities and logical thinking. Apply moderately effective presentation skills. Demonstrate mostly correct use of data and results to draw appropriate and insightful conclusions. Show evidence of partial integration of appropriate theories, principles, evidence and techniques.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes, with insufficient evidence of background reading and use of named examples. Show evidence of limited critical abilities and logical thinking. Apply limited presentation skills. Demonstrate limited ability to use data and results to draw appropriate and insightful conclusions. Show evidence of limited integration of appropriate theories, principles, evidence and techniques.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes, with no evidence of background reading or use of named examples. Show little or no evidence of critical abilities and logical thinking. Presentational skills are minimally effective or ineffective. Misuse of data and results to draw appropriate conclusions. Little or no evidence of integration of appropriate theories, principles, evidence and techniques.</td></tr></table>		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>24</td></tr><tr><td>Laboratory</td><td></td><td>24</td></tr></table>		

	Project work		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		70
	Assignments		15
	Laboratory reports		15
Required/recommended reading and online materials	E. Mayr & P. D. Ashlock: Principles of Systematic Zoology (McGraw-Hill, 1991, 2nd ed.) W. S. Judd et al.: Plant Systematics - A Phylogenetic Approach (Sinauer, 1999) TBC		
Course Website	http://www.biosch.hku.hk/ecology/lsc/		

BIOL3303 Conservation ecology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr T C Bonebrake, Biological Sciences *(tbone@hku.hk)*		
Teachers Involved	Dr T C Bonebrake, Biological Sciences Prof Y Sadovy, Biological Sciences Dr V Thiyagarajan, Biological Sciences Dr L Karczmarski, Biological Sciences TBC, Biological Sciences		
Course Objectives	To introduce students to the theory and practice of conservation and to provide students with a thorough understanding of practical, economic and management skills required for proficiency in conservation biology. Our ultimate aim is to promote an understanding of the natural biodiversity, the threats to it, and the best ways to manage them. We hope these will be your aims too, and that you will be able to use the skills and knowledge you learn from the course to reduce the local, regional and global loss of biodiversity.		
Course Contents & Topics	Among the many environmental issues, the most serious is the increasingly rapid loss of biodiversity. This loss is irreversible on a human timescale and will reduce the options available to all future human generations. Conservation Biology/Ecology is the science of preserving biological diversity. This course also provides insights to the many benefits and services that nature offers and explores strategies for management options to sustain ecological integrity and production. It is an inexact, applied, mission-orientated, multidisciplinary science which, like medicine, has built-in values: to a conservation biologist, as to a doctor, it matters whether the patient lives or dies. It is also a very new science, bringing together elements from ecology, environmental science, forestry, resource management and many other fields. The course is designed to provide the knowledge, theories, and research related to biodiversity conservation. Our teaching focuses on biodiversity conservation, conservation issues associated with climate change, the key theoretical underpinning of biodiversity conservation and an introduction to conservation legislation and economics. We emphasis on the integration of knowledge, skills and abilities that are required to practice conservation. Our problem based learning approach will require students to actively participate in their group project/class room debate by researching.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Develop a framework for critical thinking about biodiversity, environment and human interaction. 2. Understand why species are becoming extinct and predict which ones will be most vulnerable. 3. Understand the importance of the threat of tropical deforestation, marine and coastal degradation, and habitat fragmentation in species extinction, and explain the main forces behind habitat and biodiversity loss. 4. Understand the principles of population viability analysis, the basis of single-species conservation management and the role of ex situ conservation, ecological restoration and reintroduction in conservation. 5. Outline the legal and administrative basis for conservation in Hong Kong and the world. 6. Appreciate the roles and relationships of economic, social and environmental sciences in the conservation of biodiversity.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2306 Ecology and evolution		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking.	

	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Field work		10
Group work		8
Tutorials		14
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Test		10
Assignments		20
Presentation	group presentation	10

Required/recommended reading and online materials	R. B. Primack: Essentials of Conservation Biology (Sinauer, 2006, 4th ed.) V. D. Fred: Conservation biology [electronic resource]: foundations, concepts, applications (Springer, 2008) M.L. Hunter and J.P. Gibbs: Fundamentals of Conservation Biology (Blackwell, 2007, 3rd Ed) William J. Sutherland: The Conservation Handbook: Research, Management and Policy (Blackwell Science, 2008) NIL
Course Website	http://www.biosch.hku.hk/ecology/lsc/

BIOL3313 Freshwater ecology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof D Dudgeon, Biological Sciences *(ddudgeon@hku.hk)*		
Teachers Involved	Prof D Dudgeon, Biological Sciences		
Course Objectives	This course introduces freshwater science by integrating the physical and biological components of rivers and their drainage basins in the context of sustaining human livelihoods and biodiversity. Conservation and management of lakes and maintenance of water quality are considered also. Case studies are used to illustrate the principles of river science and human use of drainage basins. Emphasis will be placed upon conservation of freshwater biodiversity in Asia in the context of increasing human modification of ecosystems, habitat degradation and water scarcity.		
Course Contents & Topics	The amount of water on Earth is fixed. Less than 0.01% of the world's water is in lakes and rivers, yet this water hosts 10% of the Earth's species. Global water use has increased 300% since 1950 and is growing faster than the Earth's population; many people in Asia already face water stress. This course introduces the physicochemical processes involved in the hydrological cycle and flow of water in drainage basins, as well as their seasonal fluctuations, and describes the main longitudinal changes that occur along rivers and their floodplains. Energy flows in freshwater ecosystems are described with particular reference to the transfer of materials between water and land and the relative importance of aquatic primary production versus energy derived from detrital inputs from the land. The range of organisms associated with Asian fresh waters is introduced and their functional roles explained, and students will become familiar with some common Hong Kong species in field trips and laboratory sessions. The dependence of humans on freshwater ecosystems and the role they play in sustaining livelihoods is explained, together with the causes and consequences of human modification of fresh waters, and the implications for conservation of aquatic biodiversity. Finally the range of management strategies used to reduce or mitigate human impacts on freshwater ecosystems and maintain water quality is introduced.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the global water cycle, the main sources and pathways of energy in freshwaters, and the influence of land-water interactions on aquatic productivity. 2. Describe the composition of the freshwater biota (major groups) and their functional roles in aquatic ecosystems, and identify some of the common animals that occur in Hong Kong fresh waters. 3. Describe the results of modification of freshwater ecosystems by humans, list the main threats to freshwater biodiversity in Asia, explain why freshwater biota are vulnerable to human impacts, and indicate the management strategies used to reduce or mitigate them.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2102 Biostatistics or BIOL2306 Ecology and evolution		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		

Course Grade	A+ to F
Grade Descriptors	**A** — Evidence of original logical (or coherent) thought, strong analytical (or critical) abilities and a thorough grasp of the subject as demonstrated by background reading and excellent use of named (organism) examples. Show excellent presentational, analytical skills and/or lab/field skills, and substantial knowledge of general freshwater biodiveristy or selected taxa. Excellent or outstanding (for A+) work relative to what is required at degree level. **B** — Evidence of analytical (or critical) abilities and logical (or coherent) - but not necessarily original - thinking, a good grasp of the subject as demonstrated by background reading and use of named (organism) examples. Show good presentational, analytical and/or lab/field skills, and knowledge of general freshwater biodiversity or selected taxa. Work more than sufficient for what is required at degree level. **C** — Evidence of some analytical (or critical) abilities and logical (or coherert) thinking with an adequate (but incomplete) grasp of the subject, but little or no evidence of original thinking, with limited background reading and use of named (organism) examples. Show fair presentational, analytical and/or lab/field skills, and some knowledge of general freshwater biodiversity or selected taxa. Work sufficient for what is required for degree level. **D** — Evidence of retention of a minimum of relevant information of the subject (i.e. knowledge is very incomplete), with limited organizational, analytical or presentational skills. Shows insufficient evidence of background reading, or familiarity with lab/field techniques or freshwater biodiversity. Work merely (for D+) or barely (D) adequate for what is required at degree level. **Fail** — Evidence of poor or inadequate knowledge and understanding of the subject, and a lack of coherence, poor organization and/or excessive irrelevancy. Little or no evidence of familiarity with relevant reading material and lab/field techniques, or any knowledge of freshwater biodiversity. Work fails to reach degree level.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	Allan, J.D. & Castillo, M.M. (2007). Stream Ecology. Springer. The Mekong River Awareness Kit (RAK) http://www.mrcmekong.org/RAK/html/rak_frameset.html An online training tool developed by an international team (including the course coordinator) that contains information on the physical and biological features of rivers, and shows how human livelihoods depend on river health. A list of references available in HKU library will be provided for each lecture on the course website.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

Course Teaching & Learning Activities:

Activities	Details	No. of Hours
Lectures		26
Laboratory	project and laboratory work; field trips to local streams and wetlands	40
Reading / Self study		100

Assessment Methods and Weighting:

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments		30
Laboratory reports		10

BIOL3314 Plant structure and evolution (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	60
Course Co-ordinator	Prof R M K Saunders, Biological Sciences *(saunders@hku.hk)*		
Teachers Involved	Prof R M K Saunders, Biological Sciences		
Course Objectives	To survey the form and function of the vascular plant body, with particular emphasis on the evolutionary significance of structures. This course forms a basis for understanding plant physiology, ecology, systematics and phylogenetics.		
Course Contents & Topics	The course will investigate various cell, tissue and organ types in the vascular plant body, with functional explanations for their diversity and discussions of the value of such knowledge in understanding plant phylogeny. Information on plant structure will be integrated with our current understanding of developmental genetics and taxonomic relationships derived from molecular phylogenetic research. Topics such as food storage, strength, water conduction, growth and development, pollination, fertilization, fruit and seed dispersal, germination, etc., will be discussed.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Recognise the main plant cell types and explain how cells are integrated to form specific primary tissues (such as the xylem and phloem). 2. Describe the developmental changes that occur in primary tissues with the onset of secondary growth. 3. Describe the structure, function and development of secondary vegetative structures (wood and bark). 4. Integrate knowledge of the genetic control of floral development with the evolution of organ diversity. 5. Describe the structure of fruits from a functional perspective, and recognise how these structures are derived from the flower. 6. Explain how seeds develop after fertilization of the ovule, and how differences in seed structure influences germination patterns.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL1309 Evolutionary diversity and any level 2 BIOL course		

Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining most or all of the course learning outcomes, with evidence of extensive background reading and use of named examples. Show evidence of significant critical abilities and logical thinking. Apply highly effective presentation skills. Demonstrate effective use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of knowledge required for attaining most of the course learning outcomes, with evidence of some background reading and use of named examples. Show evidence of critical abilities and logical thinking. Apply effective presentation skills. Demonstrate use of data and results to draw appropriate and insightful conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes, with evidence of limited background reading and use of named examples. Show evidence of some critical abilities and logical thinking. Apply moderately effective presentation skills. Demonstrate mostly correct use of data and results to draw appropriate and insightful conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes, with insufficient evidence of background reading and use of named examples. Show evidence of limited critical abilities and logical thinking. Apply limited presentation skills. Demonstrate limited ability to use data and results to draw appropriate and insightful conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes, with no evidence of background reading or use of named examples. Show little or no evidence of critical abilities and logical thinking. Presentational skills are minimally effective or ineffective. Misuse of data and results to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Laboratory reports		30

Required/recommended reading and online materials	P. Rudall: Anatomy of Flowering Plants, 3rd ed. Cambridge Univ. Press (2007) P.H. Raven, R.F. Evert & S.E. Eichhorn: Biology of Plants, 7th ed. Freeman (2005) A list of additional reading material will be provided during the course.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3318 Experimental intertidal ecology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Prof G A Williams, Biological Sciences *(hrsbwga@hku.hk)*		
Teachers Involved	Prof G A Williams, Biological Sciences		
Course Objectives	To examine the communities of coastal systems: their distribution, composition and the factors which regulate them. This course will examine, using an experimental approach, patterns exhibited by a range of shores and the deterministic and stochastic processes that create and sustain them. Hong Kong shores will be used as examples but comparisons will be drawn from the coastlines of the world.		
Course Contents & Topics	The first part of this course describes shores of the marine to brackish water continuum and the communities found on them. Lectures will cover the physical environment of the intertidal (e.g. tides; waves; geological and hydrological processes) the resultant variations in exposure and shore types and consequent distribution of animals and algae on these shores (vertical and horizontal zonation patterns) with specific Hong Kong examples. The second part of the course uses an experimental approach (e.g. sampling methodology; manipulative techniques; experimental design and data analysis) to investigate the factors (e.g. predation; herbivory; competition; disturbance; succession; patchiness and recruitment; supply side ecology) that structure these shores, with particular focus on rocky intertidal shores.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the physical environmental factors (e.g., waves, tides) shaping the intertidal environment and how they interact with geographic features to produce different kinds of shores (e.g., sandy shores, mangroves). 2. Understand the factors limiting species distribution patterns on the vertical intertidal gradient and appreciate methods to measure and investigate these patterns. 3. Identify and quantify the distribution of a variety of local species on different Hong Kong shores. 4. Review, critique and design experimental studies to investigate patterns (e.g., zonation) and processes (e.g., herbivory, competition) in intertidal areas. 5. Explain the role of biological processes (e.g., predation, succession) and their interaction with the physical environment in shaping intertidal communities. 6. Plan, design, execute, analyse and present a simple experimental study on intertidal ecology.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2102 Biostatistics or BIOL3301 Marine biology		

Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Evidence of original, logical (or coherent) thought, strong analytical and critical abilities and a thorough grasp of the subject as demonstrated by background reading and excellent use of named (organism) examples. Show excellent presentational, analytical skills and/or lab/field skills, and demonstrate substantial knowledge of general intertidal ecology and excellent experimental design and analysis skills.
B	Evidence of analytical (or critical) abilities and logical (or coherent), but not necessarily original, thinking, a good grasp of the subject as demonstrated by background reading and use of named (organism) examples. Show good presentational, analytical and/or lab/field skills, and demonstrate knowledge of general intertidal ecology and good experimental design and analysis skills.
C	Evidence of some analytical (or critical) abilities and logical (or coherent) thinking with an adequate (but incomplete) grasp of the subject, but little or no evidence of original thinking, limited background reading and use of named (organism) examples. Show fair presentational, analytical and/or lab/field skills, and demonstrates some knowledge of general intertidal ecology and adequate abilities of experimental design and analysis.
D	Evidence of retention of a minimum of relevant information of the subject (i.e. knowledge is very incomplete), with limited organizational, analytical or presentational skills. Show insufficient evidence of background reading, or familiarity with lab/field techniques. Poor knowledge of general intertidal ecology and misunderstanding of experimental design and analysis.
Fail	Evidence of poor or inadequate knowledge and understanding of the subject, and a lack of coherence, poor organization and/or excessive irrelevancy. Limited or no evidence of familiarity with relevant reading material and lab/field techniques, or knowledge of general intertidal ecology, and misuse of experimental design and analysis skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		16
Field work	field trip/project work	28
Project work		6
Tutorials		4
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments		40

Required/recommended reading and online materials	Morton, B. & Morton, J.: The Seashore Ecology of Hong Kong (Hong Kong University Press, 1983) Little, C. & Williams, G.A. & Trowbridge, C.D.: The Biology of Rocky Shores (Oxford University Press, 2009) TBC
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3320 The biology of marine mammals (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	30
Course Co-ordinator	Dr L Karczmarski, Biological Sciences *(leszek@hku.hk)*		
Teachers Involved	Dr L Karczmarski, Biological Sciences		
Course Objectives	Few other groups of animals have captured the public's imagination the way marine mammals, especially whales and dolphins have. This course covers the evolutionary biology, ecology, behaviour, and conservation of marine mammals: whales, dolphins and porpoises (cetaceans), seals and walruses (pinnipeds), manatees and dugongs (sirenians) and sea otters. Students will learn to understand the ecology of mammalian life in the aquatic environment, their role in the marine ecosystem, their behavioural complexity and socio-ecology, and the current threats to these animals in the human-dominated world.		
Course Contents & Topics	The course begins with an overview of marine mammal species and their global distribution, followed by a review of the various adaptations that have evolved to meet the challenges of the marine environment. Next, the course discusses the life history, reproductive strategies, ecology and population dynamics of marine mammals, highlighting the similarities and differences between species in this taxonomically diverse group of animals. This is followed by sessions on behaviour and behavioural ecology; here we discuss animal movement, diving and ranging behaviour, foraging strategies, ecology of group living and social behaviour, behavioural complexity, cognition, and social strategies that guide the daily lives of these animals. The course concludes with a discussion of human influences on the fate of marine mammals, examples of critically endangered species and populations, and a review of conservation and management strategies; our emphasis is on the importance of applying the knowledge of population ecology, behaviour and behavioural ecology in ensuring long-term effective conservation of marine mammal populations. This course is designed for 3rd and 4th year students; it includes field trips, discussions of current scientific research, innovative research techniques and recent discoveries. Students will undertake independent literature-searches and will discuss their projects during classroom debates, training their skills in conceptual and analytical approaches to science.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciate marine mammal diversity and biogeography.		

	2. Understand how mammals adapt and function in an aquatic environment and their role in the marine ecosystem. 3. Understand and appreciate the complexity of interactions between environmental selective pressures and marine mammal behaviour, population structure and demography. 4. Appreciate the socio-ecological diversity and behavioural complexity of marine mammals. 5. Think analytically in terms of marine mammal ecology and anthropogenic impacts in the rapidly changing world.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2306 Ecology and evolution
Offer in 2013 - 2014	Y 1st sem — **Examination** Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	see below
Course Type	Lecture with laboratory component course

Grade Descriptors

A	Evidence of a thorough grasp of the subject in a broader comparative perspective as demonstrated by background reading and excellent use of named examples and case studies. Evidence of independent critical thought with excellent use of a broad range of fundamental concepts to draw insightful and logical conclusions. Show eagerness to learn, great abilities of independent work, effective presentation skills with excellent analytical argumentation. Excellent or outstanding work relative to what is required at degree level.
B	Evidence of a good grasp of the subject as demonstrated by some background reading and appropriate use of named examples and some case studies. Evidence of good critical thought, although not necessarily original. Good and very good (but not outstanding) abilities of independent work, effective presentation skills with good analytical and logical argumentation. Good general command of acquired knowledge to draw meaningful and logical conclusions. Work more than sufficient for what is required at degree level.
C	Demonstrate an adequate, but not coherent and incomplete grasp of the subject, with limited background reading and limited use of named examples and case studies. Some abilities of logical critical thinking, but not insightful and/or independent; only partial abilities to use acquired knowledge and work independently to draw meaningful conclusions. Fair presentation skills, with mostly correct argumentation, but limited (or no) abilities to integrate broader concepts. Work sufficient for what is required for degree level.
D	Demonstrate some grasp of the subject, but partial and limited to the most basic concepts, examples, and limited (or none) case studies. Insufficient evidence of background reading, limited abilities of critical independent thinking, and not particularly effective presentation skills with generally weak logical argumentation and restricted ability of drawing appropriate conclusions. Work barely meets what is required at degree level.
Fail	No evidence of basic minimum knowledge and understanding of the subject. No evidence of background reading and no familiarity with any relevant examples and case studies. Inadequate evidence of coherent logical thought; ineffective presentation skills with poor argumentation and no abilities to draw meaningful conclusions. Work fails to reach degree level.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	including field trips, research site vists, demonstration of research techniques, interactive classroom debates	32
Project work	project work review	8
Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		45
Assignments	including active participation/continuous assessment	55

Required/recommended reading and online materials	Hoelzel AR (ed). Marine mammal biology: An evolutionary approach (Blackwell Science 2002) Reynolds JE & Rommel SA (eds). Biology of marine mammals (Smithsonian Institution Press 1999) Perrin WF, Wursig B & Thewissen JGM (eds). Encyclopedia of marine mammals (Academic Press 2008) Mann J, Connor RC, Tyack PL & Whitehead H (eds). Cetacean societies (The University of Chicago Press 2000)
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3402 Cell biology and cell technology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	120
Course Co-ordinator	Prof A S T Wong, Biological Sciences *(awong1@hku.hk)*		
Teachers Involved	Prof A S T Wong, Biological Sciences Prof M L Chye, Biological Sciences Dr W Y Lui, Biological Sciences		
Course Objectives	To provide a coherent understanding of the structure and function of cells, and the principles and applications of cell culture and instrumentation in biology and biotechnology		
Course Contents & Topics	I. Cell Biology Cell membranes. Organelles. Cellular transport: ions transport and ions channels. Protein and RNA transport. Membrane potentials, Action potentials. Cell junctions. Extracellular Matrix. Cell-cell interactions.		

	Cell-matrix interactions. II. Techniques in animal cell culture Mammalian cells in culture. Primary and continuous cell lines. Cell types and cell growth parameters. Media formulation, growth factors and design of serum-free media. Culture lab facilities and sterilization. Mechanism of cryopreservation. III. Techniques in plant cell culture Root and shoot cultures. Explant regeneration. Protoplasts. Secondary metabolites.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Acquire fundamental knowledge on cell biology and cell technology. 2. Demonstrate basic laboratory techniques on cell culture. 3. Gain insight into real-life applications in cell biology and cell technology.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course or BIOL2220 Principles of biochemistry or BIOC2600 Basic biochemistry
Offer in 2013 - 2014	Y 1st sem — **Examination**: Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	see below

A	Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. Writings consistently demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
B	Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. Writings mostly demonstrate informed, thoughtful intellectual engagement with broad range of relevant concepts.
C	Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. Writings mostly indicate informed, intellectual engagement with concepts or theories but not always with sufficient depth, breadth or understanding.
D	Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. Writings indicate some intellectual engagement with concepts or theories but mostly at a superficial level.
Fail	Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective. Writings reveal an absence of intellectual engagement with concepts or theories. Writings are irrelevant or superficial.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments	assessment of practical work	30

Required/recommended reading and online materials

Textbooks:
Alberts, B. et al.: Molecular Biology of the Cell (Garland, 2008, 5th ed.)
Mather, J. P.: Introduction to Cell and Tissue Culture, Theory and Techniques (Plenum, 1998)
Collins, H.A. & Edwards, G.S.: Plant Cell Culture (Oxford: Bios Scientific, 1998)

References:
TBC

BIOL3403 Immunology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	100
Course Co-ordinator	Prof W W M Lee, Biological Sciences *(hrszlwm@hku.hk)*		
Teachers Involved	Dr B L Lim, Biological Sciences Prof W W M Lee, Biological Sciences		
Course Objectives	To provide a broad understanding of the animal immune system. Topics will also include the application of a variety of immunological methods to research and disease diagnosis.		
Course Contents & Topics	Immunological functions in the vertebrates and analogous activities in invertebrates. Structures and biological properties of immunoglobulins and T-cell receptors. Divergence of antibody genes. Emergence and characteristic of lymphoid tissues. Major histocompatibility complex. Complement pathways. Immunity against bacteria, viruses and parasites. AIDS, Vaccination, hypersensitivity, and		

	autoimmunity. Immunological tests and immunochemical techniques using non mammalian and mammalian antibodies and their application to various biological problems.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the structure and function of the immune molecules which are involved in the body defense mechanisms, including antibody, T-cell receptor, cytokines, MHC and complement proteins. 2. Describe the organization of the mammalian immune system in terms of genes, cells and tissues. 3. Explain the underlying mechanisms associated with transplant rejection, transfusion reaction and vaccination. 4. Explain how the immune system responds to infections by bacteria, viruses and parasites. 5. Understand antigen-antibody interaction and the principle of immunoassays.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry or BIOL2103 Biological sciences laboratory course
Offer in 2013 - 2014	Y 2nd sem — **Examination**: May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: 1. Exceptionally good performance demonstrating comprehensive understanding of the subject matter. 2. Critical insight and analysis into the scientific literatures. 3. Superior writing, presentation and group communication skills. **B**: 1. Good performance demonstrating full understanding of the subject matter. 2. Coherent insight and analysis into the scientific literatures. 3. Good writing, presentation and group communication skills. **C**: 1. Satisfactory performance demonstrating adequate understanding of the subject matter. 2. Some insight into the scientific literatures. 3. Adequate writing and communication skills. **D**: 1. Limited performance demonstrating some understanding of basic subject matter. 2. Some ability to use the scientific literatures. 3.Limited writing and communication skills. **Fail**: 1. Poor understanding of subject matter. 2. Little to no insight into use of the scientific literatures. 3. Unable to write or communicate.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		30
Laboratory	during reading week	16
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		80
Laboratory reports		20

Required/recommended reading and online materials	J. Kuby: Immunology (Freeman and Company, 2000, 2003 or 2007, 6th ed.) Benjamin & Leskowitz: Immunology: A Short Course (Wiley-Liss, 2007, 6th edition. Or the latest edition) I. Roitt, J. Brostoff and D. Male: Immunology (Mosby, latest 2 editions)
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3404 Protein structure and function (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	150
Course Co-ordinator	Prof W W M Lee, Biological Sciences *(hrszlwm@hku.hk)*		
Teachers Involved	Dr W K Yip, Biological Sciences Prof W W M Lee, Biological Sciences Dr J A Tanner, Biochemistry		
Course Objectives	To provide students with a good understanding of protein structure, how structure subserves function, and the methods for study of both. This course provides a strong foundation for advanced courses in biochemistry and biotechnology.		
Course Contents & Topics	The course will include: Elements of structure: sequencing, prediction and determination of secondary and higher structures; Methods for determination of structure: X-ray crystallography, various optical methods, ultracentrifugation and several hydrodynamic methods for determination of molecular size and shape; Structure and function: molecular motifs, recognition and binding, evolution, natural and artificial mutants; Enzymology: kinetics and energetics of binding, transition state and molecular mechanisms of catalysis; Protein purification and characterization: various liquid chromatographical methods, methods of determinations of molecular masses and weights; Applications: drug design and antibody design, protein stability.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Design assaying methods for enzymes. 2. Find out kinetic parameters of proteins or enzymes by graphically techniques. 3. Learn about the ways to purify protein and the many industrial uses of proteins.		
Pre-requisites (and Co-requisites and	Pass in BIOC2600 Basic biochemistry or BIOL2220 Principles of biochemistry		

Impermissible combination)			
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** 1. Exceptionally good performance demonstrating comprehensive understanding of the subject matter. 2. Critical insight into the scientific literature. 3. Superior writing and group communication skills. **B** 1. Good performance demonstrating full understanding of the subject matter. 2. Coherent insight into the scientific literature. 3. Good writing and group collaboration skills. **C** 1. Satisfactory performance demonstrating adequate understanding of the subject matter. 2. Some insight into the scientific literature. 3. Adequate writing and group collaboration skills. **D** 1. Limited performance demonstrating some understanding of basic subject matter. 2. Some ability to use the scientific literature. 3. Limited writing and group collaboration skills. **Fail** 1. Poor understanding of subject matter. 2. Little to no insight into use of the scientific literature. 3. Unable to write or collaborate.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination: 70 Assignments: 30		
Required/recommended reading and online materials	None prescribed To be announced.		
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.		

BIOL3405 Molecular microbiology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr J S H Tsang, Biological Sciences *(jshtsang@hku.hk)*		
Teachers Involved	Dr J S H Tsang, Biological Sciences		
Course Objectives	This course is intended for biology, biotechnology and biochemistry students who would like to understand the modern fundamentals of microbiology. At the end of the course the students are expected to know the physiological, biochemical and molecular aspects of microbiology.		
Course Contents & Topics	The basic biochemistry of microorganisms will be described. The intrinsic factors that affect the growth of microbes in the environment will be examined. The adaptation of the microbes to the environment by means of physiological changes and genetical alterations will be illustrated. The molecular biology of bacteria and viruses will be considered. The molecular biology of plasmids and transposable elements and their association with medical aspect will be discussed. The use of modern technology in studying microorganisms will be explored.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the intrinsic reorganization of microbes in response to the changing environments. 2. Comprehend the major modes of regulation in the microbe. 3. Explain the biology of bacteriophages and plasmids. 4. Realize the importance of transposable elements in the survival of the microbes. 5. Appreciate the development of modern techniques in studying microorganisms.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Demonstrate substantial grasp of the subject. Show evidence of analytical and critical abilities and logical thinking. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab skills and techniques. Mostly correct but some		

		erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Laboratory reports		20
Presentation		10

Required/recommended reading and online materials	TBC Maloy S.R., Cronan J.E. & Freifelder D. Microbial Genetics (Jones & Bartlett 1994, 2nd ed.) Willey, Sherwood & Woolverton: Prescott's Principles of Microbiology (McGraw Hill 2009) Watson, Baker, Bell, Gann, Levine & Losick: Molecular Biology of the Gene (CSHL Press 2008, 6th ed.) Madigan, Martinko, Dunlap & Clark: Brock Biology of Microorganisms (Pearson 2009, 12th ed.)
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3409 Business aspects of biotechnology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr W B L Lim, Biological Sciences *(bllim@hku.hk)*		
Teachers Involved	Dr W B L Lim, Biological Science Dr G Panagiotou, Biological Science		
Course Objectives	Through an introduction of the development and innovative technology of some of the most successful biotechnology companies, students will understand the business aspects of the biotechnology industry.		
Course Contents & Topics	The course will introduce the emergence and the recent landscape of the biotechnology sector. Leading companies in healthcare biotechnology, protein pharmaceuticals, vaccines, diagnostics, industrial enzymes, transgenic animals and crops, will be taken as examples for illustration. Topics on 4P of biotechnology industry, intellectual properties, patent laws, patent application process, licensing, start-up and fundraising will be covered. Research and development of products, scale-up, clinical trials, field tests, regulatory agencies, good laboratory practice and good manufacturing practice will be illustrated. Students will actively participate in patent study and company/industry analysis.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. The business model of biotechnology industry. 2. The business and pipeline of various biotechnology companies. 3. The process of product development: from bench to market.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in any level 2 BIOL or BIOC course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Students acquire exceptional skills and knowledge from the course and are capable of independently analyzing the business and technological developments of various biotechnology ventures.
B	Students demonstrate a broad and in-depth understanding of the current developments in biotechnology industry and are capable of analyzing the business and technological developments of various biotechnology ventures under guidance.
C	Students demonstrate a broad and in-depth understanding of the current developments in biotechnology industry.
D	Students demonstrate a moderate understanding of the current developments in biotechnology industry.
Fail	Students fail to demonstrate a moderate understanding of the current developments in biotechnology industry.

Course Type	Lecture-based course
Course Teaching	

& Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr><tr><td>Examination</td><td></td><td>40</td></tr><tr><td>Assignments</td><td></td><td>30</td></tr><tr><td>Project reports</td><td></td><td>30</td></tr></table>
Required/recommended reading and online materials	TBC
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3501 Evolution (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr M Sun, Biological Sciences *(meisun@hku.hk)*		
Teachers Involved	Dr M Sun, Biological Sciences		
Course Objectives	Evolution is the cornerstone of modern biology. The course aims to introduce students to the major themes of contemporary evolutionary biology, including the history of evolutionary biology, evolutionary processes, adaptation, speciation, and evolution as an explanatory framework at all levels of biological organization. The course emphasizes the interplay between theory and empirical tests of hypotheses, thus acquainting students with the process of science.		
Course Contents & Topics	Introduction to Evolution - The relevance of evolution to everyday life - Cases for evolutionary thinking Evolution as Fact - Patterns of evolutionary change - The evidence for evolution Evolution as Theory - Before Darwin - Darwinism - The Modern Synthesis & beyond The Mechanisms of Evolution - The origin of genetic variation: mutation - Genetic drift: evolution at random. - Natural selection, sexual selection, and adaptation. - Migration Evolution and Biodiversity - The history of life - Species and the mechanisms of speciation - Genomic and developmental mechanisms of evolutionary innovation		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Be familiar with the facts and theory of evolution. 2. Be able to describe Darwin's theory of evolution by natural selection and how the process of natural selection can lead to speciation. 3. Have an advanced understanding of the modern evolutionary theory since Darwin's days and its practical applications in agriculture, medicine, and biological conservation. 4. Apply evolutionary thinking to tackle important issues arising from everyday lives.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2306 Ecology and evolution or BIOL3408 Genetics		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>A</td><td>Exceptionally good performance demonstrating excellent understanding of the subject matter, extensive knowledge over a wide range of topics covered by the course, and skillful applications of concepts/theories in solving new or unfamiliar problems, showing strong abilities in critical thinking and logical reasoning, with evidence of significant insight and original thought in dealing with the critical issues in the field.</td></tr><tr><td>B</td><td>Good performance demonstrating capacity to use the appropriate concepts, a good understanding of the subject matter, and an ability to handle the problems and materials encountered in the subject, showing evidence of attaining most of the course learning outcomes.</td></tr><tr><td>C</td><td>Adequate performance demonstrating some understanding of the subject matter, an ability to handle relatively simple problems, but showing incomplete command of knowledge required for attaining most of the expected course learning outcomes.</td></tr><tr><td>D</td><td>Minimally acceptable performance demonstrating at least partial familiarity with the subject matter and some capacity to deal with relatively simple problems, but also demonstrating serious deficiencies in knowledge required for attaining most of the expected course learning outcomes.</td></tr></table>		

	Fail	Poor performance in all aspects of the course, showing little evidence of learning, lacking real understanding of the subject matter, demonstrating deficiencies serious enough to make it inadvisable to proceed further without additional course work.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Project work		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		15
Assignments		10
Presentation	including class participation (10%)	25

Required/recommended reading and online materials	Futuyma D.J.: Evolution (Sinauer, 2009, 2nd Ed.) Barton et al: Evolution Scion Publish Ltd. 2007 S. Freeman and J.C. Herron: Evolutionary Analysis (Pearson, 2007, 4th ed.) S. Freeman and J.C. Herron: Evolutionary Analysis (Pearson, 2014, 5th ed.) Ridley, M.: Evolution (Blackwell Publishing, 2004, 3rd ed.) e-book and other websites
Additional Course Information	Website - to be listed This course will be offered subject to a minimum enrollment number and availability of teachers.

BIOL3503 Endocrinology: human physiology II (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	120
Course Co-ordinator	Prof B K C Chow, Biological Sciences *(bkcc@hku.hk)*		
Teachers Involved	Prof B K C Chow, Biological Sciences Dr L T O Lee, Biological Sciences Prof A S T Wong, Biological Sciences		
Course Objectives	To provide an advanced course on hormones and how they regulate metabolism/growth, reproduction and water/salt homeostasis in our body.		
Course Contents & Topics	History: discovery of blood borne factor or hormone. Chemical nature of hormones. Mechanisms of cell-cell signaling. Secondary messengers. Responsivity and hormonal effects. The hypothalamic pituitary axis The GHRH-GH-IGF axis. The TRH-TSH-thyroid hormone axis. The CRH-ACTH-cortisol axis. Cortisol and stress. Catecholamine effects and their pathways. The gastrointestinal system The enteric nervous system. The cephalic phase, stomach phase and intestinal phase of food digestion. Regulation of acid secretion. Regulation of pancreatic exocrine and endocrine secretion. Gut hormones: gastrin, GIP, CCK, secretin, GLP-1, GLP-2 and motilin. Regulation of feeding, energy balance and food intake. Insulin and glucagon. Reproduction The GnRH-gonadotropin-sex hormone axis. Regulation of LH and FSH release. Male reproductive system. Interaction of hormones produced by various cells in the testis to regulate spermatogenesis. Biological actions of testosterone. The erection reflex. Female reproductive system. Development of ovarian follicles. The menstrual cycle: hormonal control: Ovulation, fertilization and implantation. The placenta as an endocrine organ. Endocrine regulation of parturition. Hormonal control of milk secretion. Prolactin and broodiness. Osmoregulation Posterior pituitary hormone, ADH. Aldosterone and sodium balance. Angiotensin's effect on blood pressure. Atrial natriuretic peptide and its function in water and sodium balance.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the definition and natures of hormones. 2. Explain and describe secondary messenger pathways for hormones. 3. Describe the connection between pituitary the master gland with higher brain centers and peripheral organs. 4. Explain and describe hormones involved in the regulation of 3 most important body functions including metabolism/growth, reproduction and water/salt homeostasis.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2103 Biological sciences laboratory course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational skills. **B** — Demonstrate substantial command of a broad range of knowledge required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational skills. **C** — Demonstrate general but incomplete command of knowledge required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational skills. **D** — Demonstrate partial but limited command of knowledge required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational skills. **Fail** — Demonstrate little or no evidence of command of knowledge required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	see table below
Assessment Methods and Weighting	see table below
Required/recommended reading and online materials	Williams textbook of Endocrinology, (Elsevier, 11th Edition, 2009). Silverthorn: Human Physiology, An Integrated Approach (Pearson, 2006, 4'" edition).
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	a 5-hour laboratory session per week for 5 weeks	25
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments	continuous assessement	10
Laboratory reports	lab performance & report	20

ENVS1301 Environmental life science (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	40
Course Co-ordinator	Dr T Vengatesen, Biological Sciences *(rajan@hku.hk)*		
Teachers Involved	Dr T Vengatesen, Biological Sciences		
Course Objectives	This course intended for students who wish to understand the fundamentals of environmental biology/life science and importantly the relationship (connection) between environment and life. Here you will learn about the various biological/ecological principles and concepts of environmental science which are needed for critical discussion and evaluation of current global environmental issues including human ecology, urbanization, ecological economics, and climate change.		
Course Contents & Topics	This course is a combination of lectures, group discussion/debate and field trips cum tutorials. We first explore the fundamental interactions between organisms and their environment. We then explore environmental constraints on life at various ecosystems (like marine, freshwater, and terrestrial). Students will also learn how factors such as urbanization, climate change, and anthropogenic impacts affect life at population and ecosystem levels. Similarly, students will be exposed to the incredible interrelationships that are basic to ecological principles and the impact that human development has upon these interrelationships. After learning basics of environmental life science, students will be stimulated to think about current life science issues such as biodiversity loss, organisms adaptation to climate change, tragedy of commons (human ecology) and applied life science topics such as biomaterial science.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand: Life, Environment and their interactions. 2. Appreciate: Species and ecosystem responses to human-induced environmental change. 3. Attain: Ability to critically think and discuss about current environ-life science issues. 4. Be motivated and equipped: to tackle biological environmental science questions and to choose advanced environmental science courses.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Evidence of original thought during the analysis of environmental life science issues. Show evidence of analytical, critical and multidimensional thinking about the study subject. Extensive knowledge and skills required for attaining all the course learning outcomes. Demonstrate excellent ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show highly effective organizational, presentational and		

		field trip skills.
	B	Show substantial knowledge and thought during the analysis of environmental life science issues. Show some evidence of some analytical, critical and multidimensional thinking about the study subject. Good knowledge and skills required for attaining all the course learning outcomes. Demonstrate good ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show effective organizational, presentational and field trip skills.
	C	Show general but incomplete knowledge and original thought during the analysis of environmental life science issues. Fair knowledge and skills required for attaining all the course learning outcomes. Demonstrate fair ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show considerable organizational, presentational and field trip skills.
	D	Evidence to show a minimum knowledge (i.e. knowledge is very incomplete) and thought during the analysis of environmental life science issues. Show insufficient knowledge and skills required for attaining all the course learning outcomes. Demonstrate poor ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show very little organizational, presentational and field trip skills.
	Fail	Evidence of meager or inadequate knowledge and understanding of environmental life science issues. Show no evidence of knowledge and skills required for attaining all the course learning outcomes. Demonstrate no ability to apply what you have learned in the class room to critically analyze the real environmental life science issues. Show no evidence of familiarity with relevant reading material and field trip demonstrations, or any knowledge of organizational and presentational skills.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Field work	3-12 hours field work	12
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Test		10
Assignments		10
Presentation	group presentation	10

Required/recommended reading and online materials	Appropriate reading materials/handouts will be provided during the course.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

ENVS2001 Environmental field and lab course (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr D M Baker, Biological Sciences *(dmbaker@hku.hk)*		
Teachers Involved	Dr D M Baker, School of Biological Science Dr C Dingle, School of Biological Sciences		
Course Objectives	To introduce students to a broad spectrum of field and laboratory methods for data collection in environmental science. Through exposure to environmental data collection, experimental design, data analysis, interpretation and reporting, students will gain a deeper appreciation of the process that underlies environmental science research and it's relevancy to critical thinking and future careers in the sciences.		
Course Contents & Topics	This course will involve environmental data collection in both field and laboratory settings. In-class lectures will cover basic principles of specific methodologies and relevant applications in preparation for laboratory and field-based experiential learning. Having an interdisciplinary focus, the course will cover topics relevant to the study of the biosphere, encompassing terrestrial, aquatic, and atmospheric systems. Students will gain hands-on experience with the operation of standard and advanced sampling and analytical equipment, quality control, basic data analysis and reporting.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand how scientific data is used to address environmental problems. 2. Have a basic understanding of the techniques and methodologies necessary for collecting environmental data. 3. Understand some of the problems inherent in data collection, and how this impacts data interpretation. 4. Understand how data collected in the lab and field can be used to critically evaluate ideas.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity		
Offer in 2013 - 2014	Y 1st sem	**Examination**	No Exam
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply highly effective lab / fieldwork skills and techniques. Critical use of data and results

		to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Apply effective lab / fieldwork skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Apply moderately effective lab / fieldwork skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply partially effective lab / fieldwork skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Apply minimally effective or ineffective lab / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Laboratory and workshop course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Laboratory		48
Field work		12
Project work		8
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Project reports		50
Presentation		50

Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

ENVS2002 Environmental data analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr T C Bonebrake, Biological Sciences *(tbone@hku.hk)*		
Teachers Involved	Dr T C Bonebrake, School of Biological Science		
Course Objectives	To provide students with the ability to analyze data; especially data which are relevant to issues and questions in environmental science. This course will enable students to accurately interpret, organize, display, test and analyze environmental data. The course will also introduce students to principles of a variety of important advanced approaches in analyzing environmental data including spatial analysis, geographic information systems, remote sensing, risk assessment, and time series analysis.		
Course Contents & Topics	The course will feature lectures on aspects of sampling, distributions, uncertainty, probability, and hypothesis testing in addition to lectures on advanced analysis topics. Special emphasis will be placed on qualities inherent to most environmental datasets such as large size, multivariate, and spatial. All material will be applied and practiced in environmental science contexts (e.g. chemistry, ecology, geology and oceanography) using a variety of datasets in a computer laboratory setting using the 'R Project for Statistical Computing' software (a graphical user interface will be implemented such that prior knowledge of coding or computer science is not required).		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Accurately interpret methods and approaches in the scientific literature. 2. Evaluate critically data analyses in the environmental sciences. 3. Perform standard and appropriate statistical analyses on a variety of data sources. 4. Work comfortably with large datasets using applied software (e.g. R). 5. Present results of data analyses in a clear and transparent manner.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in ENVS1301 Environmental life science or ENVS1401 Introduction to environmental science or EASC1401 Blue planet or BIOL1309 Evolutionary diversity		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Apply a highly effective computational skills and techniques for basic statistical analyses. Be able to critically use data and statistical results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject and skills required for attaining at least most of the course learning outcomes. Present evidence of analytical and critical abilities and logical thinking. Apply effective computational skills and techniques for basic statistical analyses. Be able to correctly use data and statistical results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some analytical and critical abilities and logical thinking. Apply moderately effective computational skills and techniques for basic statistical analyses. Demonstrate mostly correct but some erroneous

		use of data and statistical results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial and limited grasp of the subject and skills required for attaining some of the course learning outcomes. Present evidence of some analytical and critical abilities and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective computational skills and techniques for basic statistical analyses. Demonstrate limited ability to use data and statistical results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate limited or no grasp of the subject and skills required for attaining any of the course learning outcomes. Present evidence of little or lack of analytical and critical abilities, logical or coherent thinking. Apply minimally effective or ineffective computational skills and techniques for basic statistical analyses. Demonstrate misuse of data and statistical results and/or unable to draw appropriate conclusions. Apply minimally effective or ineffective organizational and presentational skills.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	problem-based learning/computer laboratory	24
Tutorials		6

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		25
Test	problem-based exercises	50
Project report		25

Required/recommended reading and online materials	Textbooks: Shahbaba, B. 2012. Biostatistics with R: An Introduction to Statistics through Biological Data. Springer, New York. Reimann, C. et al. 2007. Statistical Data Analysis Explained: Applied Environmental Statistics with R. John Wiley & Sons, Chichester. References: Zhang C. 2007. Fundamentals of Environmental Sampling and Analysis. John Wiley & Sons, New Jersey.
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

ENVS3020 Global change ecology (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	50
Course Co-ordinator	Dr C Dingle, Biological Sciences *(cdingle@hku.hk)*		
Teachers Involved	Dr C Dingle, Biological Sciences		
Course Objectives	To introduce students to the ways in which environmental change affects biodiversity from organisms to ecosystems. This course will explore the contributions that human population growth and globalization have made to increases in greenhouse gases and associated climate change, biological invasions, land degradation, disease, and, ultimately, impacts on biological systems.		
Course Contents & Topics	Environmental change is a natural phenomenon, with ecosystems continually shifting, rearranging, emerging, and disappearing through geologic time with changes in climatic conditions. The activities of humans have added to this natural variation, increasing the magnitude and speed with which environmental change occurs. This course will focus principally on the effects of climate change on organisms and ecosystems but will also investigate other topics registering on a global scale including land use change, biological invasions, and eutrophication. We will explore (1) what climate change is and how it is manifested including climate warming, sea level rise, and ocean acidification; (2) types and extents of land use change; (3) how globalization has contributed to the spread of alien species and disease; and (4) increases in eutrophication of aquatic ecosystems with a focus on marine "dead zones". The course will investigate how these human-caused stressors affect the morphology, phenology, distributions, and evolution of organisms and their impacts on ecosystem functioning and biodiversity in freshwater, marine, and terrestrial ecosystems.		
Course Learning Outcomes	On successful completion of the course, students should be able to : 1. Develop a basic understanding of what climate change and other human-associated impacts, such as land use change, are and how they are manifested on a global scale. 2. Explain the ways that global change affects organisms' traits and distributions, and biodiversity at the ecosystem level. 3. Understand the differences between climate change on a geologic time scale and recent climate change. 4. Be aware of the relationships between humans and global change.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

	A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, ability to integrate and synthesize information, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective presentational skills. Strong evidence of clear attention to thoughtful and reflective thinking.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, integration of materials and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate effective presentational skills. Evidence of clear attention to thoughtful and reflective thinking.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective presentational skills. Little evidence of clear attention to thoughtful and reflective thinking.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities and little attempt at integration. Show limited ability to apply knowledge to solve problems. Apply limited effectiveness in presentational skills. Lack of attention to thoughtful and reflective thinking.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Tutorials	tutorial & 20 hours of problem-based learning	44
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		40
Assignments	problem-based exercises (10%), continuous assessment (10%)	20
Essay		30
Presentation		10

Required/recommended reading and online materials	Lovejoy, T.E. and Hannah, L. 2005. Climate Change and Biodiversity. Yale University Press, New Haven, CT, USA. Araujo, M.B., and Rahbek, C. 2006. How does climate change affect biodiversity? Science 313:1396-1397. Grimm, N.B., Faeth, S.H., Golubiewski, N.E., Redman, C.L., Wu J., Bai, X., and Briggs, J.M. 2008. Global change and the ecology of cities. Science 319:756-760. Schlesinger, W.H. 2006. Global change ecology. Trends in Ecology and Evolution 21:348-351.
Course Website	http://www.biosch.hku.hk/ecology/lsc/
Additional Course Information	This course will be offered subject to a minimum enrollment number and availability of teachers.

ENVS3313 Environmental oceanography (6 credits)		**Academic Year**	**2013**
Offering Department	Biological Sciences	**Quota**	---
Course Co-ordinator	Dr D M Baker, Biological Sciences *(dmbaker@hku.hk)*		
Teachers Involved	Dr D M Baker, Biological Sciences		
Course Objectives	To provide students with a thorough introduction to coastal and ocean processes with key questions to highlight the importance of the (paleo)oceanographic processes to environmental and ecological conditions. To convey the basic science behind ocean-atmosphere and ocean-biosphere interactions and place it within the context of human's connectedness to the physical world.		
Course Contents & Topics	To provide a solid foundation of knowledge about the physical processes dictating the oceans movements and their impacts on the environment and ecosystems. The oceans take up 71% of earth's surface and contain 98% of the water. By looking at the structure of the atmosphere, thermodynamic principals and properties governing sea water, we will evaluate the critical roles the ocean plays in the environmental system including its influence on (paleo)climate, coastal resources, and nutrient cycling. Case studies specifically examining changes in sea level rise, El Nino, and (paleo)climate will be used to connect oceanographic principles to environmental problems.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the major surface and deep currents of the ocean. 2. Identify and describe important processes in the ocean controlling large scale circulation and nutrient transport. 3. Describe sources and distribution of critical chemicals and sea water properties in the ocean. 4. Illustrate connections between physical ocean processes, climate systems and biological activity.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis or BIOL2306 Ecology and evolution or EASC2404 Introduction to atmosphere and hydrosphere		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May

Offer in 2014 - 2015	N
Course Grade	A+ to F
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining the entire course learning outcomes. Show ability to think logically and critically, with evidence of original thought. Critically evaluate data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of logical and critical thought. Apply effective organizational and presentational skills. Correctly use of data and results to draw appropriate conclusions. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some logical and critical thinking. Apply moderately effective organizational and presentational skills. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited critical abilities. Apply limited or barely effective organizational and presentational skills. Limited ability to use data and results to draw appropriate conclusions. **Fail** — Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of critical, logical and/or coherent thinking. Organization and presentational skills are minimally effective or ineffective. Misuse of data and results and/or unable to draw appropriate conclusions.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	up to 12 hours of group discussion & class debate	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		50

Required/recommended reading and online materials	Beer, 1997. Environmental Oceanography: Second Edition. CRC-Press. Abel and McConnell, 2009. Environmental Oceanography: Topics and Analysis. Jones & Bartlett Publishers. Garrison, 2004. Oceanography: An Invitation to Marine Science. 5th edition. Brooks Cole. Cronin, 2009. Paleoclimates: Understanding Climate Change Past and Present. Columbia University Press.
Additional Course Information	ENVS3313 Environmental oceanography and paleoceanography will not be offered in 2012-13 and will be offered every alternate year starting from 2013-14.

CAES1000 Core University English (6 credits)		Academic Year	2013
Offering Department	English	**Quota**	---
Course Co-ordinator	Mr S Boynton, English *(sboynton@hku.hk)*		
Teachers Involved	Mr S Boynton, Centre for Applied English Studies		
Course Objectives			
Course Contents & Topics	The Core University English (CUE) course aims to enhance first-year students' academic English language proficiency in the university context. CUE focuses on developing students' academic English language skills for the Common Core Curriculum. These include the language skills needed to understand and produce spoken and written academic texts, express academic ideas and concepts clearly and in a well-structured manner and search for and use academic sources of information in their writing and speaking. Students will also complete four online-learning modules through the Moodle platform on academic grammar, academic vocabulary, citation and referencing skills and understanding and avoiding plagiarism. This course will help students to participate more effectively in their first-year university studies in English, thereby enriching their first-year experience.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Identify and distinguish between main ideas and supporting details in lectures and written texts and demonstrate an understanding of the arguments / facts expressed; 2. Form and express personal opinions through critical reading and listening; 3. Argue for and defend a position in a clear and structured way using academic sources, through writing and speaking; and 4. Demonstrate control of grammatical accuracy and lexical appropriacy in academic communication.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Excellent to outstanding result. Students are able to produce spoken and written academic texts which are at all times appropriately structured. Students can clearly and concisely explain academic concepts and critically argue for a detailed position. Students always use appropriate academic sources to support their ideas in writing and speaking. They cite and reference correctly at all times. Students demonstrate an ability to fully comprehend and critically interpret spoken and written texts. Written language contains very few, if any, systematic errors in grammar and vocabulary. Spoken language is always comprehensible and fluent.
B	Good to very good result. Students are able to produce spoken and written academic texts which are appropriately structured with only minor errors. Students can almost always clearly and concisely explain academic concepts and almost always critically argue for a detailed position. Students almost always use appropriate academic sources to support their ideas in writing and speaking. They cite and reference correctly with only a few non-systematic errors. Students can comprehend and interpret texts with ease, although they may miss some implied meanings and opinions. Written language is mostly accurate but contains a few systematic errors in complex grammar and vocabulary. Spoken language is mostly comprehensible and fluent.
C	Satisfactory to reasonably good result. Spoken and written academic texts produced by students are sometimes not-well structured but there is some evidence of this ability. Students are sometimes unable to clearly and concisely explain academic concepts. While they can argue for a position, it is not very detailed and tend to be simplistic rather than critical. Students sometimes use sources which are nonacademic and/or not appropriate to support their ideas in writing and speaking. There are some systematic errors in citation and referencing but also evidence of correct systematic use. Students have some difficulty comprehending and critically interpreting texts. They can always understand the main ideas but may miss some of the writer's views and attitudes. Written language is sometimes inaccurate, although errors, when they occur, are more often in complex grammar and vocabulary and there is some evidence of control of simple grammatical structures. Spoken language is generally comprehensible and fluent but at times places strain on the listener.
D	Barely satisfactory result. Spoken and written academic texts produced by students are often inappropriately structured but there may be some evidence of this ability. Students are often unable to clearly and concisely explain academic concepts and argue for a position. There is some evidence of an ability to explain academic concepts but not to critically argue for a position. Students often use sources which are nonacademic and/or not appropriate to support their ideas in writing and speaking. There are many systematic errors in citation and referencing however there is evidence of an understanding of some of the conventions of citation and referencing. Students often have difficulty comprehending and interpreting texts, sometimes failing to understand the main ideas and writer's views and attitudes. Written language is often inaccurate containing errors in a range of simple and complex grammar and vocabulary. Spoken language is only sometimes comprehensible and fluent, and strain is frequently placed on the listener.
Fail	Unsatisfactory result. Productive skills are too limited to be able to successfully carry out spoken and written assessments. Texts are unstructured and unclear. Students are unable to follow and interpret texts. There are language errors in almost every sentence. Spoken language is often incomprehensible. Assessments may not have been attempted or contain plagiarism.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		30
Tutorials		6
Reading / Self study		84

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		35
Assignments		65

CAES9820 Academic English for science students (6 credits)		Academic Year	2013
Offering Department	English	**Quota**	---
Course Co-ordinator	Mr S Boynton, English *(sboynton@hku.hk)*		
Teachers Involved	Mr S Boynton, Centre for Applied English Studies		
Course Objectives	This six credit English-in-the-Discipine course will be offered to second year students studying in the Science Faculty. This course will help students develop the necessary skills to use both written and spoken English within their studies. Students will learn to better communicate and discuss general and scientific concepts within their division, with other scientists as well as to a larger audience. Particular emphasis will be placed on enabling students to identify their own language needs and develop appropriate self-learning strategies to improve their proficiency.		
Course Contents & Topics	Topics covered in the course will be: - Finding, evaluating and using appropriate academic source materials. - Compiling an academic bibliography. - Contrasting academic and popular genres. - Writing for a specific audience, including stance, shared knowledge, levels of formality. - Organizing and articulating ideas in an academically suitable format including appropriate vocabulary and grammar. - 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: 1. Identify and summarize disciplinary sources related to a specified topic. 2 Produce texts (written and spoken) appropriate for a cross-disciplinary audience based on their disciplinary knowledge. 3. Identify their own language learning needs and implement a plan to meet those needs.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Excellent result. Consistently demonstrates ability to summarize salient points accurately from appropriate and reliable sources using original language. Text uses sources appropriately and demonstrates accurate and appropriate grammatical, lexical and organizational characteristics. Language learning needs are clearly identified and aligned with evidence of planning, self-study and reflection.
B	Good to very good result. Usually demonstrates ability to summarize salient points accurately using mostly original language. Text mostly uses sources appropriately and demonstrates mostly accurate and appropriate grammatical, lexical and organizational characteristics. Language learning needs are stated with some reference to evidence of planning and reflection although there is some misalignment between goals and self-study completed.
C	Satisfactory to reasonably good result. Demonstrates some ability to summarize salient points using mostly original language although some inaccuracies are present. Text uses some sources appropriately and demonstrates appropriate but simple grammatical and lexical characteristics with some organizational flaws. Language learning needs are stated with some limited evidence of planning and reflection but goals and self-study are misaligned.
D	Barely satisfactory result. Demonstrates a limited ability to summarize salient points from sources with inaccuracies and little original language. Text uses sources inappropriately and demonstrates grammatical inaccuracy, inappropriate lexical choices and organizational flaws. There is a minimal statement of language learning needs, planning and reflection with little or no apparent alignment between goals and self-study.
Fail	Unsatisfactory result. Does not demonstrate ability to summarize salient points identify, interpret or appropriately paraphrase reliable sources. Text uses no sources and demonstrates serious grammatical, lexical and/or organizational errors. Does not demonstrate any meaningful attempt to identify language learning needs or implement a plan.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Tutorials		36
Reading / Self study		120

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Test		30
Assignments		70

Required/recommended reading and online materials	Course materials to be provided electronically through course website.
Course Website	http://caes.hku.hk/caes9820/
Additional Course Information	This a compulsory course for all students studying undergraduate degrees in the Faculty of Science.

CHEM1041 Foundations of chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	150
Course Co-ordinator	Dr A P L Tong, Chemistry *(apltong@hku.hk)*		
Teachers Involved	Dr A P L Tong, Chemistry		
Course Objectives	The course aims to provide students who do not have HKDSE Chemistry or an equivalent background but are interested in exploring Chemistry further, with an understanding of the essential fundamental principles and concepts of chemistry.		
Course Contents & Topics	Topic 1: Chemistry: Matter and Measurement (2 hours) Elements, compounds, and mixtures; physical properties of matter; chemical changes and chemical properties; measuring mass, length, volume and temperature; atomic structure and subatomic particles; the mole concept and stoichiometry; solutions and concentrations; uncertainty in measurement and significant figures. Topic 2: Gases: Their Properties and Behaviour (6 hours) Gas pressure; the gas laws; the ideal gas law and reaction stiochiometry; the kinetic-molecular theory of gases. Topic 3: Chemical Bonding and Structures (7 hours) Covalent, ionic and metallic bonds; bond energy and chemical change; electronegativity and bond polarity; Lewis structures of molecules and ions; VSEPR Theory and molecular shape. Topic 4: Intermolecular Forces: Liquids, Solids, and Phase Changes (8 hours) Physical states and phase changes; types of intermolecular forces; properties of liquid state; the solid state: structure, properties, and bonding; advanced materials e.g. electronic materials, liquid crystals, ceramic materials and polymeric materials. Topic 5: Chemical Equilibrium (4 hours) The equilibrium state and the equilibrium constant; the equilibrium law: calculation of equilibrium constants and reaction quotient; Le Chelier? Principle Topic 6: Introductory Organic Chemistry (9 hours) Homologous series and nomenclature; isomerism; typical reactions of selected functional groups.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demostrate knowledge and understanding in relation to some chemical vocabulary, terminology and conventions. 2. Demonstrate knowledge and understanding of chemical stoichiometry, the properties of liquids and solids, the nature of gases, phase changes, chemical bonding and structures, and the nature of chemical equilibria. 3. Demonstrate a basic knowledge of nomenclature, isomerism, and typical reactions of various functional groups of organic compounds. 4. Apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends. 5. Organize and present chemical ideas in a clear, logical and coherent way. 6. Demonstrate awareness and appreciation of the relevant applications of chemistry in society and in everyday life.		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 3 or above in HKDSE Combined Science with Chemistry component or Integrated Science, or equivalent. Students without such background but keen on taking this foundation chemistry course may approach the course coordinator for consideration. Not for students with Level 3 or above in HKDSE Chemistry.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36

	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		65
	Test		15
	Assignments		20
Required/recommended reading and online materials	1) Petrucci; Herring; Madura; Bissonnette: General Chemistry: Principles and Modern Applications, latest edition, Pearson 2) Moore; Stanitski; Jurs: Chemistry: The Molecular Science, latest edition, Brookes/Cole 3) Zumdahl; Zumdahl: Chemistry, latest edition, Brookes/Cole		
Additional Course Information	Suggested follow-up course: CHEM1042 General Chemistry		

CHEM1042 General chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	255
Course Co-ordinator	Dr A P L Tong, Chemistry *(apltong@hku.hk)*		
Teachers Involved	Dr A P L Tong, Chemistry		
Course Objectives	The course aims to provide students with a solid foundation of the basic principles and concepts of chemistry. It also provides students with hands-on training of basic laboratory skills and techniques including volumetric analysis, preparation, purification and characterization of chemical substances and some basic instrumental methods. Students will be equipped with a good foundation of theoretical and practical knowledge and skills for further studies in Chemistry.		
Course Contents & Topics	Chemistry: its nature and method: physical properties; chemical changes and chemical properties; elements and compounds; measuring mass, length, volume and temperature; atomic structure and subatomic particles; the mole concept and stoichiometry; solutions and concentrations; uncertainty in measurement and significant figures. Atoms: the quantum world: electromagnetic radiation and matter; Planck's quantum theory; the Bohr model of the hydrogen atom; the quantum mechanical model of the atom; quantum numbers, energy levels, and atomic orbitals; shapes of atomic orbitals; electron configurations; periodic trends: atomic radii, ionic radii, ionization energies, and electron affinities. Chemical bonding and structures: review on covalent, ionic and metallic bond. Covalent bonds and molecular structures (VSEPR, VB theory, MO theory). Energetics and kinetics of reactions: heat and work; the first law of thermodynamics; heat of reactions; spontaneity of changes. Reaction rate; factors that influence reaction rate; rate laws: differential and integrated rate laws; temperature and reaction rate; reaction mechanisms; catalysis. Solutions and their properties: solutions; energy changes and the solution process; factors affecting solubility. Acid-Base equilibria: acid-base concepts; equilibria in solutions of weak acids and in weak bases; ionization constants; molecular properties and acid strength; acid-base properties of salt solutions; buffer solutions; acid-base titrations.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate a basic knowledge and understanding of the microscopic nature of atomic structure and concepts of chemical bonding and their relationships with the bulk properties of matter. 2. Demonstrate knowledge and understanding in relation to thermodynamics and kinetics of reactions as well as aqueous equilibria including acid-base equilibria. 3. Apply the theories and concepts introduced in the course to solve problems, perform calculations, make predictions and rationalize trends. 4. Carry out chemical experiments with proper procedures, record experimental oberservations accurately, and interpret and evaluate the experimental data. 5. Organize and present chemical ideas in a clear, logical and coherent way. 6. Demonstrate awareness and appreciation of the relevant applications of chemistry in society and in everyday life.		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 3 or above in HKDSE Chemistry or equivalent; students without Level 3 or above in HKDSE Chemistry but having a pass in CHEM1041 Foundations of chemistry may be allowed to take this course.		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Show highly effective lab skills and techniques. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Show effective lab skills and techniques. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective lab skills and techniques. Apply moderately effective organizational and presentational skills.	

	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		24
	Laboratory		24
	Tutorials		6
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		60
	Test		15
	Laboratory reports		25
Required/recommended reading and online materials	1) Petrucci; Herring; Madura; Bissonnette: General Chemistry: Principles and Modern Applications, latest edition, Pearson 2) Moore; Stanitski; Jurs: Chemistry: The Molecular Science, latest edition, Brookes/Cole 3) Zumdahl; Zumdahl: Chemistry, latest edition, Brookes/Cole		

CHEM2041 Principles of chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	140
Course Co-ordinator	Dr I K Chu, Chemistry *(ivankchu@hku.hk)*		
Teachers Involved	Dr A M Y Yuen, Chemistry Dr I K Chu, Chemistry		
Course Objectives	This course is designed for non-chemistry major students covering basic principles of chemistry.		
Course Contents & Topics	Gas Laws and the Kinetic Theory of Gases Thermodynamics: work, heat, the zeroth and first law of thermodynamics, internal energy, enthalpy, heat capacities, thermochemistry, Hess's Law, Kirchhoff's Law, the second and third laws of thermodynamics, entropy, Gibbs free energy, spontaneity, equilibrium, coupled reaction; Transport Phenomena: diffusion, viscosity of gases, diffusion in liquids and viscosity of liquids, ionic conduction; Chemical Kinetics: rate of reactions, orders of reactions, rate laws, reaction mechanism, experimental measurement of reaction rates, enzyme kinetics, enzyme inhibition, temperature effect on rates; Chemical Equilibrium; Equilibria in single-, and two component systems: phase transitions, phase diagrams and the phase rule, chemical potential; liquid/liquid systems; Introduction to acids and bases: calculation on concentration of different chemical species in a solution, diprotic and polyprotic acids, activity; Introduction to Spectroscopy: UV/Visible absorption spectroscopy, Beer-Lambert Law; IR Spectroscopy, identification of functional groups; NMR Spectroscopy, Larmor frequency & chemical shift, peak integral, spin-spin coupling multiplicities; Mass Spectrometry, isotopic distribution, determination of molecular formulae.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain the principles of the thermochemistry, chemical kinetics, chemical equilibrium, physical properties of solutions and gases. 2. Explain the principles of the spectroscopy, and spectrometry.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2341 Inorganic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2441 Organic chemistry I or have already enrolled in this course; and Not for students who have passed in CHEM2541 Physical chemistry I, or have already enrolled in this course; and Not for Chemistry major students.		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show strong ability to apply and integrate knowledge and theory, and strong ability to analyze problems related to general chemistry and spectroscopy.	

	B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show evidence to apply and integrate knowledge and theory, and ability to analyze problems related to general chemistry and spectroscopy.
	C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show evidence of some abilities to apply and integrate knowledge and theory, and to analyze problems to most familiar situations to general chemistry and spectroscopy.
	D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show evidence of limited abilities to apply and integrate knowledge and theory, and limited ability to analyze problems to most familiar situations related to general chemistry and spectroscopy.
	Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemistry, instrumentations and applications of spectrometry and spectroscopy for chemical analysis. Show little or no evidence of abilities to apply and integrate knowledge and theory, and little or no ability to analyze problems to most familiar situations related to general chemistry and spectroscopy.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments		25

Required/recommended reading and online materials	Spectroscopy for the biological science, by Gordon G. Hammes, Wiley-Interscience (2005)

CHEM2241 Analytical chemistry I (6 credits)		**Academic Year**	2013
Offering Department	Chemistry	**Quota**	100
Course Co-ordinator	Dr W T Chan (1st sem) / Dr K M Ng (2nd sem), Chemistry *(wtchan@hku.hk / kwanmng@hku.hk)*		
Teachers Involved	Dr W T Chan (Coordinator of 1st sem), Chemistry Dr K M Ng (Coordinator of 2nd sem), Chemistry		
Course Objectives	The course aims to introduce the basic principles of chemical analysis. The principles of chemical measurement, including error analysis, quality assurance and calibration, data acquisition and processing, will be discussed with reference to methods of chemical analysis that are based on chemical equilibrium and stoichiometric reactions. The laboratory classes will include experiments demonstrating modern approaches of data acquisition and processing as well as chemical analysis based on chemical equilibrium.		
Course Contents & Topics	Measurement: analog and digital measurement, accuracy and precision, comparing means and deviations, calibration curves and least square method for linear plots Quality assurance: validation of analytical procedures Chemical equilibrium and chemical analysis: aqueous solution and chemical equilibrium; analysis by acid-base reactivity, complexation reactivity, precipitation reactivity		
Course Learning Outcomes	On succesful completion of this course, students should be able to: 1. Explain the basic principles of chemical measurements. 2. Explain the principles of classical methods of chemical analysis including neutralization, complexation, and precipitation titrimetry. 3. Use laboratory apparatus for chemical analysis.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. Demonstrate highly effective organization and presentation skills.
B	Demonstrate substantial grasp of the subject. Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. Demonstrate effective organization and presentation skills.
C	Demonstrate general but incomplete grasp of the subject. Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to

		draw appropriate conclusions. Demonstrate moderately effective organization and presentation skills.
	D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. Demonstrate limited or barely effective organization and presentation skills.
	Fail	Demonstrate little or no grasp of the knowledge and understanding of the subject. Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. Demonstrate incoherent organization and poor presentation skills.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		65
Test		10
Assignments		5
Laboratory reports		20

Required/recommended reading and online materials	Skoog, West, Holler and Crouch, "Fundamentals of Analytical Chemistry", latest edition, Cengage Learning.

CHEM2341 Inorganic chemistry I (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Prof V W W Yam, Chemistry *(wwyam@hku.hk)*		
Teachers Involved	Prof V W W Yam, Chemistry Prof H Z Sun, Chemistry		
Course Objectives	To provide students with the basic principles and knowledge of inorganic chemistry and to introduce their relevance to biological processes and materials science. This course provides the foundation for further studies in inorganic chemistry.		
Course Contents & Topics	Acid-base concept; structure and bonding of transition metal complexes and main group compounds; electronic absorption and magnetic properties of metal complexes; chemical reactions of metal complexes: redox and substitution; chemistry of selected main group elements and transition metal complexes and their relevance to biology and materials.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the basic principles and concepts of inorganic chemistry and appreciate their relevance to selected examples of biological processes and materials science. 2. Demonstrate knowledge and understanding of the acid-base concept and definition. 3. Demonstrate knowledge and understanding of the structure and bonding of main group compounds and transition metal complexes and their relevance to the electronic absorption and magnetic properties of transition metal complexes. 4. Demonstrate knowledge and understanding of the thermodynamic stability of metal complex formation and the thermodynamic and kinetic aspects of substitution and redox reactions. 5. Demonstrate knowledge and understanding of the role of main group elements and transition metal complexes in bioinorganic chemistry.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Principles of chemistry or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show strong ability to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate highly effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show evidence to apply and integrate knowledge and

		theory relating to the basic foundation knowledge of inorganic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
	C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show evidence of some abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate moderately effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
	D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate partially effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
	Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of inorganic chemistry, especially those related to acid-base concept; structure and bonding of main group compounds and metal complexes; electronic absorption spectroscopy, magnetic properties as well as thermodynamic and kinetic aspects of metal complexes and their reactions; and their relevance to biological processes and materials science. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of inorganic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of inorganic chemistry. Demonstrate minimally effective basic laboratory skills and techniques, especially in the synthesis and characterization of inorganic compounds and metal complexes.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		65
Test		20
Assignments		5
Laboratory reports		10

Required/recommended reading and online materials	F. A. Cotton ; G. Wilkinson ; P. L. Gaus : Basic Inorganic Chemistry (John Wiley & Sons, 1995, 3rd ed.) P. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong: Shriver & Atkins Inorganic Chemistry (Oxford University Press, 2006, 4th ed.)

CHEM2441 Organic chemistry I (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	---
Course Co-ordinator	Prof P Chiu, Chemistry *(pchiu@hku.hk)*		
Teachers Involved	Prof P Chiu, Chemistry		
Course Objectives	To introduce the physical and chemical properties of alkanes, alkenes, alkynes, alkyl halides, dienes, alcohols, ethers, epoxides and organometallics, and apply this knowledge to understand and solve chemical problems. This course is the pre-requisite for continuing studies in organic chemistry (CHEM3441 Organic Chemistry II).		
Course Contents & Topics	Carbon structures and functional groups Alkanes: representations, conformation analysis Cycloalkanes: conformations and isomerism Chirality and isomerism Alkenes: stereoisomerism, synthesis and reactions Alkynes: synthesis and reactions Alkyl halides: Mechanisms of substitutions and eliminations Dienes: synthesis, properties and reactions Alcohols, Ethers and Epoxides: reactions Organometallics: synthesis and reactions		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Visualize and represent/draw three-dimensional, stereochemically correct representations of organic molecules. 2. Recognize, classify, and name chiral stereoisomers and diastereomers. 3. Understand the mechanisms, conditions and outcomes of the reactions of alkanes, alkyl halides, alkenes, alkynes, dienes, alcohols, ethers, epoxides and organometallic reagents.		

	4. Apply reactions to the synthesis of target molecules. 5. Appreciate organic chemistry in the context of biochemical processes and in daily life.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Principles of chemistry or CHEM2442 Fundamental of organic chemistry or have already enrolled in this course.
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate a thorough mastery at an advanced level of knowledge and understanding of facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show a strong ability to integrate knowledge and theory, and a strong ability to analyze and solve novel organic chemistry problems. Demonstrate highly effective organization, understanding, and execution of lab skills and techniques in organic chemistry experiments. **B**: Demonstrate substantial command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show evidence of ability to integrate knowledge and theory, and evidence of ability to analyze and solve novel organic chemistry problems. Demonstrate effective organization, understanding, and execution of lab skills and techniques in organic chemistry experiments. **C**: Demonstrate a general but incomplete command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show evidence of some ability to integrate knowledge and theory, and evidence of some ability to analyze novel problems. Show a mostly correct use of knowledge to solve most familiar problems. Demonstrate adequately effective organization, understanding, and execution of lab skills and techniques in organic chemistry experiments. **D**: Demonstrate a partial but limited command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show evidence of limited ability to integrate knowledge and theory, and a limited ability to analyze novel problems. Show some correct but also erroneous use of knowledge to solve most familiar problems. Demonstrate a partially effective organization, understanding and application of lab skills and techniques in organic chemistry experiments. **Fail**: Demonstrate little or no evidence of command of knowledge and understanding of essential facts and concepts pertaining to the chemical properties, reactions and mechanisms of organic chemistry. Show little or no evidence of ability to apply and integrate knowledge and theory, and little or no ability to analyze novel problems. Show little or no evidence of ability to solve most familiar problems. Demonstrate minimal or no organization, understanding and application of lab skills and techniques in organic chemistry experiments.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Test		10
Laboratory reports		20

Required/recommended reading and online materials	Paula Y. Bruice, "Organic Chemistry", 2011, 6th Edition, Pearson. Paula Y. Bruice, "Study Guide and Solutions Manual for Organic Chemistry" 6th Edition, Prentice Hall. J. W. Lehman, "Operational Organic Chemistry", 2009, 4th Edition, Prentice Hall.

CHEM2442 Fundamentals of organic chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	120
Course Co-ordinator	Dr P H Toy, Chemistry *(phtoy@hku.hk)*		
Teachers Involved	Dr P H Toy, Chemistry		
Course Objectives	The major objective of this course is to give the students a basic understanding of organic chemistry, especially in the context of daily life. This will be achieved through the introduction of the chemistry of organic functional groups that form the basis of organic molecules. The concepts presented in the lectures will be reinforced by a series of laboratory experiments.		
Course Contents & Topics	The chemistry of organic functional groups such as alkenes, alkynes, alkyl halides, alcohols, aldehydes, ketones, carboxylic acids and their derivatives, and amines will be discussed, as will the general concepts of molecular structure, conformation and stereochemistry.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate basic understanding of the structure of organic molecules. 2. Demonstrate basic understanding of the reactivity of organic molecules. 3. Appreciate how organic chemistry plays an important role in everyday life.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry; and Not for students who have passed CHEM2441 Organic chemistry I or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		

Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive organic chemistry knowledge, and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar problems. **B** Demonstrate substantial command of organic chemistry with a broad range of knowledge, and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar problems. **C** Demonstrate general but incomplete command of organic chemistry knowledge, and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar problems. **D** Demonstrate partial but limited command of organic chemistry knowledge, and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. **Fail** Demonstrate little or no evidence of command of organic chemistry knowledge, and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.
Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 24 Laboratory / / 20 Tutorials / / 5 Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 60 Test / 2 mid-term tests & 5 experiments / 40
Required/recommended reading and online materials	Bruice, P.Y. Essential Organic Chemistry (Pearson, 2010, 2nd edition)
Additional Course Information	Students who are planning to CHEM3441 should take CHEM2441

CHEM2443 Fundamentals of organic chemistry for pharmacy students (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Dr P H Toy, Chemistry *(phtoy@hku.hk)*		
Teachers Involved	Dr P H Toy, Chemistry		
Course Objectives	The major objective of this course is to give pharmacy students a basic understanding of organic chemistry, especially in the context of daily life. This will be achieved through the introduction of the chemistry of organic functional groups that form the basis of organic molecules. The concepts presented in the lectures will be reinforced by a series of laboratory experiments.		
Course Contents & Topics	The chemistry of organic functional groups such as alkenes, alkynes, alkyl halides, alcohols, aldehydes, ketones, carboxylic acids and their derivatives, and amines will discussed, as will the general concepts of molecular structure, conformation and stereochemistry.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate basic understanding of structure of organic molecules. 2. Demonstrate basic understanding of the reactivity of organic molecules. 3. Appreciate how organic chemistry plays an important role in everyday life.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2442 Fundamentals of organic chemistry, or already enrolled in this course. (This course is for BPharm students only)		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive organic chemistry knowledge, and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar problems. **B** Demonstrate substantial command of organic chemistry with a broad range of knowledge, and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar problems. **C** Demonstrate general but incomplete command of organic chemistry knowledge, and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar problems. **D** Demonstrate partial but limited command of organic chemistry knowledge, and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and		

		critical abilities. Show limited ability to apply knowledge to solve problems.
	Fail	Demonstrate little or no evidence of command of organic chemistry knowledge, and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Tutorials		5
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Test	2 mid-term tests & 5 experiments	40

Required/recommended reading and online materials	Bruice, P.Y.: Essential Organic Chemistry (Pearson, 2010, 2nd edition)

CHEM2541 Physical chemistry I (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	80
Course Co-ordinator	Dr J Y Tang, Chemistry *(jinyao@hku.hk)*		
Teachers Involved	Prof G H Chen, Chemistry Dr J Y Tang, Chemistry		
Course Objectives	The course aims to provide a rigorous understanding of equilibrium thermodynamics and chemical kinetics. Topics include the three laws of thermodynamics, thermodynamic properties of mixtures, solutions, chemical equilibrium, rates of chemical reactions and reaction dynamics. This course also provides training of laboratory skills and techniques: characterization of thermodynamic properties and chemical kinetics of selected chemical reactions using instrumental methods and computations. Students will gain a good foundation of knowledge and skills for further study in Physical Chemistry.		

Course Contents & Topics

Properties of Gases
States of gases and the gas laws with applications.

The First Law of Thermodynamics
Basic concepts of work, heat, energy, expansion work, heat transactions, enthalpy and adiabatic changes and examples in relation to biochemistry and materials science.

The Second and Third Laws of Thermodynamics
Direction of spontaneous change, entropy and the Third Law of Thermodynamics.

Simple Mixtures
Thermodynamic description of mixtures, partial molar quantities, and chemical potentials of liquids and examples of osmosis in physiology and biochemistry. Activities of solvent, solute, regular solutions and ions in solution.

Chemical Equilibrium
Spontaneous chemical reactions, the Gibbs energy minimum and equilibrium and example of energy conversion in biological cells. Response of equilibria to pressure, temperature.

Molecules in Motion
Molecular motion in gases and liquids, kinetic model, collisions with surfaces, the rate of effusion and transport properties, conductivities of electrolyte solutions and ion channels in biology.

Rates of Chemical Reactions
Empirical chemical kinetics including experimental methods, rates of reactions, integrated rate laws and temperature dependence of reactions and and discussion
of plant photosynthesis and solar energy devices.

Reaction Dynamics
Reactive collision theory, Transition state theory and Eyring equation.
Dynamics of reactive collisions on potential energy surfaces.

Course Learning Outcomes

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

1. Demonstrate knowledge and understanding of the properties of gases, molecules in motion and the rates of chemical reactions.
2. Understand and demonstrate knowledge of the three laws of thermodynamics.

	3. Understand and apply the concepts of chemical equilibrium and the response of chemical equilibria to temperature and pressure. 4. Demonstrate knowledge and understanding of basic reaction dynamics including transition state theory and reactive collisions on a potential energy surface.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM1042 General chemistry; and Not for students who have passed in CHEM2041 Principles of chemistry or have already enrolled in this course.
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show thorough grasp of the subject. Demonstrate strong analytical and critical abilities and logical thinking, with ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Show highly effective lab skills and techniques. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show substantial grasp of the subject. Demonstrate evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Show effective lab skills and techniques. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show general but incomplete grasp of the subject. Demonstrate evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Show moderately effective lab skills and techniques. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show partial but limited grasp, with retention of some relevant information, of the subject. Demonstrate evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate partially effective lab skills and techniques. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Show evidence of little or no grasp of the knowledge and understanding of the subject. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate minimally effective or ineffective lab skills and techniques. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments	including lab report & test	30

Required/recommended reading and online materials: "Physical Chemistry" by P. W. Atkins, latest edition

CHEM3141 Environmental chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	100
Course Co-ordinator	Dr W T Chan, Chemistry *(wtchan@hku.hk)*		
Teachers Involved	Dr W T Chan, Chemistry Prof A S C Cheung, Chemistry		
Course Objectives	This course introduces students to Environmental Chemistry and enables them to understand the chemical principles involved in various environmental phenomena and processes.		
Course Contents & Topics	Atmosphere chemistry: atmospheric composition and behavior, ozone in the stratosphere, chemistry of the troposphere, air pollution Water Chemistry: property of water, water resources and cycle, chemical quality of natural water, acid-base chemistry, oxidation-reduction chemistry, water purification Organic pollutants: persistent organic pollutants, pesticides, toxicology Energy: energy resources, fossil fuels, solar energy, nuclear energy, energy conversion (heat engine, fuel cells) Waste treatment: domestic and hazardous waste treatment (landfill, incineration, air stripping, adsorption, oxidation)		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate knowledge on chemical principles of the various environmental phenomena and processes. 2. Describe the practical processes of chemistry in atmosphere, water purification, waste treatment, and energy production. 3. Critically discuss local and global environmental issues based on scientific principles and data. 4. Apply knowledge to analyze chemical processes involved in various environmental problems.		
Pre-requisites	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic		

(and Co-requisites and Impermissible combination)	chemistry I or CHEM2442 Fundamentals of organic chemistry or CHEM2541 Physical chemistry I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	- Demonstrate thorough grasp of the subject. - Demonstrate integration of the full range of appropriate theories, principles, and evidence. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly effective organization and presentation skills.	
	B	- Demonstrate substantial grasp of the subject. - Demonstrate general integration of theories, principles, and evidence. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate effective organization and presentation skills.	
	C	- Demonstrate general but incomplete grasp of the subject. - Demonstrate some partial integration of theories, principles, and evidence. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate moderately effective organization and presentation skills.	
	D	- Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Demonstrate limited integration of theories, principles, and evidence. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate limited or barely effective organization and presentation skills.	
	Fail	- Demonstrate little or no grasp of the knowledge and understanding of the subject. - Demonstrate little or inapt integration of theories, principles, and evidence. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate incoherent organization and poor presentation skills.	
Course 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 (%)**
	Examination		75
	Assignments		25
Required/recommended reading and online materials	C. Baird and M. Cann: Environmental Chemistry, Freeman, latest edition. S.E. Manahan: Environmental Chemistry, Lewis Publishers, latest edition.		

CHEM3142 Chemical process industries and analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Prof G K Y Chan, Chemistry *(hrsccky@hku.hk)*		
Teachers Involved	Prof G K Y Chan, Chemistry Guest lecturer, Chemistry		
Course Objectives	To familiarize with typical chemical industries important in local and global economy. To understand the technology of chemicals manufacturing and chemical processes in general industry.		
Course Contents & Topics	Process flow charts, units and conversions, materials and energy balances, unit operations. Selection of chemical processes to include variation in products, scale, and types of operation, e.g. for petrochemical industries, industrial gases, beverage processes, chloroalkaline manufacturing.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Solve basic problems of energy and mass balances in chemical and environmental processes. 2. Be familiarized with a few common chemical industries and chemical processes. 3. Understand some general principles of industrial practice through plant visits.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2041 Principles of chemistry or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Physical chemistry I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**	Demonstrate thorough knowledge of industrial chemical processes and mastery of mass and energy balance skills required for attaining all of the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to solve problems in a wide range of complex, familiar and unfamiliar situations. Critical use of data and sourcing of references. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to solve problems in familiar and some unfamiliar situations. Correct use of data and sourcing of references. Apply effective organizational and presentational skills.	

	C	Demonstrate general but incomplete knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge solve problems to most familiar situations. Mostly correct but some erroneous use of data and references. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Limited ability to use data and source references. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of knowledge of industrial chemical processes and command of mass and energy balance skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Misuse of data and references. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		24
Laboratory	computational lab	12
Field work		12

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		70
Assignments		30

Required/recommended reading and online materials	Felder and Rousseau: Elementary Principles of Chemical Processes

CHEM3146 Principles and applications of spectroscopic and analytical techniques (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	110
Course Co-ordinator	Dr X Li, Chemistry *(xiangli@hku.hk)*		
Teachers Involved	Dr X Li, Chemistry		
Course Objectives	To cover the principles and applications of modern practical spectroscopic and analytical techniques. This course is a pre-requisite for the advanced chemistry courses.		
Course Contents & Topics	UV-Visible Absorption Spectroscopy, Nuclear Magnetic Resonance Spectroscopy, Mass Spectrometry, Infra-red Spectroscopy, Elemental Analysis, Molecular Formulas and analysis of data.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the basic principles and applications of IR, UV/Vis, MS and NMR spectroscopic techniques. 2. Describe and explain the terminology of IR, UV/Vis, MS and NMR spectroscopies. 3. Perform chemical structure elucidation and analysis based on UV/Vis, MS and NMR spectroscopic data.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in any CHEM2XXX level course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 70 Test / (2 quizzes) / 15 Assignments / / 15
Required/recommended reading and online materials	Donald L. Pavia, Gary M. Lampman, George S. Kriz: Introduction to Spectroscopy (Thomson Learning, 2001, 3rd & 4th edition) W. Kemp: Organic Spectroscopy (Macmillan, 1991, 3rd ed.)
Additional Course Information	Suggested follow-up course: CHEM3241

CHEM3241 Analytical chemistry II: chemical instrumentation (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	80
Course Co-ordinator	Dr W T Chan, Chemistry *(wtchan@hku.hk)*		
Teachers Involved	Dr W T Chan, Chemistry Dr I K Chu, Chemistry		
Course Objectives	To cover the basic principles and applications of chemical instrumentation. This course aims to provide working knowledge, in addition to the principles, of instruments that are commonly used in chemical laboratories.		
Course Contents & Topics	Optical methods: Beer's Law; UV-visible, infrared, and atomic spectrometry; fluorescence; atomic mass spectrometry; grating spectrometer; photon detectors and thermal detectors. Separation methods: partition; chromatography theories; high performance liquid chromatography (HPLC) and gas chromatography (GC); instrumental set up of HPLC and GC. Mass spectrometry: fundamental concept of mass spectrometry; electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI); time-of-flight (TOF) and quadrupole (Q) mass analyzers.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain the principles of the optical methods, separation methods, and mass spectrometry. 2. Describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes. 3. Apply experimental skills in chemical analysis including sample preparation, standard solution preparation, instrument calibration, and matrix effects correction (standard additions).		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2041 Principles of chemistry or CHEM2241 Anlytical chemistry I or CHEM3146 Principles and applications of spectroscopic techniques		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: - Demonstrate thorough grasp of the subject. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. - Demonstrate highly effective organization and presentation skills **B**: - Demonstrate substantial grasp of the subject. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. - Demonstrate effective organization and presentation skills. **C**: - Demonstrate general but incomplete grasp of the subject. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. - Demonstrate moderately effective organization and presentation skills. **D**: - Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. - Demonstrate limited or barely effective organization and presentation skills. **Fail**: - Demonstrate little or no grasp of the knowledge and understanding of the subject. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. - Demonstrate incoherent organization and poor presentation skills.		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 24 Laboratory / / 28 Tutorials / / 12 Reading / Self study / / 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 70		

	Assignments	including lab & test	30
Required/recommended reading and online materials	D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition). D.A. Skoog, D.M. West, F.J. Holler, and S.R. Crouch: Fundamentals of Analytical Chemistry (Thomson, latest edition)		

CHEM3242 Food and water analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	120
Course Co-ordinator	Prof G H Chen, Chemistry *(ghchen@hku.hk)*		
Teachers Involved	Prof G H Chen, Chemistry Dr I K Chu, Chemistry Dr K M Ng, Chemistry		
Course Objectives	To cover areas in the application and new methodology development in Analytical Chemistry with focus on food and water analysis.		
Course Contents & Topics	Chemical Analysis in Practicing Laboratories: Use of standard methods, guidelines and standards for food and environmental analysis; good laboratory practice; reliability and quality issues. Water Analysis: QA/QC and automation in water analysis; sampling, pretreatment, storage and analysis of clean, dirty, environmental and industrial processing waters; quality standards of water bodies; laboratory, onsite and field analysis. Food Analysis: Requirement of nutritional labeling; analysis of major composition, minor additives and trace contaminants in food; analysis of natural and imitated food products; recent issues and case studies in food analysis. New Techniques: Selective electrodes; electrophoresis and mass spectrometry for food and water analysis.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Identify and determine errors and uncertainty of analytical results. 2. Apply measures taken to control quality and ensure reliability of analytical results. 3. Demonstrate a general knowledge in food and water analysis. 4. Understand issues in public health protection related to chemical analysis. 5. Carry out analytical techniques used in practicing food and water laboratories.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2241 Analytical chemistry I or CHEM2341 Inorganic chemistry I or CHEM2441 Organic chemistry I or CHEM2541 Physical chemistry I or CHEM2041 Principles of chemistry; and Pass in CHEM3241 Analytical chemistry II: chemical instrumentation, or already enrolled in this course.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate through a thorough grasp of the knowledge and skills required in theory and laboratory work in food and water analysis to acquire accurate results with full interpretation for analytical application as described in all the course learning outcomes. Show strong analytical and critical abilities, logical thinking and capability to apply knowledge learnt to solve a wide range of complex issues and problems related to the analysis of food and water. Apply highly effective organization and presentation skills as shown in class work.
B	Demonstrate a substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities, logical thinking, and capability to apply knowledge learnt to solve a wide range of complex issues and problems related to the analysis of food and water. Apply effective organization and presentation skills as shown in class work.
C	Demonstrate a general command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of analytical and critical abilities, logical thinking, and ability to apply knowledge learnt to solve a wide range of complex issues and problems related to the analysis of food and water. Apply effective organization and presentation skills as shown in class work.
D	Demonstrate a partial but limited command of knowledge and skills required for attaining some of the course learning outcomes in Food and Water Analysis. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems related to the analysis of food and water. Apply limited or barely effective organization and presentation skill as shown in class work.
Fail	Demonstrate little or no evidence for the command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems related to the analysis of food and water. Organization and presentation skills are minimally effective or ineffective as shown in class work.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		8
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70

	Assignments		30
Required/recommended reading and online materials	D. A. Skoog, D. M. West, and F. J. Holler: Fundamentals of Analytical Chemistry (Brook/Cole -Thomson Learning, latest edition)		
Additional Course Information	References to specialist texts and other published material will be made throughout the course.		

CHEM3243 Introductory instrumental chemical analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	100
Course Co-ordinator	Dr X Li, Chemistry *(xiangli@hku.hk)*		
Teachers Involved	Dr X Li, Chemistry Dr J Y Tang, Chemistry		
Course Objectives	This course is designed for non-chemistry major students covering basic principles of separation and spectroscopy for chemical analysis. This course provides a general foundation for further studies in pharmacology, life and environmental sciences.		
Course Contents & Topics	Optical methods: Beer's Law; UV-visible, infrared, and atomic spectrometry; fluorescence; atomic mass spectrometry; grating spectrometer; photon detectors and thermal detectors. Separation methods: partition; chromatography theories; high performance liquid chromatography (HPLC) and gas chromatography (GC); instrumental set up of HPLC and GC. Mass spectrometry: fundamental concept of mass spectrometry; electrospray ionization (ESI) and matrix-assisted laser desorption ionization (MALDI); time-of-flight (TOF) and quadrupole (Q) mass analyzers. NMR: basic principle of nuclear magnetic resonance. Analysis and quality assurance: statistical analysis of small sets of data, control chart.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain the principles of the optical methods, separation methods, mass spectrometry, and NMR. 2. Describe the basic experimental set up and the properties of the basic components of the instruments used in the laboratory classes.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2041 Principles of chemistry or CHEM2241 Analytical chemistry I; and Not for students who have passed CHEM3241 Analytical chemistry II: chemical instrumentation or have already enrolled in this course.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

Grade	Descriptor
A	- Demonstrate thorough grasp of the subject. - Show evidence of strong analytical abilities, logical and independent thinking, and ablility to apply knowledge to a wide range of complex, familiar and unfamiliar situations. - Demonstrate highly proficient lab skills and techniques and critical use of data and results to draw appropriate and insightful conclusions. - Demonstrate highly effective organization and presentation skills.
B	- Demonstrate substantial grasp of the subject. - Show evidence of analytical abilities and logical thinking, some evidence of independent thinking, and ability to apply knowledge to familiar and some unfamiliar situations. - Demonstrate proficient lab skills and techniques and correct use of data and results to draw appropriate conclusions. - Demonstrate effective organization and presentation skills.
C	- Demonstrate general but incomplete grasp of the subject. - Show evidence of some analytical abilities and logical thinking, little evidence of independent thinking, and ability to apply knowledge to most familiar situations. - Demonstrate adequate lab skills and techniques and mostly correct but some erroneous use of data and results to draw appropriate conclusions. - Demonstrate moderately effective organization and presentation skills.
D	- Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. - Show evidence of limited analytical abilities, little or no evidence of independent thinking, and limited ability to apply knowledge to solve problems. - Demonstrate partially effective lab skills and techniques and limited ability to use data and results to draw appropriate conclusions. - Demonstrate limited or barely effective organization and presentation skills.
Fail	- Demonstrate little or no grasp of the knowledge and understanding of the subject. - Show little or no evidence of analytical abilities, logical and independent thinking, and very little or no ability to apply knowledge to solve problems. - Demonstrate minimally effective or ineffective lab skills and techniques and misuse of data and results and/or unable to draw appropriate conclusions. - Demonstrate incoherent organization and poor presentation skills.

Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		24
	Laboratory		28
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		70
	Assignments		30
Required/recommended reading and online materials	D.A. Skoog, F.K. Holler, S.R. Crouch: Principles of Instrumental Analysis (Thomson, latest edition). D.A. Skoog, D.M. West, F.J. Holler, and S.R. Crouch: Fundamentals of Analytical Chemistry (Thomson, latest edition)		

<table>
<tr><td colspan="2">CHEM3341 Inorganic chemistry II (6 credits)</td><td>Academic Year</td><td>2013</td></tr>
<tr><td>Offering Department</td><td>Chemistry</td><td>Quota</td><td>82</td></tr>
<tr><td>Course Co-ordinator</td><td colspan="3">Prof V W W Yam, Chemistry (wwyam@hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td colspan="3">Prof V W W Yam, Chemistry
Dr A M Y Yuen, Chemistry</td></tr>
<tr><td>Course Objectives</td><td colspan="3">This course is a continuation from CHEM2341 Inorganic Chemistry I, with a more detailed treatment of general inorganic chemistry, with examples relevance to biological processes and material science, suited to the needs of those intending to extend their studies in chemistry.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">Chemistry of selected classes of inorganic, coordination and organometallic compounds including mechanisms of their reaction where appropriate.

Structure, bonding, magnetism and spectral properties of inorganic systems including examples in bioinorganic systems.</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:

1. Demonstrate knowledge of chemistry of selected classes of inorganic, coordination and organometallic compounds.
2. Understand structure, bonding, magnetism and spectral properties of inorganic systems.
3. Understand mechanisms of selected chemical reactions that are essential to coordination and organometallic compounds.
4. Gain appropriate knowledge of coordination compounds in biological systems.</td></tr>
<tr><td>Pre-requisites
(and Co-requisites and Impermissible combination)</td><td colspan="3">Pass in CHEM2341 Inorganic chemistry I</td></tr>
<tr><td>Offer in 2013 - 2014</td><td>Y 1st sem</td><td>Examination</td><td>Dec</td></tr>
<tr><td>Offer in 2014 - 2015</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3">
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<tr><td>A</td><td>Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show strong ability to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate highly effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.</td></tr>
<tr><td>B</td><td>Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show evidence to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.</td></tr>
<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show evidence of some abilities to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate moderately effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.</td></tr>
<tr><td>D</td><td>Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate partially effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.</td></tr>
<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the more advanced foundation knowledge of inorganic chemistry, especially those related to structure and bonding of inorganic, coordination and organometallic compounds; mechanisms of reactions; and magnetic and spectral properties of inorganic systems including examples in bioinorganic systems. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the more advanced foundation knowledge of inorganic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the essential and more advanced foundation principles and knowledge of inorganic chemistry. Demonstrate minimally effective laboratory skills and techniques, especially in the synthesis and reactivity study of inorganic compounds and metal complexes, and their characterization by various spectroscopic methods.</td></tr>
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<tr><td>Course Type</td><td colspan="3">Lecture with laboratory component course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3">
<table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>24</td></tr>
<tr><td>Laboratory</td><td></td><td>24</td></tr>
<tr><td>Tutorials</td><td></td><td>6</td></tr>
<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
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Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 70 Assignments / including lab report & test / 30
Required/recommended reading and online materials	Shriver & Atkins, Inorganic Chemistry (4th Ed.), Oxford University Press, 2005 Catherine, Housecroft & Sharpe, Inorganic Chemistry (3nd Ed.), Prentice Hall, 2008

CHEM3342 Bioinorganic chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Prof H Z Sun, Chemistry *(hsun@hku.hk)*		
Teachers Involved	Prof H Z Sun, Chemistry Dr H Y Au-Yeung, Chemistry		
Course Objectives	This course is a continuation from Basic Inorganic Chemistry and Basic Organic Chemistry, giving further and more details of inorganic chemistry in biological system, with examples relevance to biological processes and medical science, suited to the needs of those intending to extend their studies in (bio) chemistry and biomedical science.		
Course Contents & Topics	Bioinorganic Chemistry of selected topics of interest. Examples include the inorganic chemistry (and biochemistry) behind the requirement of biological cells for metals such as zinc, iron and copper; and metals in medicine such as mechanisms by which organisms obtain required metal ions from their environment, and use of metal-containing compounds in treating diseases such as cancer.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the principles and concepts of inorganic/organic chemistry in biological system. 2. Understand structure, bonding, and spectral properties of selected metals in proteins and nucleic acids. 3. Understand chemical mechanisms of selected metal homeostasis (i.e. uptake, transport and storage). 4. Understand the role of metal complexes medicine.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2341 Inorganic chemistry I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show strong ability to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show strong ability to analyze novel problems and critical use of data and experimental results to draw appropriate and insightful conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate highly effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules. **B**: Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show evidence to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show evidence to analyze novel problems and correct use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules. **C**: Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show evidence of some abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate moderately effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules. **D**: Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show evidence of limited abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show limited ability to analyze problems to most familiar situations and mostly correct but erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate partially effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules. **Fail**: Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles, and theories relating to the basic foundation knowledge of bioinorganic chemistry, especially those related to hard-soft acid-base theory; chelation; structure and bonding of metals in biological systems; thermodynamic and kinetic aspects of metal ions in biological processes and their relevance to metal homeostasis; metal-based drugs. Show little or no evidence of abilities to apply and integrate knowledge and theory relating to the basic foundation knowledge of bioinorganic chemistry. Show little or no ability to analyze problems to most familiar situations and erroneous use of data and experimental results to draw appropriate conclusions relating to the basic principles and knowledge of bioinorganic chemistry. Demonstrate minimally effective basic techniques, especially in the characterization of inorganic active site and overall metallo-biomolecules.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**

Activities	Details	No. of Hours
Lectures		36
Tutorials	including literature survey & presentation	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments		25

Required/recommended reading and online materials

Lippard, S. J. and Berg, J. M. Principles of Bioinorganic Chemistry (University Science Books; Mill Valley, CA, 1994
Bertini, I.; Gray, H. B.; Stiefel, E. I.; Valentine, J. S., editors. Biological Inorganic Chemistry: Structure and Reactivity, University Science Books, 2007
Metals and Life, Moore C., RSC Publishing, 2010.
Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, Kaim W. & Schwederski B., John Wiley & Sons, 2013.

CHEM3441 Organic chemistry II (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	90
Course Co-ordinator	Prof D Yang, Chemistry *(yangdan@hku.hk)*		
Teachers Involved	Prof D Yang, Chemistry		
Course Objectives	As a continuation from CHEM1003, this course aims to provide a solid foundation of organic chemistry. It focuses primarily on the basic principles to understand the structure and reactivity of organic molecules, with examples illustrating the role of organic chemistry in biology, medicine, and industry.		
Course Contents & Topics	Chemistry of common organic functional groups: ketones and aldehydes; carboxylic acids and their derivatives; amines and heterocycles; aromatic chemistry. Principles of organic synthesis.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Define and employ the vocabulary of organic chemistry. 2. Draw correct structural representations of organic molecules. 3. Understand the basic principles of structure and reactivity of organic molecules. 4. Write reasonable mechanisms for transformations of carbonyl compounds (aldehydes, ketones, carboxylic acids, acyl halides, anhydrides, esters, amides), nitriles, and amines. 5. Appreciate the importance of organic chemistry in daily life. 6. Devise synthetic pathways to organic compounds using functional group chemistry. 7. Perform the laboratory synthesis, purification, and characterization of organic compounds.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2441 Organic chemistry I; and Pass in CHEM3146 Principles of applications of spectroscopic techniques, or already enrolled in this course.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab skills and techniques.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final

			course grade (%)
	Examination		60
	Assignments		40
Required/recommended reading and online materials	Paula Y. Bruice, "Organic Chemistry", 2014, 7th Edition, Pearson. J.W. Lehman, "Operational Organic Chemistry", 2009, 4th Edition, Prentice Hall.		

CHEM3442 Organic chemistry of biomolecules (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	50
Course Co-ordinator	Dr P H Toy, Chemistry *(phtoy@hku.hk)*		
Teachers Involved	Dr P H Toy, Chemistry		
Course Objectives	The major objective of this course is to give the students an understanding and appreciation of the role of organic chemistry in biology and biochemistry.		
Course Contents & Topics	The chemistry of organic molecule groups such as carbohydrates, amino acids, peptides, coenzymes, nucleotides and lipids will discussed. Enzyme catalysis, cofactors and inhibitors will also be presented.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Have a basic understanding of biologically important organic molecules. 2. Have a basic understanding of enzyme catalysis. 3. Appreciate how organic chemistry plays an important role in biology and biochemistry.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2442 Fundamental of organic chemistry or CHEM2443 Fundamentals of organic chemistry for pharmacy students or CHEM3441 Organic chemistry II		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive biomolecule organic chemistry knowledge, and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar problems. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of biomolecule organic chemistry with a broad range of knowledge, and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar problems. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of biomolecule organic chemistry knowledge, and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar problems. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of biomolecule organic chemistry knowledge, and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of biomolecule organic chemistry knowledge, and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Test	2-mid term tests	30
Presentation		10

Required/recommended reading and online materials: Paula Y. Bruice, "Organic Chemistry", 2011, 6th Edition, Pearson, Chapters 21-27.

CHEM3541 Physical chemistry II: introduction to quantum chemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	80

Course Co-ordinator	Prof A S C Cheung, Chemistry *(hrsccsc@hku.hk)*		
Teachers Involved	Prof A S C Cheung, Chemistry		
Course Objectives	The course presents fundamental principles and topics on quantum chemistry in order to provide a soiled foundation for students intending to further their studies in chemistry.		
Course Contents & Topics	Elementary quantum mechanics: Historical development, Postulates of quantum mechanics, Principles of quantum mechanics, Theory of angular momentum, Heisenberg uncertainty principle. Applications to simple systems: particle in a box, harmonic oscillator, rigid rotator; Atomic structure: Hydrogen and many electron atoms. Molecular structure and chemical bonds. Approximation methods: variational method, Hartree-Fock method, valence bond theory, and perturbation theory.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand and use the terminology and nomenclature in quantum chemistry and topics discussed in the course. 2. Demonstrate knowledge and understanding of basic concepts in quantum mechanics, atomic and molecular structure. 3. Understand elementary numerical procedures and the basic relationships of quantum mechanics and molecular systems. 4. Hands-on experience of the application of Hartree-Fock method to molecules.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in CHEM2541 Physical chemistry I		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with thorough grasp of the subject, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and substantial grasp of the subject, ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and general but incomplete grasp of the subject, ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show partial but limited grasp of the subject, retention of some relevant information of the subject, ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show little or no grasp of the knowledge and understanding of the subject, very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments		30

Required/recommended reading and online materials: D. A. McQuarrie: Quantum Chemistry (2nd Edition, 2007)
I.. N. Levin: Quantum Chemistry (5th Edition, 2008)

ENVS3042 Pollution (6 credits)		**Academic Year**	**2013**
Offering Department	Chemistry	**Quota**	60
Course Co-ordinator	Dr W T Chan, Chemistry *(wtchan@hku.hk)*		
Teachers Involved	Dr J D Gu, Biological Sciences Dr W T Chan or Prof D L Phillips (in alternate year), Chemistry		
Course Objectives	To introduce students to the principles of chemical and biological processes of pollution development and the impacts of pollution on environmental health. The course provides the basics for advanced courses on environmental toxicology, environmental monitoring and testing, environmental impact assessment, biodiversity, waste treatment and technologies, and environmental remediation.		

Course Contents & Topics	Types of pollution and associated characteristics; strategy of pollution reduction and treatment; chemical and biochemical processes involved in pollution development; indicators and (bio)markers of pollution status; pollution monitoring techniques and application; interactions between biological systems and pollutants in aquatic and terrestrial environments; chemical toxicity, exposures and risk assessment; pollution of air, water and soil; global climate change, and stratospheric-ozone depletion; water pollution and wastewater treatment; harmful algal blooms; solid and hazardous waste; soil pollution and remediation.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain types of pollution and their impact to the environment and population. 2. Explain mechanisms of pollution development. 3. Explain indicators and biomarkers of pollution and monitoring techniques of pollution. 4. Explain strategy of pollution reduction, treatment and remediation. 5. Explain chemical toxicity and risk assessment.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in ENVS1401 Introduction to environmental science or BIOL1110 From molecules to cells or ENVS1301 Environmental life science; and CHEM2041 Principles of chemistry or ENVS2001 Environmental field and lab course or ENVS2002 Environmental data analysis
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show strong ability to apply and integrate knowledge and theory, and strong ability to analyze problems related to fundamental principles and practical aspects of instrument design.
B	Demonstrate substantial command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show evidence to apply and integrate knowledge and theory, and ability to analyze problems related to fundamental principles and practical aspects of instrument design.
C	Demonstrate general but incomplete command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show evidence of some abilities to apply and integrate knowledge and theory, and to analyze problems to most familiar situations to fundamental principles and practical aspects of instrument design.
D	Demonstrate partial but limited command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show evidence of limited abilities to apply and integrate knowledge and theory, and limited ability to analyze problems to most familiar situations related to fundamental principles and practical aspects of instrument design.
Fail	Demonstrate little or no evidence of command of knowledge and understanding of essential facts, concepts, principles and theories relating to the modern chemical instrumentations and applications. Show little or no evidence of abilities to apply and integrate knowledge and theory, and little or no ability to analyze problems to most familiar situations related to fundamental principles and practical aspects of instrument design.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		36
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments	student-based assessment - lab report, review report, group project and presentation	40

Required/recommended reading and online materials: Marquita K. Hill: Understanding Environmental Pollution (Cambridge University Press, 2nd edition)

EASC1020 Introduction to climate science (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Z H Liu, Earth Sciences *(zhliu@hku.hk)*		
Teachers Involved	Dr Z H Liu, Earth Sciences Dr S H Li, Earth Sciences		
Course Objectives	This course provides an introduction to the study of global climate systems and climate change. We study the controls of temporal and spatial variations in earth's climate and its histories of past climates preserved in the geological record. We look at modern research methods that are used in paleoclimatic and paleoenvironmental reconstructions.		
Course Contents & Topics	Global climatic systems, climate classification, natural variability of climate, physical causes for changes through geologic time, external and internal forcing mechanisms, solar orbital variations, major climatic events of the past and their effects on how our planet has developed, glacial and interglacial oscillations, predicting future global change.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Identify major aspects of climatology and approaches to climatological study. 2. Explain the factors and physical processes controlling climate system. 3. Understand the driving forces of Earth's climate change. 4. Recognize the history of Earth's climate change.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate critical use of data and results to draw appropriate and insightful conclusions. Show insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate correct use of data and results to draw appropriate conclusions. Show critical use of relevant information from sources and ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Demonstrate mostly correct but some erroneous use of data and results to draw appropriate conclusions. Show use of relevant information from sources and ability to make comparisons between different interpretations and to quote/reference aptly.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate limited ability to use data and results to draw appropriate conclusions. Show use and reference of several sources, but mainly through summary rather than analysis and comparison.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate misuse of data and results and/or unable to draw appropriate conclusions. Show limited use of secondary sources and no critical comparison of them.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Project work		24
Reading / Self study		50

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		25
Project reports		25

Required/recommended reading and online materials: Ruddiman, W. F.: Earth's Climate Past and Future (W. F. Freeman, 2008, 2nd edition)
Robert V. Rohli and Anthony J. Vega: Climatology (Jones and Bartlett Publishers, 2008)

EASC1401 Blue planet (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr P Bach, Earth Sciences *(pabach@hku.hk)*		
Teachers Involved	Dr P Bach, Earth Sciences		

	Prof Y Q Zong, Earth Sciences
Course Objectives	The aim is to provide those students who are taking a first course in Earth Sciences with a fundamental knowledge of how our diverse and living planet Earth works with weaving together an understanding of the dynamic and interactive processes in the Earth's lithosphere, hydrosphere, biosphere and atmosphere. In addition, students should become familiar with the way the study of Earth Sciences blends observation, information, hypothesis, communication and decision making for a better understanding of the future of our planet.
Course Contents & Topics	The course will introduce and discuss the following topics: - Introduction to Earth Systems and Habitable Planet Earth, - Lithosphere (Earth Materials, Plate Tectonics, Volcanism, Earthquakes, Surface Processes and Rock Cycle) - Hydrosphere (Surface- and Groundwater, Oceans and Water Cycle) - Atmosphere (Composition, Weather, Climate, Green House Effect, Oxygen Cycle) - Biosphere (Life, Ecosystems, Evolution and Extinction, Geochemical Cycles, - Concepts and Evolution of Dynamic Earth Systems, Human Interactions with Planet Earth (Earth Resources, Geological Hazards, Climate Change, Human Impact and Environmental Changes)
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the terminology and nomenclature appropriate to the introductory study of Earth Sciences. 2. Demonstrate knowledge and understanding of the underlying concepts associated with the study of the Earth Systems and their dynamic interactive processes. 3. Understand the extent and nature of global change and environmental concerns around us. 4. Demonstrate the ability to make and record observations on Earth Systems processes in natural field environments. 5. Develop skills to synthesize observation and knowledge in a report in essay form.
Pre-requisites (and Co-requisites and Impermissible combination)	NIL
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery of extensive knowledge / competencies/skills at an Earth Science introductory level required for attaining most or all of the course learning outcomes. Shows clear understanding of introductory terminology and concepts and strong abilities to apply and relate them in a range of complex interactive processes between Earth Systems. Demonstrates highly effective observational skills in field as well as organizational skills to present important observations made and uses them to draw appropriate and insightful conclusions with an impressive level of depth and original thoughts.
B	Demonstrate substantial command of knowledge / competencies/skills at an Earth Science introductory level required for attaining most of the course learning outcomes. Shows evidence for understanding of introductory terminology and concepts and some abilities to apply and relate them in a range of complex interactive processes between Earth Systems. Demonstrates effective observational skills in field as well as organizational skills to present important observations made and uses them to draw appropriate and insightful conclusions with some level of depth.
C	Demonstrate general but incomplete command of knowledge / competencies/skills at an Earth Science introductory level required for attaining most of the course learning outcomes. Shows evidence for some understanding of introductory terminology and concepts and some abilities to apply and relate them in some interactive processes between Earth Systems. Demonstrates moderately effective observational skills in field as well as organizational skills to present observations made mostly correct but with some erroneous use and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge / competencies/skills at an Earth Science introductory level required for attaining some of the course learning outcomes. Shows evidence of limited understanding of introductory terminology and concepts and limited abilities to apply and relate them in some interactive processes between Earth Systems. Demonstrates limited observational skills in field. Applies limited or barely effective organizational and presentational skills to present observed details and facts correctly. Limited ability to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge / competencies/skills at an Earth Science introductory level required for attaining the course learning outcomes. Shows little or no evidence of understanding of introductory terminology and concepts and little or no abilities to apply and relate them in interactive processes between Earth Systems. Demonstrates poor observational skills in field. Applies incoherent organizational and poor presentational skills. Ineffective presentation of observed details and facts and unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Field work	2-day field camp	16
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		40
Test	Quizzes	10
Laboratory reports		20
Project report	Field project report	30

Required/recommended reading and online materials

Skinner B.J and Porter S.C.: The Blue Planet (1999)
Murphy, B and Damian N.: Earth Science Today (1999)

<table>
<tr><td colspan="2">EASC1402 Principles of geology (6 credits)</td><td>Academic Year</td><td>2013</td></tr>
<tr><td>Offering Department</td><td>Earth Sciences</td><td>Quota</td><td>---</td></tr>
<tr><td>Course Co-ordinator</td><td colspan="3">Prof L S Chan, Earth Sciences (chanls@hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td colspan="3">Prof L S Chan, Earth Sciences
Prof M Sun, Earth Sciences</td></tr>
<tr><td>Course Objectives</td><td colspan="3">This course is an introduction to fundamental principles and concepts in geology.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">- Earth's formation, history and geological time scale
- Rocks and rock cycle
- Plate tectonics: a unifying theory
- Earthquakes and Earth's interior
- Igneous processes and igneous rocks
- Geomorphology and surficial processes
- Sedimentary rocks
- Folds, Faults and Metamorphism
- Metamorphic rocks
- Principles of stratigraphy; stratigraphic dating methods
- Biostratigraphic methods; fossils and index fossils
- Radiometric dating methods</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:

1. Recite the rock cycle and the rock material in the earth's crust.
2. Describe the overall structure of the earth and the key external and internal processes.
3. Explain the major geological phenomena in the context of plate tectonics theory.
4. Describe the methods in geological dating.
5. Name the major events in earth's history.</td></tr>
<tr><td>Pre-requisites
(and Co-requisites and
Impermissible combination)</td><td colspan="3">NIL</td></tr>
<tr><td>Offer in 2013 - 2014</td><td>Y 1st sem</td><td>Examination</td><td>Dec</td></tr>
<tr><td>Offer in 2014 - 2015</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3"><table>
<tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr>
<tr><td>B</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.</td></tr>
<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr>
<tr><td>D</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.</td></tr>
<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr>
</table></td></tr>
<tr><td>Course Type</td><td colspan="3">Lecture with laboratory component course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3"><table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td>12 sessions x 2 hours</td><td>24</td></tr>
<tr><td>Laboratory</td><td>laboratory practical on rocks and minerals, earthquakes, fossil identifcation</td><td>16</td></tr>
<tr><td>Field work</td><td>1 field trip</td><td>8</td></tr>
<tr><td>Group work</td><td>1 group project with presentation</td><td>4</td></tr>
<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
</table></td></tr>
<tr><td>Assessment Methods
and Weighting</td><td colspan="3"><table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr>
<tr><td>Examination</td><td>2-hour written exam</td><td>50</td></tr>
<tr><td>Laboratory reports</td><td>Practical reports</td><td>25</td></tr>
<tr><td>Project report</td><td></td><td>15</td></tr>
<tr><td>Presentation</td><td></td><td>10</td></tr>
</table></td></tr>
<tr><td>Required/recommended
reading
and online materials</td><td colspan="3">TBC</td></tr>
</table>

EASC1403 Geological heritage of Hong Kong (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	35
Course Co-ordinator	Prof M F Zhou, Earth Sciences *(mfzhou@hku.hk)*		
Teachers Involved	Prof M F Zhou, Earth Sciences		
Course Objectives	To give an overview of the geology of Hong Kong, potential geological resources for tourism and the role of geology in the development of Hong Kong infrastructure.		
Course Contents & Topics	6 Lectures on general geology of Hong Kong, geology of Hong Kong Country Parks, and aspects of geological knowledge pertaining to large scale construction project plus at least 4 weekend field trips (equivalent to a total of 32 hours) guided by experts to localities of geological interest.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Acquire an appreciation of the processes leading to the formation of various landforms. 2. Demonstrate understanding of the major morphological features in Hong Kong. 3. Enhance the observation and analytical skills, and physical ability through participation in the field excursion.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate thorough understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking. Evidence of original thoughts, excellent field observation and ability to solve problems. Highly effective organization and presentation skills.
B	Demonstrate substantial understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show analytical and critical abilities and logical thinking. Evidence of original thoughts and abilities of field observation. Effective organization and presentation skills.
C	Demonstrate general but incomplete understanding required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking. Moderately effective organization and presentation skills.
D	Demonstrate partial but limited understanding for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	No or little knowledge about the subject. No evidence for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Very little or no ability for field observation and for solving problems. Poor organization and presentational skills.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	6 sessions x 2 hours	12
Field work	4 field trips	32
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written examination	40
Assignments	coursework assessment in form of participation (30%)	30
Essay		30

EASC1405 Peaceful use of nuclear technologies (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S H Li, Earth Sciences *(shli@hku.hk)*		
Teachers Involved	Dr S H Li, Earth Sciences		
Course Objectives	To provide students with the science backgrounds and knowledge on application of nuclear technologies in daily life and to invoke an awareness of current applications of nuclear sciences by case studies.		
Course Contents & Topics	Man and radiation; principles of nuclear technology; case studies of nuclear techniques applied in arts, engineering, biological, physical and social sciences; radiation on earth and beyond; industrial application of nuclear techniques; nuclear techniques in medical study. Future development in nuclear technologies.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Recognize the science fundamentals in nuclear technologies. 2. Explain and describe the principles of nuclear technologies applied. 3. Have the awareness of current applications of nuclear sciences. 4. Demonstrate the knowledge and understanding of the underlying concepts associated with nuclear		

	technologies.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Field work		6
Group work		6
Project work		6
Reading / Self study		92

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour	50
Assignments	Group activities and reports	30
Project reports	Individual Report	20

Required/recommended reading and online materials: To be announced

EASC2401 Fluid/solid interactions in earth processes (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr K Lemke, Earth Sciences *(kono@hku.hk)*		
Teachers Involved	Dr K Lemke, Earth Sciences Prof J G Malpas, Earth Sciences		
Course Objectives	This course provides an overview of the physical and chemical principles that govern Earth processes		
Course Contents & Topics	List topics with approximate number of weeks - Earth in the laboratory, scaling time and space (1) - Introduction to thermodynamics, and the concept of equilibrium (2) - States of matter, phase diagrams - sublimation, condensation, crystallisation and melting (2) - Mineral-solution interfaces (1) - Energy exchange in Earth environments: convection, conduction and radiation (2) - Kinetics, reaction rates and isotope fractionation on geological time scales(1) - Newtonian mechanics and basic laws of motion (1) - Fluid flow and particle transport (1) - Gravitational, geostrophic and centripetal forces (1)		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand basic principles of thermodynamics as applied to the Earth Sciences. 2. Use phase diagrams to explain processes of fluid/solid interactions. 3. Describe how energy is exchanged throughout the Earth System. 4. Demonstrate an understanding of the kinetics of geochemical reactions. 5. Comprehend the principles of motion and the basic forces affecting movement of gases, liquids and solids on Earth.		
Pre-requisites (and Co-requisites and	Pass in EASC1401 Blue planet or EASC1402 Principles of geology		

Impermissible combination)			
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture with laboratory component course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hour	24
Laboratory	paper exercises	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		40
Assignments		60

Required/recommended reading and online materials	TBA

EASC2402 Field methods (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr P Bach, Earth Sciences *(pabach@hku.hk)*		
Teachers Involved	Dr P Bach, Earth Sciences		
Course Objectives	This course is hands-on field and class-based that introduces basic geological field and mapping techniques and the use of geological equipment and air photographs, an overview of the geology of Hong Kong.		
Course Contents & Topics	- Maps and map reading, map reference system (1 week) - Interpretation of geological maps: topographic and geological cross sections, geological structures from outcrop patterns and structural contour lines (horizontal, inclined strata, folded, and faulted strata, unconformities) (3 weeks) - Interpretation and use of air photographs (1 week) - Geological field techniques and equipment, field observation and description of rocks and outcrops (7 field days)		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Read geological maps and comprehend 3-D geological structures from 2-D geological maps. 2. Construct a geological cross section showing interpreted subsurface rocks and structures. 3. Demonstrate techniques for basic field observations, measurements and identifications. 4. Create and interpret an internally consistent geological map from a set of collected field observations and data. 5. Develop skills in integrating geological field data in determining a geological history and writing a structured field report.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough and complete grasp of the subject in order to fulfill most or all learning outcomes. Shows strong ability to record observations on earth processes in the field and to apply knowledge to familiar and unfamiliar situations. Evidence of strong independent analytical, critical and logical thinking. Show strong ability to synthesize all observations made and knowledge in a field report and geological map with highly effective organizational and presentational skills.		

	B	Demonstrate substantial grasp of the subject required for most of the learning outcome. Shows evidence of ability to record observations on earth processes in the field and to apply knowledge to familiar and some unfamiliar situations. Evidence of independent analytical, critical and logical thinking. Shows ability to synthesize all observations made and knowledge in a field report and geological map with effective organizational and presentational skills.
	C	Demonstrate general but incomplete grasp of the subject required for most of the learning outcome. Evidence of some ability to record observations on earth processes in the field and apply knowledge to most familiar situations. Evidence of some independent analytical, critical and logical thinking. Show ability to synthesize most observations made and knowledge in a field report and geological map with moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited grasp of the subject required for most of the learning outcome. Evidence of limited ability to record observations on earth processes in the field and limited application of knowledge to solve problems. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to synthesize some observations made and knowledge in a field report and geological map with barely effective organizational and presentational skills.
	Fail	Demonstrate little or no grasp of the subject required for most of the learning outcome. Little or no evidence of ability to record observations on earth processes in the field and show very little or no ability to apply knowledge to solve problems. Evidence of little or lack of analytical and critical abilities, coherent and logical thinking. Shows very little or no ability to synthesize observations made and knowledge in a field report and geological map with incoherent organizational and poor presentational skills.
Course Type	Field camps	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 1 hour	12
Field work	5-day field camp & 2 day trips	56
Laboratory work	12 hours paper exercises	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Test		20
Assignments	Lab Assignments	10
Report	Field Work Assessment	70

Required/recommended reading and online materials

Comprehensive Course Notes provided.
John Barnes: Basic Geological Mapping (Wiley, 1995, 3rd edition)

EASC2404 Introduction to atmosphere and hydrosphere (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	50
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences Prof P Wu, Earth Sciences		
Course Objectives	This course introduces the atmosphere and hydrosphere systems, and explains at a basic level how they interact with one another.		
Course Contents & Topics	Introduction and course plan, Earth within a broader context (Solar System and other key features); Geological forces shaping the floor of the Oceans and Seas; Water Structure, Ocean Structure and Seawater Composition/Chemistry; Introduction to the Atmosphere; Heating Earth's surface and Atmosphere; Temperature; Moisture and Atmospheric Stability; Forms of condensation and precipitation; Hydrological Cycle - an overview; Air Pressure and Winds; Atmospheric Circulation and Air Masses; Ocean Circulation; Waves and Tides; Coasts; Weather Patterns and Typhoons; Weather Analysis and Forecasting; Air Pollution; World's Climate Zones; Changing Climate.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the important features which distinguish Earth from the other planets within our Solar System, particularly with regards to its outer fluid envelopes. 2. Appreciate that on a geological timescale, the ocean basins and the seas are continually changing their location and morphology, and why this is the case. 3. Understand the key features of water, and the critical role the compound plays in the Atmosphere-Hydrosphere system. 4. Understand the basic physical phenomena associated with the Atmosphere and the Oceans/Seas and their important lower-order elements. 5. Have an awareness of the scientifically "hot" Atmosphere and Hydrosphere topics.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough grasp of the subject; evidence of strong critical abilities and logical thinking; highly effective organizational and presentational skills; insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly; integration of the full range of appropriate theories, principles, evidence and techniques.

	B	Substantial grasp of the subject; evidence of critical abilities and logical thinking; effective organizational and presentational skills; critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly; general integration of theories, principles, evidence and techniques.
	C	General but incomplete grasp of the subject; evidence of some critical abilities and logical thinking; moderately effective organizational and presentational skills; use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly; some partial integration of theories, principles, evidence and techniques.
	D	Limited grasp of the subject, retention of some relevant information of the subject; evidence of limited critical abilities; limited or barely effective organizational and presentational skills; use and reference of several sources, but mainly through summary rather than analysis and comparison; limited integration of theories, principles, evidence and techniques.
	Fail	Little or no grasp of the knowledge and understanding of the subject; little or no evidence of critical abilities and logical / coherent thinking; incoherent organization and poor presentational skills; limited use of secondary sources and no critical comparison of them; little or no or inapt integration of theories, principles, evidence and techniques.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	including tutorials & discussion	24
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		50

Required/recommended reading and online materials

Tom S. Garrison: Oceanography: An Invitation to Marine Science
Frederick K. Lutgens and Edward J. Tarbuck: The Atmosphere: An Introduction to Meteorology

EASC2406 Geochemistry (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S H Li, Earth Sciences *(shli@hku.hk)*		
Teachers Involved	Dr S H Li, Earth Sciences		
Course Objectives	This course provides an understanding of the fundamentals and approaches for geochemical analysis. It introduces students to the basic chemical principles, modern techniques and quantitative analysis for studying the earth.		
Course Contents & Topics	- Physical and chemical state of the earth, - Differentiation of and cosmic abundance of elements, - Aqueous solutions and chemistry of natural water, - Trace element, - Chemistry of igneous rocks, - Chemical controls on soil formation, - Radioactive isotope geochemistry, - Stable isotope geochemistry, - Oxidation and reduction, - Atmospheric chemistry, - Chemical weathering		
Course Learning Outcomes	On the successful completion of this course, students should be able to: 1. Demonstrate an understanding of basic principles of geochemistry and their applications to geological studies. 2. Describe element distribution in major rocks. 3. Apply the principles of isotopes to dating and studies of petrogenesis and climate changes. 4. Demonstrate knowledge of the chemical weathering processes.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC1402 Principles of geology		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate extensive knowledge and skills at an advanced level required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply highly effective lab skills and techniques to solve problems. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply effective lab skills and techniques to solve problems. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply moderately effective lab skills and techniques to solve problems. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.

	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities, and limited ability to apply partially effective lab skills and techniques to solve problems. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking, and ability to apply minimally effective or ineffective lab skills and techniques to solve problems. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	paper exercises	24
Tutorials		6
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments		40

Required/recommended reading and online materials	Fure G.: Principle and applications of Geochemistry (Prentice Hall, 1998, 2nd ed.) Krauskopf K.B. and Bird D.K. Introduction to Geochemistry (McGraw-Hill, Inc. 1995, 3rd ed.) Walther J.V. : Essentials of Geochemistry (Jones and Bartlett Publishers 2005)

EASC2407 Mineralogy (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	30
Course Co-ordinator	Prof M Sun, Earth Sciences *(minsun@hku.hk)*		
Teachers Involved	Prof M Sun, Earth Sciences Prof G Zhao, Earth Sciences		
Course Objectives	To provide essential knowledge of mineralogy, to familiarize students with common minerals that are basis for study of petrography of igneous, sedimentary and metamorphic rocks.		
Course Contents & Topics	- Mineral crystallization, mineral chemistry - Mineral symmetry, Miller indices - Physical properties of minerals - Mineral composition, structure and classification - Identification of rock forming minerals-hand specimens - Use of petrographic microscope - Optical properties under plane polarized light - Optical properties under orthoscopic illumination - Optical properties under conoscopic illumination - Identification of rock forming minerals-thin sections - Precious minerals - Instrument analysis for minerals		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the methods and systems used in classification of minerals. 2. Apply the physical and chemical properties used in identification of rock-forming mineralogy and mineral structure. 3. Describe the principle of optical mineralogy. 4. Identify the common rock-forming minerals in hand specimens and thin sections.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC1402 Principles of geology		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate extensive knowledge and skills at an advanced level required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply highly effective lab skills and techniques to solve problems. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply effective lab skills and techniques to solve problems. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply moderately effective lab skills and techniques to solve problems. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities, and limited ability to apply partially effective lab skills and techniques to solve problems. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.

	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking, and ability to apply minimally effective or ineffective lab skills and techniques to solve problems. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	12 sessions x 2 hours	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		50

Required/recommended reading and online materials	C. Klein and C.S. Hurlbat: Manual of Mineralogy (Wiley, 1999, 1st ed.) W.D. Nesse: Introduction to Optical Mineralogy (Oxford University Press, 1998, 2nd ed).

EASC2408 Planetary geology (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr M H Lee, Earth Sciences *(mhlee@hku.hk)*		
Teachers Involved	Dr M H Lee, Earth Sciences		
Course Objectives	This course provides students with an introduction to the origin, evolution, structure, composition and distribution of matter in the Solar System condensed in the form of planets, satellites, comets, asteroids and rings, with particular emphasis on surface features, internal structures and histories from a geological point of view. The course incorporates the findings from recent space investigations, planetary imagery, remote sensing and Earth analogues to extraterrestrial features into a fascinating portrayal of the geological activities and histories in our Solar System.		
Course Contents & Topics	Formation, evolution, internal structure and surface processes of planetary bodies; the terrestrial planets Mercury, Venus, the Earth-Moon system, and Mars; the giant planets Jupiter, Saturn, Uranus, and Neptune and their moons; Pluto, Charon and the Kuiper Belt; asteroids, meteorites, comets and the Oort cloud; Origin of our Solar System.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the basic features of our Solar System and its constituents. 2. Explain how this knowledge is acquired through observations and experiments. 3. Demonstrate knowledge and understanding of the key geological, physical and chemical processes governing the structure, formation and evolution of planetary bodies. 4. Compare and contrast our own planet Earth with other planetary bodies.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC1401 Blue planet or EASC1402 Principles of geology or PHYS1650 Nature of the universe		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	12 sessions x 2 hours	24
Reading / Self study		100

Assessment Methods and Weighting	Methods	Details	Weighting in final course grade (%)
	Examination		50
	Test		15
	Assignments		20
	Presentation		15
Required/recommended reading and online materials	N. McBride and I. Gilmour: An Introduction to the Solar System (Cambridge University Press, 2004)		

EASC3402 Petrology (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof G Zhao, Earth Sciences *(gzhao@hku.hk)*		
Teachers Involved	Prof G Zhao, Earth Sciences Prof M Sun, Earth Sciences Dr M Pittman, Earth Sciences		
Course Objectives	To give students an understanding of the features in sedimentary, igneous and metamorphic rocks, as well as the ability to identify major rock types and their textures and structures in both hand specimens and under microscope.		
Course Contents & Topics	- Magma and magmatism; textures and structures of igneous rocks, classification of igneous rocks, including volcanism and plutonism - Basic igneous rocks - Intermediate igneous rocks - Acid igneous rocks - Sedimentary diagenesis, classification of sedimentary rocks; textures and structures of sedimentary rocks. - Clastic sedimentary rocks: conglomerate and sandstone, siltstone and mudstone - Biochemical sedimentary rocks: limestone and dolostone - Metamorphism; controlling factors of metamorphism; textures and structures of metamorphic rocks; classification of metamorphic rocks - Meta-pelitic rocks - Meta-basic rocks - Meta-carbonate rocks and meta-felsic rocks		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Identify major igneous rocks and their textures and structures in both hand specimens and under microscope. 2. Identify major sedimentary rocks and their textures and structures in both hand specimens and under microscope. 3. Identify major metamorphic rocks and their textures and structures in both hand specimens and under microscope. 4. Make full description and write report on the above rock types.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC2407 Mineralogy		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	specimen descriptions & thin-section observations under microscope	24

	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		50
	Assignments		50
Required/recommended reading and online materials	Harvey Blatt and Robert J. Tracy, Petrology (Second Edition; W.H. Freman and Company, New York)		

EASC3403 Sedimentary environments (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S C Chang, Earth Sciences *(suchin@hku.hk)*		
Teachers Involved	Dr S C Chang, Earth Sciences Dr J King, Earth Sciences		
Course Objectives	This course discusses the origin, diagenesis, classification and economic importance of sedimentary rocks. Students will learn features and processes of sedimentary geology, paleontology and depositional processes.		
Course Contents & Topics	- Overview of sedimentary geology - Physics of erosion, transportation and sedimentation - Sedimentary structures - Siliciclastic rocks - Carbonate rocks, cherts and evaporites - Invertebrate paleontology - Vertebrate paleontology - Micropaleontology - Depositional environments (non-marine) - Depositional environments (marine) - Sequence stratigraphy - Basin analysis		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the nature and significance of sedimentary features and structures. 2. Identify carbonate and siliciclastic rocks in hand sample. 3. Describe the facies in a depositional environment. 4. Undertake detailed study of a stratigraphic section in the field. 5. Conduct basic observations and interpretations from outcrops.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3402 Petrology		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough grasp of the subject. Show strong analytical abilities and logical thinking, with evidence of original thought. Apply highly effective lab/fieldwork skills and techniques. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial grasp of the subject. Show strong analytical abilities and logical thinking. Apply effective lab/fieldwork skills and techniques. Apply highly effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject. Show some analytical abilities and logical thinking. Apply moderately effective lab/fieldwork skills and techniques. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited grasp of the subject. Show some analytical abilities and logical thinking. Apply partially effective lab/fieldwork skills and techniques. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no grasp of the subject. Evidence of little or lack of analytical abilities and logical thinking. Apply minimally effective lab/fieldwork skills and techniques. Organization and presentational skills are ineffective.

Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures	12 sessions x 2 hours	24
	Laboratory	indentify sedimentary rock, describe sedimentary structures, & observe fossils using hand lenses	24
	Field work	1 day trip with field project	8
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**

	Examination		40
	Test	Mid-term examination	30
	Laboratory reports		20
	Presentation		10
Required/recommended reading and online materials	Sedimentology and Stratigraphy (Second Edition), Gary Nichols		

EASC3404 Structural geology (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences		
Course Objectives	The course covers the mechanical properties of rocks and how and why rocks deform, geological maps and their use in interpreting structure.		
Course Contents & Topics	- Stress, strain, stress-strain relation, Mohr circle techniques; - Strain types; - Stereonets; - Faults: strike-slip faults, dip-slip faults and thrusts; - Joints; - Extensional structures, listric faults; - Folds; Satellite folds; - Shear Zones; - Fabrics (foliations, lineations); - Pressure solution cleavages; - Microscopic deformation, Dislocations; - Structurally focused map interpretation; - Key Structures in HK.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand a moderate level rock deformation. 2. Interpret structural data from a geology map. 3. Plot and interpret structural data on a stereonet. 4. Appreciate 3D rock and 4D rock-time relationships.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC2402 Field methods and EASC3402 Petrology		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough grasp of the subject; evidence of strong critical abilities and logical thinking; apply knowledge to a wide range of complex, familiar and unfamiliar situations; highly effective fieldwork skills and techniques; critical use of data and results to draw appropriate and insightful conclusions; integration of the full range of appropriate theories, principles, evidence and techniques.
B	Substantial grasp of the subject; evidence of critical abilities and logical thinking; apply knowledge to familiar and some unfamiliar situations; effective fieldwork skills and techniques; correct use of data and results to draw appropriate conclusions; general integration of theories, principles, evidence and techniques.
C	General but incomplete grasp of the subject; evidence of some critical abilities and logical thinking; apply knowledge to most familiar situations; moderately effective fieldwork skills and techniques; mostly correct but some erroneous use of data and results to draw appropriate conclusions; some partial integration of theories, principles, evidence and techniques.
D	Limited grasp of the subject, retention of some relevant information of the subject; evidence of limited critical abilities; limited ability to apply knowledge to solve problems; partially effective fieldwork skills and techniques; limited ability to use data and results to draw appropriate conclusions; limited integration of theories, principles, evidence and techniques.
Fail	Little or no grasp of the knowledge and understanding of the subject; little or no evidence of critical abilities and coherent thinking; very little or no ability to apply knowledge to solve problems; minimally effective or ineffective fieldwork skills and techniques; misuse of data and results and/or unable to draw appropriate conclusions; little or no or inapt integration of theories, principles, evidence and techniques.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	eleven 2-hour sessions	22
Laboratory	stereonets, map interpretation with a structural focus	22
Field work	3 days field work	24
Project work	additional 1-2 days self directed 'field' studies of facing stones showing interesting structural features	20
Reading / Self study		50

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr><tr><td>Examination</td><td></td><td>50</td></tr><tr><td>Assignments</td><td></td><td>50</td></tr></table>
Required/recommended reading and online materials	Park, R. G.: Foundations of Structural Geology (Blackie, 1989) Davies and Reynolds 1996; Ben A. van der Pluijm & Stephen Marshak. 2004.
Additional Course Information	Structural geology has lots of associated textbooks and web hosted materials, so the three named works are not required purchases.

EASC3406 Reconstruction of past climate (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr S H Li, Earth Sciences *(shli@hku.hk)*		
Teachers Involved	Dr S H Li, Earth Sciences Dr M Pittman, Earth Sciences		
Course Objectives	This course provides students with an understanding of how dynamic earth is and how it has changed over the last 2.6 million years. This course introduces the theory and methods of climate reconstructions.		
Course Contents & Topics	The Quaternary period (1), Ice sheet in north hemisphere(1), Driven forces of climate change (1) Quantitative reconstruction methods (1) Pollen analysis and biological proxies (2) Climate change in arid regions (1) Quaternary geochronology (1) Sea-level and coastal change (1) Climate changes in East Asia (1) Climate change impacts on human evolution and society (1) Global warming and future climate change (1)		
Course Learning Outcomes	On the successful completion of this course, student should be able to: 1. Understand the earth climate change during last 2.6 million years. 2. Understand the driving forces of climate changes in different scales. 3. Learn the methods for palaeo-environment reconstruction. 4. Understand the impacts of climate changes. 5. Synthesize and interpret data sets of climate change proxies.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC2404 Introduction to atmosphere and hydrosphere		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	N		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr></table>		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td>12 sessions x 2 hours</td><td>24</td></tr><tr><td>Laboratory</td><td>2 sessions</td><td>4</td></tr><tr><td>Field work</td><td>1 half-day fieldtrip</td><td>5</td></tr><tr><td>Tutorials</td><td>8 sessions</td><td>16</td></tr><tr><td>Reading / Self study</td><td></td><td>90</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr></table>		

	Examination		50
	Assignments		50
Required/recommended reading and online materials	J.J. Lowe and M.J.C. Walker Reconstructing Quaternary Environments. (Harlow, Essex : Addison Wesley Longman, 1997, 2nd ed) W.F. Ruddiman: Earths climate: Past and future (Freeman, 2008, 2nd ed.) D.E. Anderson, A.S. Goudie and A.G. Parker: Global Environments through the Quaternary (Oxford, 2007)		
Additional Course Information	Previous course code & title: EASC2131 A Cool World: Ice Ages and Climate Change		

EASC3408 Geophysics (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof L S Chan, Earth Sciences *(chanls@hku.hk)*		
Teachers Involved	Prof L S Chan, Earth Sciences Prof P Wu, Earth Sciences		
Course Objectives	An overview of the geophysical characteristics and processes of the solid earth and a survey of the various geophysical disciplines, including seismology, gravity, geothermometry, geomagnetism and paleomagnetism, as well as exploration geophysical methods for studying the earth's interior and near subsurface structure.		
Course Contents & Topics	- Earth's Dimension and Motion in Space - Earthquake Seismology - Seismic waves and free oscillations - Seismicity Analysis - Gravity and gravity anomalies - Isostasy and Geodesy - Geomagnetism - Paleomagnetism and rock magnetism - Thermal Properties of the Earth - Applied Geophysical Methods: Electrical methods - Applied Geophysical Methods: seismic method - Applied Geophysics: marine seismic - Application of geophysics in HK		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe the approaches and methods geophysicists use to study the interior of the earth. 2. Apply basic techniques in measurements of earthquakes and interpret a seismogram. 3. Describe the procedure to determine gravity anomalies and their interpretation. 4. Understand the methods of paleomagnetism and describe the processes of rock magnetisation. 5. Describe how density, pressure and temperature of the earth's interior are determined.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC2401 Fluid/solid interactions in earth processes or EASC2402 Field methods or PHYS2250 Introductory mechanics		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrated an in-depth understanding of the subject well above the expected level of an university undergraduate and achieving over 80% of total marks and an ability to pursue advance-level study in some of the geophysics subdisciplines.
B	Demonstrate an understanding of the subject at the appropriate level of a university student and achieving 70% of the total course marks. A greater effort and further preparation are needed if student plans to pursue further study of geophysics.
C	Coursework and examination results reflect only only a basic understanding of the subject without the ability to carry out in-depth analysis. Achieved 60-70% of total course marks.
D	Demonstrated an insufficient understanding of the subject as total course mark achieved is below 60%. The pass grade is reflective only of the time the student puts in on the subject.
Fail	A total lack of effort and insufficient ability to understand the subject and failure to achieve 50% of the available course marks.

Course Type	Lecture with laboratory component course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures	12 sessions x 2 hours	24
Laboratory	8 paper exercises, 2 field exercises on exploration geophysical methods	24
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		60
Assignments		40

EASC3410 Hydrogeology (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof J J Jiao, Earth Sciences *(jjiao@hku.hk)*		
Teachers Involved	Prof J J Jiao, Earth Sciences		
Course Objectives	This course aims to introduce some basic concepts and theories of groundwater flow with special reference to case studies in HK. It consists of three components: 1) fundamentals of groundwater physics; 2) well hydraulics and evaluation of groundwater as a resource; and 3) influence of groundwater on geotechnical and environmental engineering		
Course Contents & Topics	Hydrologic Cycle And water Budgets, Introduction to Hydrogeology (1 Week) Properties Of Aquifers (2 Weeks) Hydraulic head and flow net(2 Weeks) Basic Equations of Groundwater Flow (1 Week) Groundwater Flow To Wells (1 Week) Analysis Of Aquifer Test(2 Weeks) Well installation & pumping test design(1 Week) Regional Groundwater Flow Systems (HK case study)(1 Week) Groundwater contamination (China case study)(Week 12)		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciate the importance of hydrogeology in geotechnical and environmental engineering. 2. Understand basic concepts of hydrological cycle and water balance, and interaction between groundwater and surface water. 3. Appreciate the close relationship between groundwater system and geology and topography. 4. Understand basic concepts of aquifer and aquifer properties, hydraulic head, flow net, and basic principles of groundwater flow. 5. Use basic field aquifer tests to estimate some important aquifer parameters		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC2402 Field methods		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	see below		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	see below		
Assessment Methods and Weighting	see below		
Required/recommended reading and online materials	C. W. Fetter: Applied Hydrogeology (Prentice-Hall, 2001, 4th ed.)		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex practical problems. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to most practical problems. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to some practical problems. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve practical problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve practical problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures	12 sessions x 2 hours	24
Laboratory	10 x 2 hours	20
Field work	Half day field trip	5
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments		30

EASC3412 Earth resources (6 credits)		Academic Year	2013
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof M F Zhou, Earth Sciences *(mfzhou@hku.hk)*		

Teachers Involved	Prof M F Zhou, Earth Sciences Prof G Zhao, Earth Sciences		
Course Objectives	To provide students with knowledge about the classification of mineral deposits and their basic features; to understand the processes that lead to their formation; to gain hand on experience with mining procedures. In addition, students should gain knowledge about the world wide distributions of mineral and industrial resources.		
Course Contents & Topics	Concepts in mineral deposits and mining industrial; exploration and mining methods, classification of mineral deposit, mineral deposit models, magmatic oxide and sulfide deposits, skarn deposits, porphyre deposits, volcanogenic massive sulfide deposits, coal, oil and gas, resource evaluation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the terminology and nomenclature in the mining industrial and mineral deposits. 2. Understand factors that are key to the formation of metallic and industrial resources. 3. Understand the controls of earth resources in a global scale. 4. Understand methods of exploration and exploitation for mineral deposits.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3402 Petrology		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking. Evidence of original thoughts, excellent field observation and ability to solve problems. Highly effective organization and presentation skills.
B	Demonstrate substantial understanding at an advanced level of extensive knowledge and skills with evidence for attaining all the course learning outcomes. Show analytical and critical abilities and logical thinking. Evidence of original thoughts and abilities of field observation. Effective organization and presentation skills.
C	Demonstrate general but incomplete understanding required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking. Moderately effective organization and presentation skills.
D	Demonstrate partial but limited understanding for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	No or little knowledge about the subject. No evidence for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Very little or no ability for field observation and for solving problems. Poor organization and presentational skills.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures	2 hour lectures per week for 10 weeks	20
Laboratory		20
Field work	1 overseas camp	40
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		50
Assignments		50

Required/recommended reading and online materials: TBC

EASC3413 Engineering geology (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof J J Jiao, Earth Sciences *(jjiao@hku.hk)*		
Teachers Involved	Prof J J Jiao, Earth Sciences Prof A Malone, Earth Sciences		
Course Objectives	To present some of the concepts and skills of importance in the profession of Engineering Geology and illustrate their use by case histories.		
Course Contents & Topics	Introduction to engineering design and the role of the Engineering Geologist; site investigation concepts and skills (air photo interpretation, soil and rock description, engineering geological plans, reporting); slopes, foundations. Case histories from Hong Kong.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciate how civil engineering design is carried out and understand the work of the geologist on engineering projects, particularly the economic- and safety-critical duties. 2. Make simple engineering-geological models and understand how desk study, site reconnaissance		

	survey and ground investigation design should be carried out. 3. Carry out simple air photo interpretation tasks and elementary soil and rock description and classification for engineering purposes. 4. Understand major types of slope failures and basic methods to control and mitigate landslides. 5. Carry out stability analyses using methods such as the limit equilibrium and stereographic projection method.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3410 Hydrogeology, or already enrolled in this course
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge and skills to solve a wide range of complex, familiar and unfamiliar practical problems. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge and skills to solve familiar and some unfamiliar practical problems. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge and skills to solve most familiar, but not unfamiliar, practical problems. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge and skills to solve familiar practical problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge and skills to practical problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		20
Field work	half day field trip	5
Reading / Self study		90

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments	including field report	30

Required/recommended reading and online materials	Goodman, R. E.: Engineering Geology (Wiley, 1993)

EASC3414 Soil and rock mechanics (6 credits)		**Academic Year**	2013
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Prof J J Jiao, Earth Sciences *(jjiao@hku.hk)*		
Teachers Involved	Prof J J Jiao, Earth Sciences Dr Yanrong Li, Geotechnical Company		
Course Objectives	To provide a basic knowledge of soil and rock mechanics for those wishing to consider further studies on a career in engineering geology/geotechnics.		
Course Contents & Topics	Stress and strain; properties and classifications of soil and rock; clay minerals; pore pressure and effective stress; strength and failure criteria, initial stresses and their measurement; deformation; consolidation; planes of weakness in rocks; ground treatment methods.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand basic concepts of stress and strain, pore pressure and effective stress, strength and failure criteria. 2. Understand basic properties and classifications of soil and rock. 3. Appreciate the process of rock deformation and soil consolidation.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3410 Hydrogeology, or already enrolled in this course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory		24
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		70
Assignments		30

Required/recommended reading and online materials

R. F. Craig: Soil Mechanics (Chapman & Hall, 6th ed.)
R. E. Goodman: Introduction to Rock Mechanics (John Wiley & Sons, 1989)

EASC3415 Metereology (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr Z H Liu, Earth Sciences *(zhliu@hku.hk)*		
Teachers Involved	Dr Z H Liu, Earth Sciences Dr M H Lee, Earth Sciences		
Course Objectives	The course is a survey of the Earth's atmospheric structure and behavior, instrument of observation, weather elements and weather systems.		
Course Contents & Topics	Energy budget and radiative forcing, Adiabatic cooling and lapse rate, Moisture in the atmosphere, condensation and precipitation, Coriolis effects and pressure system, Air masses and frontal systems, Dynamics of the atmosphere, and Weather forecasting.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Define basic weather elements (temperature, humidity, winds etc.). 2. Recognise basic atmospheric processes (clouds, air masses, fronts and precipitation etc.). 3. Explain synoptic charts (weather maps). 4. Interpret HK weather (typhoons etc.).		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC2404 Introduction to atmosphere and hydrosphere		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate critical use of data and results to draw appropriate and insightful conclusions. Show insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Demonstrate correct use of data and results to draw appropriate conclusions. Show critical use of relevant information from sources and ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Demonstrate mostly correct but some erroneous use of data and results to draw appropriate conclusions. Show use of relevant information from sources and ability to make comparisons between different interpretations and to quote/reference aptly.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Demonstrate limited ability to use data and results to draw appropriate conclusions. Show use and reference of several sources, but mainly through summary rather than analysis and comparison.
		Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning

	Fail	outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Demonstrate misuse of data and results and/or unable to draw appropriate conclusions. Show limited use of secondary sources and no critical comparison of them.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Project work		36
Tutorials		12
Reading / Self study		48

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Assignments		25
Project report		25

Required/recommended reading and online materials	C. Donald Ahrens, Meteorology Today, An Introduction to Weather, Climate and the Environment (Ninth edition, Thomson Brooks/Cole, 2008).

EASC4404 Earth system history (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof J G Malpas, Earth Sciences *(jgmalpas@hku.hk)*		
Teachers Involved	Prof J G Malpas, Earth Sciences		
Course Objectives	This course addresses the interconnected physicochemical and biological changes that our planet has experienced over the course of geological time, at an advanced level, in order to provide a perspective for dealing with present and future changes, particularly those that affect humankind.		
Course Contents & Topics	Review of concepts and principles in the study of Earth as a system; geological, geochemical, and isotopic tools/indicators of changes within the system; the evolution and future of Earth's climate; Gaia hypothesis; biogeochemical cycles; natural feedback mechanisms; major problems affecting humankind's interaction with other parts of the system using examples such as soil, water, energy, mineral resources, waste.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciate the Earth as a system comprising both physicochemical and biological components that has evolved over time. 2. Understand how the information of Earth System History can be retrieved from geological archives. 3. Compare and differentiate competing geological hypotheses, through data collection and distillation. 4. Comment on how present and future environmental conditions may affect us from the perspective of Earth System History. 5. Work as an effective and communicative member of a research team		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3411 Solid earth, ocean, atmosphere interactions		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	The student should show a thorough mastery of the knowledge and skills necessary to attain all of the course outcomes, have an in-depth grasp of the subject, and provide evidence of strong analytical and logical thinking, where possible with original thought. Show outstanding and effective organizational and presentation skills, and the insightful use of data, literature reviews and other sources to undertake a high level of critical analysis and draw appropriate conclusions. Be able to integrate the full range of appropriate theories, principles, and evidence. Show an outstanding ability to lead others within a research team.
B	The student should show a substantial knowledge of a significant range of the skills necessary for attaining most, if not all, of the course outcomes, and have a substantial grasp of the subject. Show evidence of the ability to think critically and to have effective organizational and presentational skills and make critical use of relevant information from different sources, showing the ability to make comparisons between consequent interpretations. Be capable of the general integration of theories, principles and evidence. Show the ability to take a major role within a research team.
C	The student should have a general command of the knowledge, competencies and skills required for attaining the majority of the course outcomes, and a general grasp of the subject. Show some evidence of critical ability and logical thinking and moderately effective organizational and presentational skills. The student should be moderately effective in the use of data to draw appropriate conclusions, should be able to use relevant information from sources and able to make comparisons between different interpretations, through partial integration of theories, principles and evidence. To be able to participate confidently and actively within a research team.
D	The student should have a partial but limited command of the knowledge, competencies and skills necessary for attaining a number of the course learning outcomes, and a limited grasp of the subject. Show evidence of some analytical competence and critical thinking and at least marginally effective organizational and presentational skills. Have limited ability to use data and results to draw appropriate conclusions and use and reference a variety of sources mainly in summary rather than through analysis and comparison. To provide a minimum of input into the activities of a research team.
Fail	The student shows little or no evidence of knowledge and skills required for attaining even the minority of course learning outcomes, lacks an overall grasp of the subject area and shows an absence of analytical and critical thinking abilities. Shows little ability to a apply knowledge to solve problems and has poor and ineffective

	presentation and/or organizational skills. Shows little evidence of the integration of theories, principles and evidence. Shows little capability of usefully participating in a research team environment.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Group work	PBL group work	18
Project work	writing report and preparing presentation	20
Discussion	presentation and discussion on PBL	1
Reading / Self study		48
Assessment	write-ups of PBL sessions	9

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour final exam	30
Assignments	including problem based learning sessions	10
Essay	2000 word mid-term essay	20
Project reports	4500 word final PBL report	25
Presentation	30 minute presentation on report	15

Required/recommended reading and online materials	Stanley, S. M.: Earth System History (W. F. Freeman, 2005), further readings will be provided.

EASC4406 Earth dynamics (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof J G Malpas, Earth Sciences *(jgmalpas@hku.hk)*		
Teachers Involved	Prof J G Malpas, Earth Sciences		
Course Objectives	To review the concepts and processes that shape the configuration of the Earth, from core to crust. This course is intended to provide students with an understanding of the driving forces of Earth processes and the global outcome of these processes through an examination of direct and indirect observations, the evolution of hypotheses, and critical thinking.		
Course Contents & Topics	- Earth as a heat engine; Earth's interior; major features of the continents and oceans; - Plate tectonics; orogenesis; crustal growth. - Mantle convection; hot spots and plumes; - Energy and driving forces of Earth processes; - Methods of investigation of large scale structures and processes; - Structure and physical properties of the planet; - Isostasy; continental drift; - Sea floor spreading; ocean ridges; transform faults; - Subduction zones; mountain belts and orogenesis; - Formation of continental crust; - Continental rifts and continental margins; - Sedimentary basins; - Mechanism, consequence and implication of plate tectonics.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Have an appreciation of the Earth as a dynamic planet. 2. Understand how energy release within the earth is translated into geological processes. 3. Appreciate the importance of a knowledge of the history of investigation of global scale tectonic processes. 4. Distill of a wide range of data to differentiate competing geological theories. 5. Produce concise written and oral summaries of literature research on specific topics in global dynamics.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3408 Geophysics or EASC3409 Igneous and metamorphic petrogenesis		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	The student should show a thorough mastery of the knowledge and skills necessary to attain all of the course outcomes, have an in-depth grasp of the subject, and provide evidence of strong analytical and logical thinking, where possible with original thought. Show outstanding and effective organizational and presentation skills, and the insightful use of data, literature reviews and other sources to undertake a high level of critical analysis and draw appropriate conclusions. Be able to integrate the full range of appropriate theories, principles, and evidence.

	B	The student should show a substantial knowledge of a significant range of the skills necessary for attaining most, if not all, of the course outcomes, and have a substantial grasp of the subject. Show evidence of the ability to think critically and to have effective organizational and presentational skills and make critical use of relevant information from different sources, showing the ability to make comparisons between consequent interpretations. Be capable of the general integration of theories, principles and evidence.
	C	The student should have a general command of the knowledge, competencies and skills required for attaining the majority of the course outcomes, and a general grasp of the subject. Show some evidence of critical ability and logical thinking and moderately effective organizational and presentational skills. The student should be moderately effective in the use of data to draw appropriate conclusions, should be able to use relevant information from sources and able to make comparisons between different interpretations, through partial integration of theories, principles and evidence.
	D	The student should have a partial but limited command of the knowledge, competencies and skills necessary for attaining a number of the course learning outcomes, and a limited grasp of the subject. Show evidence of some analytical competence and critical thinking and at least marginally effective organizational and presentational skills. Have limited ability to use data and results to draw appropriate conclusions and use and reference a variety of sources mainly in summary rather than through analysis and comparison.
	Fail	The student shows little or no evidence of knowledge and skills required for attaining even the minority of course learning outcomes, lacks an overall grasp of the subject area and shows an absence of analytical and critical thinking abilities. Shows little ability to a apply knowledge to solve problems and has poor and ineffective presentation and/or organizational skills. Shows little evidence of the integration of theories, principles and evidence.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	student-led seminars	12
Reading / Self study	2 essays and 1 presentation plus additional reading	100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		30
Essay	Including essays and seminars	70

Required/recommended reading and online materials	Kearey, P and Vine, F.J. Global tectonics (Oxford: Blackwell Science, 1996, 2nd ed.)

EASC4407 Regional geology (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	40
Course Co-ordinator	Dr J R Ali, Earth Sciences *(jrali@hku.hk)*		
Teachers Involved	Dr J R Ali, Earth Sciences Prof G Zhao, Earth Sciences		
Course Objectives	Provide students with a full appreciation about how their region (S-SE-E Asia and the adjacent part of the Pacific) has evolved over the last 1 billion years.		
Course Contents & Topics	Introduction; Tools; China assembly; China origins; Emeishan LIP, SW China; Mesozoic South China; Geology of HK: igneous; HK seds; deep structure; upper-level structure; Philippine Sea Plate-Taiwan; Tibet: India-Asia collision SE Asia (Java orogen, Sumatra orogen, Banda Sea, Molucca Sea, South China Sea); Formation and evolution of Archean crust in the Eastern Block of the North China Craton: Plate tectonics vs. mantle plumes; Paleoproterozoic amalgamation of the North China Craton; Late Mesoproterozoic to early Neoproterozoic igneous events in the Yangtze Block: review of recently proposed models; Supercontinents from Columbia, through Rodinia, to Pangea: records in Chinese blocks.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciation of Chinas tectonic evolution, specifically that it is a relatively young geological construct. 2. Understanding of the tectonic processes that are forming areas adjacent to China (E, SE and SW). 3. Exposure to active research, and an appreciation that some of the models proposed for the regions development are hotly contested. 4. An ability to carry out a detailed literature survey on an assigned topic, and to prepare a properly structured report and give a related presentation.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in EASC3403 Sedimentary environments or EASC3404 Structural geology or EASC3409 Igneous and metamorphic petrogenesis		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	N		
Course Grade	A+ to F		

Grade Descriptors

A	Thorough grasp of the subject; evidence of strong critical abilities and logical thinking; highly effective organizational and presentational skills; insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly.
B	Substantial grasp of the subject; evidence of critical abilities and logical thinking; effective organizational and presentational skills; critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly.
C	General but incomplete grasp of the subject; evidence of some critical abilities and logical thinking; moderately effective organizational and presentational skills; use of relevant information from sources, showing ability to make comparisons

		between different interpretations and to quote/reference aptly.
	D	Limited grasp of the subject, retention of some relevant information of the subject; evidence of limited critical abilities; limited or barely effective organizational and presentational skills; use and reference of several sources, but mainly through summary rather than analysis and comparison.
	Fail	Little or no grasp of the knowledge and understanding of the subject; little or no evidence of critical abilities and logical / coherent thinking; incoherent organization and poor presentational skills; limited use of secondary sources and no critical comparison of them.
Course Type	Lecture with laboratory component course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Laboratory	guided literature surveys	24
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments		50

ENVS1401 Introduction to environmental science (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Dr C Dingle, Earth Sciences *(cdingle@hku.hk)*		
Teachers Involved	Dr C Dingle, Earth Sciences Prof Y Q Zong, Earth Sciences		
Course Objectives	To provide students with an inter-disciplinary introduction to Environmental Science with key questions to highlight the interconnections between biological, geological and chemical processes. To convey the basic science behind environmental interactions and place it within the context of human impacts and dependence on the natural world. To better understand how humans interact, manage and sustain the environment within the context of our economies, governments and individual choices.		
Course Contents & Topics	The teaching and learning will be organized around key issues: application of science to solve environmental problems; human population growth as the underlying environmental problem; ways to restore damaged ecosystems; the appropriate use and misuse of forest and wildlife; the problems in feeding the world without destroying the environment; the difficulty in assuring a sustainable supply of energy; ways to maintain water resources for future generations; our contribution to global climate change; problem of air pollution in cities; waste management; the reasons for natural hazards becoming disasters and catastrophes; prices on scenic beauty; ways to plans, and achieve, a sustainable environment.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Explain and describe connections between the physical and biological stresses in the environment, discuss the impact of human society on the environment. 2. Explain the concept of environmental sustainability, give examples of how society can adapt behavior to achieve sustainability. 3. Compare different approaches to resolving specific problems presented in class.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough understanding of the subject and an ability to apply knowledge gained in class to a wide range of complex, familiar and unfamiliar situations. Show evidence of logical thinking and some original thought. Coursework completed on time and to a high academic standard.
B	Demonstrate a good understanding of the subject and an ability to apply knowledge to familiar and some unfamiliar situations. Show evidence of logical thinking abilities. Coursework completed on time and to a good academic standard.
C	Demonstrate general but incomplete understanding of the subject and an ability to apply knowledge to most familiar situations. Show some evidence of logical thinking, but with some inconsistencies. Some coursework incomplete, but submitted on time and in an adequate academic standard.
D	Demonstrate partial but limited grasp of the subject and a limited ability to apply knowledge to some familiar situations. Show only able to apply knowledge to simple examples. Show little evidence of logical thinking. Coursework submitted late to a poor standard.
Fail	Demonstrate little or no understanding of the subject and very little or no ability to apply knowledge to familiar situations. Show no evidence of logical or coherent thinking. Coursework missing or substandard.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		24
Tutorials	group discussion and class	24

		debate	
	Field work	a one-day field trip	8
	Reading / Self study		112
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		50
	Assignments		50
Required/recommended reading and online materials	Miller: Living in the Environment (Thomson, 2007, 15th ed.) Keller and Botkin: Essential Environmental Science (Wiley, 2008)		

ENVS3004 Environment, society and economics (6 credits)		**Academic Year**	**2013**
Offering Department	Earth Sciences	**Quota**	---
Course Co-ordinator	Prof Y Q Zong, Earth Sciences *(yqzong@hku.hk)*		
Teachers Involved	Prof Y Q Zong, Earth Sciences		
Course Objectives	This course introduces students the interface between human society and the earth systems, and helps students examine the relationship between them. The course emphasizes knowledge and understanding of how human society has interacted with the natural environment in the past and present, and the environmental problems that have arisen from human exploitation of the natural environment. Students will explore ways human society can deal with environmental problems using concepts from environmental economics, and develop sustainable economies.		
Course Contents & Topics	Environmental economics Interconnections between human society and the environment Use and misuse of natural resources, and consequences Urbanization, economic growth and environmental degradation Sustainable natural resources management		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Appreciate the usefulness of environmental econimics in solving problems. 2. Demonstrate knowledge and critical understanding of the complexity and interconnectedness between human society and the natural environment. 3. Understand the appropriate use or misuse of natural resources, and possible ways to achieve sustainable economies.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in ENVS2001 environmental field & lab course or ENVS2002 Environmental data analysis or EASC2404 Introduction to atmosphere and hydrosphere or CHEM2041 Principles of chemistry		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery of the course material. Show strong ability for analytical, critical and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Demonstrate highly effective organizational and presentational skills.
B	Demonstrate substantial command of the course material and an ability to apply knowledge to familiar and some unfamiliar situations. Show evidence of analytical, critical thought to some complex issues. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of the course material and an ability to apply knowledge to most familiar situations. Show evidence of some critical and logical thinking abilities. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of the course material and a limited ability to apply knowledge to solve problems. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of course material with very little or no ability to apply knowledge to solve problems. Lack of critical thinking abilities and incoherent thinking. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		24
	Tutorials		24
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		50
	Essay		50
Required/recommended reading	Tietenberg and Lewis: Environmental economics and policy Keller and Botkin: Essential Environmental Science (John Wiley & Sons, 2008)		

and online materials	Kaufmann and Cleveland: Environmental Science (Amazon, 2008) Middleton N.: The Global Casino: An Introduction to Environmental Issues (Arnold, 1999)
Additional Course Information	Previous course code: ENVS2004 Compulsory to 4-year students

MATH1011 University mathematics I (6 credits)		Academic Year	2013
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@maths.hku.hk)*		
Teachers Involved	Dr K H Law, Mathematics		
Course Objectives	This course aims at students with only HKDSE Mathematics (or equivalent) background and provides them with basic knowledge of mathematics that serves as essential foundation in various disciplines. It is expected to be followed by MATH1013 University mathematics II.		
Course Contents & Topics	- Sets, Venn diagram, set operations - Permutations, combinations and elementary probabilities - Mathematical induction - Exponential and logarithmic functions - Trigonometric functions, trigonometric formulae - Limits of algebraic, exponential and logarithmic functions - Derivatives of algebraic, exponential and logarithmic functions - Differentiation rules: addition, product, quotient and chain rule - Maxima and minima - Indefinite and definite integrals - Area - Integration by substitution - Trapezoidal rule with error estimation		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Use the set notations; calculate probabilities; and prove by induction. 2. Solve problems involving exponential, logarithmic and trigonometric functions. 3. Evaluate limits and derivatives. 4. Compute simple definite and indefinite integrals. 5. Solve practical problems such as determining maxima and minima; finding area.		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 2 or above in HKDSE Mathematics or equivalent; and Not for students with Level 2 or above in Module 1 or Module 2 of HKDSE Mathematics or equivalent.		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test	3 tests	45
Assignments	assignments, tutorials, participation, etc	5

Required/recommended reading and online materials	To be decided
Course Website	http://hkumath.hku.hk/course/MATH1011/

MATH1013 University mathematics II (6 credits)		Academic Year	2013
Offering Department	Mathematics	**Quota**	560
Course Co-ordinator	Dr Y M Chan, Mathematics *(ymchan@maths.hku.hk)*		

Teachers Involved	Dr Y M Chan (1st sem), Mathematics Dr B Kane (2nd sem), Mathematics
Course Objectives	This course aims at students with Core Mathematics plus Module 1 or Core Mathematics plus Module 2 background and provides them with basic knowledge of calculus and some linear algebra that can be applied in various disciplines. It is expected to be followed by courses such as MATH2012 (Fundamental concepts of mathematics), MATH2101 (Linear Algebra I), MATH2102 (Linear Algebra II), MATH2211 (Multivariable calculus), and MATH2241 (Introduction to mathematical analysis).
Course Contents & Topics	- Functions; graphs; inverse functions - Limits, continuity and differentiability - Mean value theorem; implicit differentiation; L'Hopital's rule - Higher order derivatives, maxima and minima, graph sketching - Radian, calculus of trigonometric functions - Improper integrals, partial fractions, integration by parts - Complex numbers, polar form, de Moivre's formula - Basic matrix and vector (of order 2 and 3) operations, determinants - First order ordinary differential equations
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe properties of a function and an inverse function. 2. Evaluate various kinds of limits, and determine continuity and differentiability of functions. 3. Apply advanced rules/techniques of differentiation and integration to compute derivatives and; integrals; sketch graphs of functions. 4. Solve problems involving complex numbers. 5. Perform matrix and vector operations, compute determinants. 6. Solve simple first order ordinary differential equations.
Pre-requisites (and Co-requisites and Impermissible combination)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent. Students who do not fulfill this requirement are advised to take MATH1011 University mathematics I; and Not for students who have passed MATH1821 Mathematical methods for actuarial science I, or have already enrolled in this course.
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	To be decided
Course Website	http://hkumath.hku.hk/course/MATH1013/

MATH1821 Mathematical methods for actuarial science I (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J T Chan, Mathematics *(jtchan@hku.hk)*		
Teachers Involved	Dr J T Chan, Mathematics		
Course Objectives	This course is the first of the two mathematics courses designed to provide actuarial science students with a solid background of calculus of one and several variables and an introduction to linear algebra. The course focuses on single variable calculus and elementary matrix theory. It aims at students with Core		

	Mathematics plus Module 1 or Core Mathematics plus Module 2 background.
Course Contents & Topics	- Functions; graphs; inverse functions - Limits, continuity and differentiability - Mean value theorem; implicit differentiation; L'Hopital's rule - Bisection method and Newton's method - Higher order derivatives, maxima and minima, graph sketching - Taylor approximation and error estimation - Improper integrals, partial fractions, integration by parts - Numerical integration, Trapezoidal rule and Simpson's rule - Complex numbers, polar form, de Moivre's formula - Basic matrix and vector (of order 2 and 3) operations, determinants - Simple differential equations
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe properties of a function and an inverse function. 2. Evaluate various kinds of limits, and determine continuity and differentiability of functions. 3. Apply advanced rules/techniques of differentiation and integration to compute derivatives and integrals; sketch graphs of functions. 4. Approximate integrals by numerical methods. 5. Perform matrix and vector operations, compute determinants. 6. Solve simple first and second order ordinary differential equations.
Pre-requisites (and Co-requisites and Impermissible combination)	Level 4 or above in HKDSE Mathematics plus Module 1, or Level 4 or above in HKDSE Mathematics plus Module 2, or equivalent; and Not for students who have passed MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics), or have already enrolled in these courses.
Offer in 2013 - 2014	Y 1st sem — **Examination**: Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test	2 tests	50

Required/recommended reading and online materials	George B. Thomas; as revised by Maurice D. Weir and Joel Hass: Thomas' Calculus, 12th edition (Addison Wesley) Steven J. Leon: Linear Algebra with Applications (Pearson Prentice Hall) NIL
Course Website	http://hkumath.hku.hk/course/MATH1821/

MATH1851 Calculus and ordinary differential equations (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	560
Course Co-ordinator	Dr S Wu, Mathematics *(swu@maths.hku.hk)*		
Teachers Involved	Dr S Wu (Course coordinator of 1st sem), Mathematics Prof K M Tsang (Course coordinator of 2nd sem), Mathematics Prof K W Chow (1st & 2nd sem), Mechanical Engineering		
Course Objectives	In this course, students will be introduced to some important topics of mathematics commonly used in many engineering fields. A concrete foundation of engineering mathematics that underpins the various engineering subjects will be built. Mathematical concepts and principles, as well as some typical engineering applications, would be emphasized so that students could enhance their mathematical skills in		

	solving engineering problems, and be well prepared in learning a higher level of applied mathematics required in different engineering disciplines.
Course Contents & Topics	- Differential and Integral Calculus (Single Variable) - Ordinary Differential Equations - Laplace Transforms For more information, please refer to http://hkumath.hku.hk/MathWWW/ucourse.php?provisional.MATH1851.description
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate knowledge and understanding of the basic engineering mathematics as well as their relationship with some typical engineering applications. 2. Apply mathematical skills to model and solve some basic engineering problems. 3. Have a general grasp on the interrelation among mathematical theory, result and the engineering problem. 4. Be well prepared to cope with a higher level of engineering mathematics required in different engineering disciplines. For more information, please refer to http://hkumath.hku.hk/MathWWW/ucourse.php?provisional.MATH1851.description
Pre-requisites (and Co-requisites and Impermissible combination)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University Mathematics I (This course is exclusive for Engineering students.)
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and methods or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and methods or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	Lectures: 36 Tutorials: 12 Reading / Self study: 100
Assessment Methods and Weighting	Examination: 80 Test (2 tests): 20
Required/recommended reading and online materials	A textbook will be announced at the beginning of the course in September, 2013
Course Website	http://hkumath.hku.hk/course/MATH1851/
Additional Course Information	There will be no 'make-up' for a missed test or assignment under normal circumstances. Students are not allowed to take MATH1851 and MATH1853 together in the same semester. This course is offered by the Department of Mathematics and the Faculty of Engineering.

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 (%)
Examination		80
Test	2 tests	20

MATH1853 Linear algebra, probability and statistics (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	560
Course Co-ordinator	Dr W K Ching, Mathematics *(wching@hkucc.hku.hk)*		
Teachers Involved	Dr W K Ching (Course coordinator of 1st sem), Mathematics Dr G Han (Course coordinator of 2nd sem), Mathematics Dr N Wong (1st sem), Electrical & Electronic Engineering Dr Y C Wu (2nd sem), Electrical & Electronic Engineering		
Course Objectives	As the consecutive course of MATH1851, students will be introduced to more topics of mathematics commonly applied in engineering so that students could be further enhanced with a concrete skill in mathematics underpinned for different engineering subjects. The course emphasizes mathematical concepts, principles, analysis, and their relationship to the modelling of engineering systems. Students could be furnished with the essential mathematical skill to analytically tackle some typical engineering		

	problems to prepare for all the engineering subjects.		
Course Contents & Topics	- Vector Algebra; Matrix Algebra; Eigenvalues Problems - Elementary Complex Variables - Basic Probability Laws; Random Variables, Probability Distribution, Expectation and Variance - Binomial, Geometric, and Poisson Distribution; Normal Distribution - Sampling distribution, Point Estimates and Confidence Interval For more information, please refer to http://hkumath.hku.hk/MathWWW/ucourse.php?provisional.MATH1853.description		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Demonstrate knowledge and understanding of the essential engineering mathematics as well as their relationship to the engineering problems in general. 2. Model an engineering problem into a mathematical form or a mathematical model, which can be an algebraic equation, a differential equation, a graph, or some other mathematical expression. 3. Solve the model by selecting and applying a suitable mathematical method, skill or technique learned. 4. Have a general grasp on the interrelation among mathematical theory, result and the engineering problem. For more information, please refer to http://hkumath.hku.hk/MathWWW/ucourse.php?provisional.MATH1853.description		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1011 University Mathematics I (This course is exclusively for Engineering students.)		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and methods and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and methods or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and methods, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and methods or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination: 80 Assignments: 20		
Required/recommended reading and online materials	D.C. Lay: Linear Algebra and its Applications (Addison-Wesley, 2012, 4th ed.) S.J. Leon: Linear Algebra with Applications (Pearson Education, 2006, 7th ed.) G. James, et al.: Modern Engineering Mathematics (Pearson Education, 2008, 4th ed.) C. Rorres and H. Anton: Applications of Linear Algebra (Wiley, 1984, 3rd ed.) E. Kreyzig: Advanced Engineering Mathematics (Wiley, 2006, 9th ed.)		
Course Website	http://hkumath.hku.hk/course/MATH1853/		
Additional Course Information	There will be no 'make-up' for a missed quiz or assignment under normal circumstances. Students are not allowed to take MATH1851 and MATH1853 together in the same semester. This course is offered by the Department of Mathematics and the Faculty of Engineering.		

MATH2012 Fundamental concepts of mathematics (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Y M Chan, Mathematics *(ymchan@maths.hku.hk)*		
Teachers Involved	Dr Y M Chan, Mathematics		
Course Objectives	To provide students with solid background on fundamental concepts of mathematics and methods of mathematical proofs. Such concepts and methods are important for subsequent studies in all higher level courses in mathematics. This course can be taken concurrently with other Level 2 or above courses.		
Course Contents & Topics	- elementary set theory		

	- statement calculus - mathematical proofs - relations and functions - finite and infinite sets - natural numbers and mathematical induction - axiomatic systems in mathematics - real numbers and the limit of a sequence - examples of groups
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the definition of a set and apply set theory in simple daily life problems. 2. Construct the truth table of a given statement. 3. Apply different proof strategies (e.g. proof by contradiction and mathematical induction) in proving a mathematical statement. 4. Demonstrate the basic properties of equivalence relations. 5. Understand the definition of the limit of a sequence of real numbers. 6. Demonstrate the operational properties of groups.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics)
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination: 50 Test: 50
Required/recommended reading and online materials	Gray Chartrand, Albert D Polimeni and Ping Zhang: Mathematical Proofs: A Transition to Advanced Mathematics Boston (Pearson/Addison-Wesley, 2008)
Course Website	http://hkumath.hku.hk/course/MATH2012/
Additional Course Information	Students with good grades in HKDSE Math Module 1 or Math Module 2 and have strong interests in math may also apply.

MATH2101 Linear algebra I (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@maths.hku.hk)*		
Teachers Involved	Dr K H Law, Mathematics		
Course Objectives	This is a first university level course on linear algebra, which aims at introducing to students the basic concept of linear structure through many concrete examples in the Euclidean spaces. The course also enriches students' exposure to mathematical rigor and prepares them for studying more advanced mathematical courses.		
Course Contents & Topics	1. Vector Geometry in R^2 and R^3: Revision of addition and scalar multiplication of vectors, dot product, lines and planes; and applications to geometry. 2. Matrix Algebra: Matrix addition and multiplication, determinant and inverse of square matrices, system of linear equations as a matrix equation. 3. Systems of Linear Equations: Gauss-Jordan elimination, elementary row operations, row echelon form, elementary matrices, matrix inversion.		

	4. Vector Spaces: Coordinate system in R^n, the Euclidean spaces as vector spaces, its subspaces, span of vectors, linear independence, basis, dimension, change of basis (computational examples), applications. 5. Linear Transformations: Definition and examples of linear transformations in R^2 and R^3, standard matrices of linear transformations, kernel and image, isomorphism. 6. Eigenvalue Problem: Eigenvalues and eigenvectors, diagonalization of matrices (with distinct eigenvalues), applications. 7. Inner Product: Gram-Schmidt process, least square problems.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Handle matrix operations and use them in some practice problems. 2. Solve systems of linear equations by Gauss-Jordan elimination and also compute inverses of square matrices. 3. Understand the concept of vector spaces, basis, dimension, and linear transformations and compute the matrix representations of some linear transformations. 4. Solve some simple eigenvalue problems and apply the theory to some practical problems. 5. Solve some minimization problems by the least squares method.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics)
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test	2 tests	40
Assignments	assignments, tutorials, participation, etc	10

Required/recommended reading and online materials	TBC
Course Website	http://hkumath.hku.hk/course/MATH2101/

MATH2102 Linear algebra II (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Y K Lau, Mathematics *(yklau@maths.hku.hk)*		
Teachers Involved	Dr M Young (1st sem), Mathematics Dr Y K Lau (2nd sem), Mathematics		
Course Objectives	This is a follow up of the course Linear Algebra I. It aims at introducing the general concept of vector spaces, subspaces, dimensions, inner product spaces, etc. The course prepares the foundation on linear algebra for students' future study in mathematics and other disciplines. Many examples of applications will be drawn on different subject areas.		
Course Contents & Topics	1. Vector Spaces: Definition and examples, subspaces, kernel and image, row and column spaces and rank of a matrix, linear independence, basis, dimension. 2. Determinant and its properties. 3. Linear Transformations: matrix representation, change of basis. 4. Eigenvalue Problem: Characteristic polynomial, Cayley theorem,		

	eigen-subspaces. 5. Inner Product Spaces: Inner product, Gram-Schmidt orthogonalization, orthonormal basis, self-adjoint operators. 6. Diagonalization of Matrices.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Identify vector space structures and apply relevant knowledge to some practical problems. 2. Understand the notion of subspaces and compute basis, dimension, etc. 3. Relate linear transformations with matrices. 4. Solve some eigenvalue problems and apply the theory to some practical problems. 5. Understand the notion of inner product space and diagonalize certain matrices.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I or MATH2822 Mathematical methods for actuarial science II
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	Nicholson: Elementary Linear Algebra
Course Website	http://hkumath.hku.hk/course/MATH2102/

MATH2211 Multivariable calculus (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J Fullwood, Mathematics *(fullwood@maths.hku.hk)*		
Teachers Involved	Dr Z Hua (1st sem), Mathematics Dr J Fullwood (2nd sem), Mathematics		
Course Objectives	Students of this course will learn the theory of multivariable calculus in a rather rigorous manner, and learn how to apply the theory to solve practical problems. This is a required course for students taking major in Mathematics or Mathematics/Physics, and is suitable for all students who will use multivariable calculus in their area of study. Students taking minor in Mathematics may take this course as one of the required courses. This course is a pre-requisite of many mathematics courses of more advanced level.		
Course Contents & Topics	- Vectors: vectors in 2-, 3-, and n-dimensions; dot product and cross product; lines and planes; polar, cylindrical, and spherical coordinates - Differentiation in several variables: limits and derivatives; the chain rule; directional derivatives and gradients - Vector-valued functions: parametrized curves; arc-length; vector fields; gradient, divergence, curl, and the del operator - Maxima and minima: differentials and Taylor's Theorem of several variables; extrema of functions; Lagrange multipliers; applications of extrema - Multiple integration: double and triple integrals; change of variables; applications - Line integrals: scalar and vector line integrals; Green's Theorem; conservative vector fields - Surface integrals and vector analysis: parametrized surfaces; surface integrals; Stoke's and Gauss's Theorems		

Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand and demonstrate the basic theory of calculus of functions in several real variables. 2. Evaluate partial derivatives and multiple integrals; compute line integrals and surface integrals. 3. Apply the knowledge to solve some practical problems, such as constrained optimization problems and other problems involving differentiation and integration of multivariable functions.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics)
Offer in 2013 - 2014	Y 1st sem 2nd sem; **Examination** Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		40
Assignments		10

Required/recommended reading and online materials	Jerrold E. Marsden, Anthony Tromba: Vector Calculus, 6th Edition, illustrated (W. H. Freeman, 2011)
Course Website	http://hkumath.hku.hk/course/MATH2211/
Additional Course Information	Students are assumed to have mastered calculus of one-variable prior to taking this course.

MATH2241 Introduction to mathematical analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J T Chan, Mathematics *(jtchan@hku.hk)*		
Teachers Involved	Dr J T Chan (1st sem), Mathematics Dr Y M Chan (2nd sem), Mathematics		
Course Objectives	To introduce students to the basic ideas and techniques of mathematical analysis.		
Course Contents & Topics	- The real number system: the real numbers as an ordered field, supremum and infimum, the completeness axiom, denseness of the rational numbers - Sequences and series of real numbers: limits of sequences, properties of convergent sequences, monotone sequences and Cauchy sequences, subsequences, series, tests of convergence for series - Continuity of real-valued functions: properties of continuous functions, the extreme value theorem, the intermediate value theorem, uniform continuity, limits of functions - Differentiation: properties of differentiable functions, the mean value theorem, Taylor's theorem and its applications - Integration: construction of the Riemann integral using Darboux sums and Riemann sums, the fundamental theorem of calculus		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Comphrehend and use abstract mathematical arguments such as the epsilon-delta argument. 2. Demonstrate convergence or non-convergence of a sequence/series using properties of convergent sequences/series. 3. Elucidate important properties of continuous functions such as the extreme value theorem and the intermediate value theorem. 4. Articulate the construction of the Riemann integral and its relation to differentiation.		

Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH1013 University mathematics II or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics) or MATH2822 Mathematical methods for actuarial science II		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate a thorough mastery of the mathematical notions and proof techniques taught in the course by being able to handle abstract mathematical arguments, to apply appropriate theorems correctly, and to make use of those proof techniques in novel situations. Ability to present solutions clearly and logically, and the use of innovative ideas in solving problems are expected. **B**: Demonstrate a substantial command of the mathematical notions and proof techniques taught in the course by being able to handle abstract mathematical arguments, to apply appropriate theorems correctly, and, with guidance, to make use of those proof techniques in novel situations. Ability to present solutions clearly and logically, and evidence of innovative ideas in solving problems are expected. **C**: Demonstrate a good understanding of the mathematical notions and proof techniques taught in the course by being able to handle abstract mathematical arguments and to apply appropriate theorems correctly. Ability to present solutions clearly and logically is expected. **D**: Demonstrate some understanding of the mathematical notions taught in the course by being able to correctly identify appropriate theorems for applications and to carry out logical arguments that are leading to complete solutions. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems for applications, or not being able to apply the theorems correctly.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination: 50 Test: 50		
Required/recommended reading and online materials	Elementary Analysis: The Theory of Calculus, by Kenneth A. Ross, 1980, Springer		
Course Website	http://hkumath.hku.hk/course/MATH2241/		

MATH2822 Mathematical methods for actuarial science II (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr J T Chan, Mathematics *(jtchan@hku.hk)*		
Teachers Involved	Dr J T Chan, Mathematics		
Course Objectives	This course is the second of the two mathematics courses designed to provide actuarial science students with a solid background of calculus of one and several variables and an introduction to linear algebra. The course focuses on multivariable calculus and linear algebra. It aims at students with MATH1821. It can be followed by other 2000 or 3000 level mathematics courses.		
Course Contents & Topics	- Matrices, systems of linear equations, determinants - Eigenvalues and eigenvectors, diagonalization of matrices - Quadratic functions and their standard forms - Vector spaces and subspaces - Functions of several variables; partial differentiation - Gradients and directional derivatives - Taylor approximation, systems of nonlinear equations, Newton's method - Maxima and minima; Lagrange multipliers - Double and triple integrals, areas and volumes		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand 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. 2. Understand various topics in functions of several variables including partial differentiation, the Hessian test for local extrema, Newton's method for solving systems of nonlinear equations, 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 combination)	Pass in MATH1821 Mathematical methods for actuarial science I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 50 Test / 2 tests / 50
Required/recommended reading and online materials	K Binmore and J Davies: Calculus - Concepts and Methods (Cambridge University Press, 2001) George B. Thomas; as revised by Maurice D. Weir and Joel Hass: Thomas' Calculus, 12th edition (Addison Wesley) Steven J. Leon: Linear Algebra with Applications (Pearson Prentice Hall) NIL
Course Website	http://hkumath.hku.hk/course/MATH2822/

MATH3002 Mathematics seminar (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	12
Course Co-ordinator	Dr T W Ng, Mathematics *(ntw@maths.hku.hk)*		
Teachers Involved	Dr T W Ng, Mathematics Dr Y Fe, Mathematics		
Course Objectives	This is a seminar style course intended for those who have very strong interests and good ability in mathematics. Students will be given book chapters and elementary research articles for private study and then make presentations in front of the whole class. Individual meetings with the instructors will be arranged prior to their presentations. Active participation in all the discussions is expected. The aim of the course is to let students learn how to initiate self/independent study in mathematics.		
Course Contents & Topics	Topics chosen by the instructors, including chapters from books and elementary research articles.		
Course Learning Outcomes	On successful completion of the course, students should be able to: Initiate private independent study on some interesting mathematical topics.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2012 Fundamental concepts of mathematics, MATH2101 Linear algebra I, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Actively engage in and contribute substantially and fruitfully to class discussions. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Good participation in class discussions with generally good contributions. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Make some but not substantial fruitful contributions to class discussions. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Contribute only in a limited way to fruitful and meaningful class discussions. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Make little or no meaningful contributions to class discussions. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Project-based course		
Course Teaching			

& Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Meeting with supervisor</td><td>meeting of the whole class for two hours each teaching week</td><td>24</td></tr><tr><td>Reading / Self study</td><td>individual meetings with the instructors</td><td>24</td></tr></table>
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr><tr><td>Research report</td><td>written examination (30%), coursework (70%)</td><td>100</td></tr></table>
Course Website	http://hkumath.hku.hk/course/MATH3002/
Additional Course Information	Enrollment needs instructors' approval. This course is for second year BSc students only.

MATH3301 Algebra I (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof J T Yu, Mathematics *(yujt@hku.hk)*		
Teachers Involved	Prof J T Yu, Mathematics		
Course Objectives	This course aims to present those fundamental topics and techniques of algebra that are finding wide applications in mathematics and the applied sciences. It is complete in itself, and may also be followed by Algebra II and Topics in Applied Discrete Mathematics.		
Course Contents & Topics	Groups: examples of groups, subgroups, cosets, Lagrange theorem, quotient groups, normal subgroups, group homomorphisms, direct product of groups, group actions. Rings: examples of rings, integral domains, ideals, fields of fractions, principal ideal domains, unique factorization domains. Fields: definition and examples of fields. Polynomials: polynomial rings in one variable over fields and over the integers, Gauss' lemma.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Write down the precise definitions of the basic concepts in the "Course Conents". 2. Give examples for each of the concepts in the "Course Conents". 3. Understand basic properties of groups, rings, and fields.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I and MATH2102 Linear algebra II		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.</td></tr><tr><td>**B**</td><td>Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and 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.</td></tr><tr><td>**C**</td><td>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.</td></tr><tr><td>**D**</td><td>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.</td></tr><tr><td>**Fail**</td><td>Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.</td></tr></table>		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>100</td></tr></table>		
Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr><tr><td>Examination</td><td></td><td>50</td></tr><tr><td>Test</td><td></td><td>50</td></tr></table>		
Required/recommended reading and online materials	To be decided by the course instructor. S. Lang: Undergraduate Algebra (Springer, 2004) J.B. Fraleigh: A First Course in Abstract Algebra (Addison-Wesley, 1989, 4th edition) I.N. Herstein: Abstract Algebra (Prentice-Hall, 1996)		

	T.W. Hungerford: Abstract Algebra: An Introduction (Saunders College Publishing, 1990, 2nd edition)
Course Website	http://hkumath.hku.hk/course/MATH3301/

MATH3303 Matrix theory and its applications (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Y K Lau, Mathematics *(yklau@maths.hku.hk)*		
Teachers Involved	Dr Y K Lau, Mathematics		
Course Objectives	Matrix theory has a close connection with other mathematical subjects such as linear algebra, functional analysis, and combinatorics. It also plays an important role in the development of many subjects in science, engineering, and social sciences. In this course, students will be taught the fundamentals of matrix analysis and its application to various kinds of practical problems. Mathematical software may be used in the course, so that students can learn how to use the computer to solve matrix problems.		
Course Contents & Topics	Eigenvalues and eigenvectors: similarities, applications on difference equations and differential equations. Orthogonality: inner products and the induced norms, orthogonality of null spaces and column spaces, applications to over-or under-determined systems, least squares fit. Unitary, normal, and hermitian matrices: Schur's triangularization theorem. Variational description of eigenvalues: applications in optimization and in eigenvalue estimation. Singular value decomposition: polar decomposition, pseudo inverse, spectral norm of matrices, interlacing inequalities for singular values. Jordan form and applications.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Have a good understanding on matrices, determinants, linear transformations, eigenvalues and eigenvectors. 2. Understand the concept of similar matrices and the eigenvalue decomposition. 3. Understand the concept of orthogonality. 4. Understand the concept of unitary, normal, and Hermitian matrices. 5. Find the singular value decomposition of a matrix and apply the theory of singular values to study polar decomposition, pseudo inverse and spectral norm of matrices. 6. Understand the concept of the Jordan blocks, Jordan matrices and the Jordan canonical form of a matrix.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I and MATH2102 Linear algebra II		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		50
	Test		50
Required/recommended reading and online materials	Jack L. Goldberg: Matrix Theory with Applications (McGraw-Hill, 1991) Steven J. Leon: Linear Algebra with Applications (Macmillan, 1994, 4th edition) Chris Rorres & Howard Anton: Applications of Linear Algebra (Wiley, 1984, 3rd edition) Roger A. Horn & Charles R. Johnson: Matrix Analysis (Cambridge University Press, 1987) The Mathworks, Inc.: The Student Edition of Matlab (Version 4 for Microsoft Windows) (Prentice - Hall, 1995)		
Course Website	http://hkumath.hku.hk/course/MATH3303/		

MATH3304 Introduction to number theory (6 credits)		Academic Year	2013
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Y K Lau, Mathematics *(yklau@maths.hku.hk)*		
Teachers Involved	Dr Y K Lau, Mathematics		
Course Objectives	To provide students with basic concepts about numbers, their properties and the arithmetic of congruences. The prime numbers are the basic building blocks of all the natural numbers under multiplication. The interplay between the multiplicative and additive properties of prime numbers is particularly interesting. The course will study further properties and the distribution of the prime numbers, and some of the longstanding open problems concerning them. Important applications of number theory to modern cryptography will also be introduced.		
Course Contents & Topics	The course will begin with some basic notions in number theory, including divisibility, greatest common divisor, Euclidean algorithm, congruences, etc. It will then be followed by several fundamental theorems, such as Chinese reminder theorem, solutions of linear and polynomial congruences, Fermat's Little theorem, quadratic residues and the quadratic reciprocity law. Many well-known folklore open problems will also be introduced. Application of number theory to public key cryptography will be explained. Basic properties and some research on the prime numbers will be discussed. Then depending on the time remaining, the course will cover a selection of further topics, such as the prime number theorem, sum of squares, dirichlet's theorem on diophantine approximations, etc.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Solve a system of linear congruences. 2. Solve polynomial congruences. 3. Determine the solubility of quadratic congruences by computation of Legendre symbols. 4. Determine the existence of primitive roots and use them in solving some exponential congruences. 5. Understand the prime number theorem. 6. Understanding some longstanding problems in number theory.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis; and Pass in MATH3301 Algebra I, or already enrolled in this course.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate a thorough and coherent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing number theoretic problems, clearly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing number theoretic problems, but with some minor errors/inadequacies in arguments and being able to present coherent logical reasoning and carry out computations carefully without major errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with weak and fragmentary argument and presentation, or with moderate computational errors.
D	Demonstrate some superficial understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation, or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding of the key concepts and ideas by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course 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 (%)
Examination		50
Test		50

Required/recommended reading and online materials	David M. Burton, Elementary Number Theory, McGraw-Hill Higher Education, International Edition. T.M. Apostol, Introduction to Analytic Number Theory, Springer International Student Edition. A. Baker, A Concise Introduction to the Theory of Numbers, Cambridge University Press, Cambridge.
Course Website	http://hkumath.hku.hk/course/MATH3304/

MATH3401 Analysis I (6 credits)		Academic Year	2013
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W S Cheung, Mathematics *(wscheung@maths.hku.hk)*		

Teachers Involved	Prof W S Cheung, Mathematics
Course Objectives	This course extends to more general situations some basic results covered in Calculus and introduces some fundamental concepts which are essential for advanced studies in mathematical analysis.
Course Contents & Topics	Basic properties of metric spaces; openness; closedness; interior point; adherent point; accumulation point; boundary point; compactness; completeness; continuity; connectedness; pathwise connectedness; uniform continuity; uniform convergence; Banach's fixed point theorem.
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Demonstrate knowledge and understanding of the basic features of mathematical analysis and point set topology (e.g., able to identify objects that are topological equivalent). 2. Apply knowledge and skills acquired in mathematical analysis to analyze and handle novel situations in a critical way (e.g., able to determine whether a specific function is uniformly continuous). 3. Think creatively and laterally to generate innovative examples and solutions to non-standard problems (e.g., able to provide counterexamples to inaccurate mathematical statements).
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis
Offer in 2013 - 2014	Y 1st sem — **Examination**: Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate a thorough understanding of all concepts and ideas by being able to draw complex connections among various concepts and apply the theorems through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, reasoning, identifying the appropriate theorems, applications, or presentation.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with acceptable argument and presentation.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	Apostol: Mathematical Analysis Rudin: Principles of Mathematical Analysis
Course Website	http://hkumath.hku.hk/course/MATH3401/

MATH3403 Functions of a complex variable (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof N Mok, Mathematics *(nmok@hkucc.hku.hk)*		
Teachers Involved	Prof N Mok, Mathematics		
Course Objectives	This course is indispensable for studies in higher mathematical analysis and the more theoretical aspects of physics. In this course, the students are introduced to the fundamental concepts and properties of analytic functions and are shown how to look at analyticity from different points of view. At the same time, the techniques of solving problems without losing sight of the geometric picture are emphasized.		
Course Contents & Topics	Complex number system. Analytic functions and elementary functions. The Cauchy-Riemann equations. Cauchy's theorem and its applications. Taylor's series. Laurent's series. Zeros, singularities and poles. The Residue Theorem and its applications.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Recognize the theory of functions of a complex variable as a rigorous and foundational subject in mathematics. 2. Grasp the techniques from Cauchy-Riemann equations, power series expansion and Cauchy integral formulas to study analytic functions from different perspectives. 3. Compute contour integrals by calculating residues. 4. Apply such techniques to determine improper integrals such as those for certain rational functions on		

	the real line.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis
Offer in 2013 - 2014	Y 1st sem **Examination** Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination: 50 Test: 50
Required/recommended reading and online materials	E.C. Titchmarsh: The Theory of Functions (OUP) L.V. Ahlfors: Complex Analysis (McGraw-Hill, 3rd edition) J. Bak & D.J. Newman: Complex Analysis, Undergraduate Texts in Mathematics (Springer-Verlag) K. Kodaira: Introduction to Complex Analysis (Cambridge)
Course Website	http://hkumath.hku.hk/course/MATH3403/

MATH3405 Differential equations (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof J H Lu, Mathematics *(jhlu@maths.hku.hk)*		
Teachers Involved	Prof J H Lu, Mathematics		
Course Objectives	The standard topics in the wide field of ordinary differential equations (ODE) included in this course are of importance to students of mathematics and sciences. Our emphasis is on principles rather than routine calculations and our approach is a compromise between diversity and depth.		
Course Contents & Topics	Review of elementary differential equations. Existence and uniqueness theorems. Second order differential equations, Wronskian, variation of parameters. Power series method, Legendre polynomials, Bessel functions. The Laplace transform. Linear systems, autonomous systems. Qualitative properties of solutions.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Solve simple first order and second order (linear or nonlinear) ODEs by various techniques, including auxiliary equations, variation of parameters, Laplace transform, and series method. 2. Solve systems of first order linear ODEs with constant coefficients, of which the number of equations and the number of unknown functions are no more than three. 3. Discuss qualitatively the solutions of nonlinear ODEs or systems of nonlinear ODEs by studying their linear approximations or their phase diagrams. 4. Apply the theory of differential equations to study quantitatively/qualitatively problems from physical and life sciences.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical		

		reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
	B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	R. Nagle, E. Staff and A. Snider, Fundamentals of Differential Equations and Boundary Value Problems (Pearson, 6th edition) W.E. Boyce and R.C. DiPrima: Elementary Differential Equations and Boundary Value Problems (John Wiley, 6th edition) E.A. Coddington: An Introduction to Ordinary Differential Equations (Prentice-Hall)
Course Website	http://hkumath.hku.hk/course/MATH3405/

MATH3408 Computational methods and differential equations with applications (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr C W Wong, Mathematics *(cwwongab@hku.hk)*		
Teachers Involved	Dr C W Wong, Mathematics		
Course Objectives	This course covers topics in the fields of differential equations and numerical analysis which are of importance to sciences students. The emphasis is practical applications of basic principles.		
Course Contents & Topics	Numerical differentiation and integration. Solution of nonlinear systems of equations. Elementary differential equations. Power series method. Numerical solutions of ordinary and partial differential equations. Numerical solutions of systems of first-order ordinary differential equations.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Construct and implement numerical methods for numerical integration and differentiation, and the solution of nonlinear system of equations. 2. Explain mathematical ideas of numerical methods in solving ordinary and partial differential equations. 3. Construct one-step and linear multistep methods for the numerical solution of initial-value problems for ordinary differential equations and systems of such equations and analyze their stability and accuracy properties. 4. Construct finite difference methods for the numerical solution of partial differential equations and analyze their stability and accuracy properties. 5. Implement numerical methods for solving initial and boundary value problems by software packages like Scilab.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and computational methods and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and computational methods and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and computational methods or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and computational methods, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.

	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and computational methods, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and computational methods or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	D.F. Parkhurst: Introduction to Applied Mathematics for Environmental Science (Springer) E.A. Coddington: An Introduction to Ordinary Differential Equations (Prentice-Hall) A. Ralston and P. Rabinowitz: A First Course in Numerical Analysis (McGraw-Hill)
Course Website	http://hkumath.hku.hk/course/MATH3408/

MATH3600 Discrete mathematics (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	Prof W Zang, Mathematics		
Course Objectives	To introduce students to the basic ideas and techniques of discrete mathematics.		
Course Contents & Topics	- Counting: combinations, permutations, pigeonhole principle, inclusion-exclusion, recurrence relations, and generating functions - Graph theory: paths, circuits, trees, connectivity, planarity, etc. - Applications of counting techniques and graph theory		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Demonstrate knowledge and understanding of the basic ideas and techniques of discrete mathematics. 2. Solve various real-world problems by using counting techniques and graph theory. 3. Develop their ability to read, comprehend, and create mathematical arguments.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH1013 University mathematics II and any 1 of Level 2 MATH courses) or (MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics and any 1 of level 2 MATH courses) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50

	Test		50

Required/recommended reading and online materials	K H Rosen: Discrete Mathematics and its Applications (McGraw-Hill, 2007) NIL
Course Website	http://hkumath.hku.hk/course/MATH3600/

MATH3601 Numerical analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Chan, Mathematics *(mkhchan@hku.hk)*		
Teachers Involved	Dr K H Chan, Mathematics Dr C W Wong, Mathematics		
Course Objectives	This course covers both the theoretical and practical aspects of numerical analysis. Emphasis will be on basic principles and numerical methods of solution, using high speed computers.		
Course Contents & Topics	Round off errors. Polynomial interpolation. Solution of equations of one variable. Direct and iterative methods for solving linear systems. Numerical differentiation and integration. Simple initial value problems.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Construct and implement algorithms to find the zeros of functions, apply the bisection, Newton, secant and fixed point iteration methods. 2. Construct and implement Newton's method to find the roots of a system of nonlinear equations. 3. Construct interpolation polynomials in Lagrange, Newton, Hermit and spline forms. 4. Apply the basic numerical integration and differentiation methods. 5. Solve initial value problems using Taylor series and Runge-Kutta methods of varying orders. 6. Use software package such as Scilab to solve numerical problems.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Course Type	Lecture-based course		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and methods by being able to identify the appropriate theorems/algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out numerical procedures carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and methods by being able to identify the appropriate theorems/algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate algorithms or their applications or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and methods by being able to correctly identify appropriate theorems/algorithms, but with some inadequacies in applying the theorems/methods through incorrectly analysing problems with poor argument and presentation or with a number of minor computational errors.
D	Demonstrate some understanding of key concepts and methods by being able to correctly identify appropriate theorems/algorithms, but with substantial inadequacies in applying the theorems/methods through incorrectly analysing problems with poor argument and presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems/algorithms or their applications, or not being able to complete the solution.

Course 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 (%)**
Examination		50
Test		50

Required/recommended reading and online materials	Instructor's Lecture Notes A. Ralston and P. Rabinowitz: A First Course in Numerical Analysis (McGraw-Hill) K. E. Atkinson: An Introduction to Numerical Analysis (Wiley, 1989)
Course Website	http://hkumath.hku.hk/course/MATH3601/
Additional Course Information	Knowledge of a programming language is required.

MATH3603 Probability theory (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---

Course Co-ordinator	Dr G Han, Mathematics *(ghan@maths.hku.hk)*
Teachers Involved	Dr G Han, Mathematics
Course Objectives	The emphasis of this course will be on probability models and their applications. The primary aim is to elucidate the fundamental principles of probability theory through examples and to develop the ability of the students to apply what they have learned from this course to widely divergent concrete problems.
Course Contents & Topics	- Basic probability theory and decision theory: discrete probability distributions, continuous probability distributions, conditional probability, expectation, variance, moment generating function, limit theorems, Bayes' Theorem, decision analysis, decision tree method - Poisson process and reliability theory: exponential distribution, Markov property, Poisson process, concepts of reliability, components in series, components in parallel, maintenance models - Markov chain theory: concepts of states and transition probability, irreducibility, stationary distribution, applications in marketing and genetic problems, branching process, other Markov models - Inventory theory: concepts of EOQ, lead time effect, newsboy models, stochastic inventory systems
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the fundamental principles of probability theory. 2. Explain the typical proofs and computational techniques in probability theory and apply them to concrete problems. 3. Demonstrate knowledge and understanding of various types of probability models.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)
Offer in 2013 - 2014	Y 1st sem — **Examination** Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	S.M. Ross: Introduction to Probability Models (Academic Press, 2007, 9th ed.)
Course Website	http://hkumath.hku.hk/course/MATH3603/

MATH3901 Operations research I (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof S C K Chu, Mathematics *(schu@hku.hk)*		
Teachers Involved	Prof S C K Chu, Mathematics		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of linear programming (LP) and its related topics in operations research. There is an equal emphasis on all three aspects of understanding, algorithms and applications. The course serves, together with a course on network models, as essential concept and background for more advanced studies in operations research.		
Course Contents & Topics	Linear Programming. Matrix game. Goal programming.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the fundamental concept and approach of linear programming appropriate to the further study of operations research.		

	2. Demonstrate knowledge and understanding of the underlying techniques of the Simplex Method and its extensions such as the revised Simplex and dual Simplex algorithms. 3. Understand and apply the theory of LP duality such as in the theory and computations of matrix games.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I or MATH2102 Linear algebra II or equivalent
Offer in 2013 - 2014	Y 1st sem — **Examination**: Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	See table below
Assessment Methods and Weighting	See table below
Required/recommended reading and online materials	J.P. Ignizio and T.M. Cavalier: Linear Programming (Prentice-Hall International, 1994) J.P. Ignizio: Goal Programming and Extensions (Lexington Books, 1976) H.A. Taha: Operations Research (Prentice-Hall International, 7/e 2003) P.R. Thie: An Introduction to Linear Programming and Game Theory (Wiley 2/e 1988) W.L. Winston: Introduction to Mathematical Programming (Duxbury 4/e 2003)
Course Website	http://hkumath.hku.hk/course/MATH3901/

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 (%)
Examination		50
Test		50

MATH3904 Introduction to optimization (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	Prof W Zang, Mathematics		
Course Objectives	This course introduces students to the theory and techniques of optimization, aiming at preparing them for further studies in operations research, mathematical economics and related subject areas.		
Course Contents & Topics	Unconstrained and constrained optimization, necessary conditions and sufficient conditions for optimality, convexity, duality. Algorithms and numerical examples.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Demonstrate knowledge and understanding of the basic theory and techniques of optimization. 2. Solve various optimization problems encountered in practice. 3. Understand the connection between the purely analytical character of an optimization problem and the behavior of algorithms for solving it.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.		

	B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	Instructor's lecture notes
Course Website	http://hkumath.hku.hk/course/MATH3904/

MATH3905 Queueing theory and simulation (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	Dr W K Ching, Mathematics		
Course Objectives	This course introduces students to the models and theory of queueing system, as well as the technique of simulation as a practical tool of analysis.		
Course Contents & Topics	Markov, birth-and-death, and Poisson processes, exponential models. Markovian queueing networks. Imbedded Markov-chain queueing models. Simulation of queueing models and discrete-event systems.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the terminology and nomenclature appropriate to queueing theory. 2. Demonstrate knowledge and understanding of various queueing models. 3. Formulate concrete problems using queueing theoretical approaches. 4. Become familiar with fundamental principles of simulation and compare different simulation techniques.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)**: Examination — 50; Test — 50
Required/recommended reading and online materials	R.B. Cooper: Introduction to Queueing Theory (Edward Arnold, 1981, 2nd ed.) S.M. Ross: Introduction to Probability Models (Academic Press, 1993, 5th ed.) S.M. Ross: A Course in Simulation (Macmillan, 1991)
Course Website	http://hkumath.hku.hk/course/MATH3905/

MATH3906 Financial calculus (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr S P Yung, Mathematics *(spyung@hkucc.hku.hk)*		
Teachers Involved	Dr S P Yung, Mathematics		
Course Objectives	This course gives an elementary treatment for the modeling of financial derivatives, asset pricing and market risks from an applied mathematician's point of view. Stochastic calculus and solution methods will be introduced.		
Course Contents & Topics	An introduction to financial instruments: stocks, bonds, foreign exchange, options, forward and future contracts. Asset pricing: risk neutral relationship, no arbitrage principle. Brownian motion, stochastic calculus, Ito's Lemma, Black-Scholes model and its pricing partial differential equation. Variations on the Black-Scholes model: American options, path dependent options. Numerical binomial tree method.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the terminology and nature of bonds, interest rates, forwards, futures, stocks, options, and the no-arbitrage-principle. 2. Demonstrate knowledge on using binomial tree models to find option prices via the risk-neutral concept. 3. Describe basic properties of a Brownian motion and the Black-Scholes stock price model. 4. Implement stochastic calculus (such as Ito's Lemma) to derive Black-Scholes pricing partial differential equation on various type of options; and find a solution to this partial differential equation.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours**: Lectures — 36; Tutorials — 12; Reading / Self study — 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)**: Examination — 50; Test — 50		
Required/recommended reading and online materials	A. Etheridge: A Course in Financial Calculus (Cambridge University Press) M. Baxter and A. Rennie: Financial Calculus: An Introduction to Derivative Pricing (Cambridge University Press, 1996) P. Wilmott, S. Howison, J. Dewynne: The Mathematics of Financial Derivatives (Cambridge University Press, 1995) R. Jarrow, S. Turnbull: Derivative Securities (South-Western College Publishing, 1994)		
Course Website	http://hkumath.hku.hk/course/MATH3906/		

MATH3911 Game theory and strategy (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@maths.hku.hk)*		
Teachers Involved	Dr K H Law, Mathematics		
Course Objectives	Game theory is the logical analysis of situations of conflict and cooperation. This course will introduce the students to the basic ideas and techniques of mathematical game theory in an interdisciplinary context.		
Course Contents & Topics	Combinatorial games and Zermelo's Theorem; Prisonner's Dilemma; pure and mixed strategies, minimax theorem; mixed Nash equilibria; application to biology: evolutionary stable strategies; games in coalition form; Shapley value; application to politics: Shapley-Shubik power index; core and von Neumann-Morgenstern solution; bargaining set.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the basic terminology and solution concepts in game theory. 2. Compute explicitly different solution concepts for some simple cooperative and non-cooperative games. 3. Apply game theoretical ideas and methods to solve some problems in economics and biology.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (MATH2101 Linear algebra I and MATH2211 Multivariable calculus) or (MATH1821 Mathematical methods for actuarial science I and MATH2822 Mathematical methods for actuarial science II)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

Grade	Descriptor
A	Demonstrate an excellent understanding of key concepts and ideas of Game Theory by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas of Game Theory by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas of Game Theory by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas of Game Theory by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		50
Test		50

Required/recommended reading and online materials	Robert J. Aumann, Lectures on Game Theory, Westview Press, 1989.
Course Website	http://hkumath.hku.hk/course/MATH3911/

MATH3943 Network models in operations research (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof S C K Chu, Mathematics *(schu@hku.hk)*		
Teachers Involved	Prof S C K Chu, Mathematics		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of network models in operations research. There is an equal emphasis on all three aspects of understanding, algorithms and applications. The course serves, together with a course on linear programming, to provide essential concept and background for more advanced studies in operations research.		
Course Contents & Topics	Graphs and algorithms. Trees, matchings and paths. Network models of transportation and assignment problems. Ford-Fulkerson network flow theory and computation for maximum flow and minimum cost flow algorithms. Applications to combinatorial optimization problems such as allocation, location and sequencing. Project networks, if time permits.		

Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the fundamental concept and approach of graphs and network models appropriate to the further study of operations research. 2. Demonstrate knowledge and understanding of the underlying techniques of the various graph and network algorithms and their extensions. 3. Understand the theory of network flows and the duality aspects in such methods of flow computations.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus; and Pass in MATH3901 Operations research I, or already enrolled in this course
Offer in 2013 - 2014	Y 2nd sem — **Examination**: May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	M.S. Bazaraa, J.J. Jarvis and H.D.Sherali: Linear Programming and Network Flows. (2/e 1990) R.K. Ahuja, T.L. Magnanti and J.L. Orlin: Network Flows: Theory Algorithms, and Applications. (1993) H.A. Taha: Operations Research: an Introduction. (7/e 2003)
Course Website	http://hkumath.hku.hk/course/MATH3943/
Additional Course Information	TBC

MATH4302 Algebra II (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof J T Yu, Mathematics *(yujt@hku.hk)*		
Teachers Involved	Prof J T Yu, Mathematics		
Course Objectives	This course is an extension of Algebra I and goes deeper into the various topics treated in that course. Together, the two courses are complete in themselves, and may be followed by Topics in Algebra and Topics in Applied Discrete Mathematics.		
Course Contents & Topics	- Presentation of groups: generators and relations, free groups - Polynomial rings in several variables - Fundamental theorem on symmetric polynomials - Fields extensions, elements of Galois theory (characteristic zero)		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand and compute splitting fields of irreducible polynomials. 2. Understand and compute typical extensions of fields. 3. Compute the automorphisms and Galois groups of field extensions.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3301 Algebra I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		

Course Grade	A+ to F
Grade Descriptors	**A** — Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** — Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** — Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D** — Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail** — Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 50 Test / / 50
Required/recommended reading and online materials	J.B. Fraleigh: A First Course in Abstract Algebra (Addison-Wesley, 1989, 4th ed.) I.N. Herstein: Topics in Algebra (Wiley, 1975) N. Jacobson: Basic Algebra (Freeman, 1974) S. Lang: Undergraduate Algebra (Springer, 1996) T.W. Hungerford: Abstract Algebra: An Introduction (Saunders College Publishing, 1990, 2nd ed.)
Course Website	http://hkumath.hku.hk/course/MATH4302/

MATH4402 Analysis II (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr P P W Wong, Mathematics *(ppwwong@maths.hku.hk)*		
Teachers Involved	Dr P P W Wong, Mathematics		
Course Objectives	This course gives a comprehensive and rigorous treatment on calculus of several variables, and a modern treatment of integration theory in the language of differential forms which is essential for more advanced studies in analysis and geometry.		
Course Contents & Topics	Differentiation of functions of several variables: partial derivatives, differential, differentiability, inverse function theorem, implicit function theorem, free extremum problems, constrained extremum problem, method of Lagrange multipliers Integration in R^n: Basic definitions, measure zero and content zero sets, integrability, Fubini's Theorem, partition of unity, change of variables Integration on chains: tensors, alternating tensors, vector fields, differential forms, Poincare Lemma, Stokes' Theorem		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Demonstrate knowledge and understanding of the modern language of mathematical analysis and geometry (e.g., able to manipulate differential forms). 2. Apply knowledge and skills acquired in mathematical analysis to analyze and handle novel situations in a critical way (e.g., able to determine the differentiability and integrability of specific functions). 3. Think creatively and laterally to generate innovative solutions to novel problems (e.g., able to do integration of specific functions on chains).		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3401 Analysis I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B** — Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C** — Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate		

		theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	Apostol: Mathematical Analysis Munkres: Analysis on Manifolds Rudin: Principles of Mathematical Analysis Spivak: Calculus on Manifolds
Course Website	http://hkumath.hku.hk/course/MATH4402/

MATH4404 Functional analysis (6 credits)		**Academic Year**	2013
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr C W Wong, Mathematics *(cwwongab@hkusua.hku.hk)*		
Teachers Involved	Dr C W Wong, Mathematics		
Course Objectives	This course introduces students to the basic knowledge of linear functional analysis, an important branch of modern analysis.		
Course Contents & Topics	- Metric spaces: Open and closed sets. Convergent sequences. Completeness - Normed spaces, Banach spaces: Finite dimensional normed spaces and subspaces. Compactness and finite dimension. Bounded linear operators. Normed spaces of operators, dual space - Inner product spaces, Hilbert spaces: Orthogonal complements, direct sums. Orthonormal sets and sequences, series related to orthonormal sets and sequences. Total orthonormal sets and sequences. Special polynomials. Riesz's representation theorem. Adjoint operator, self-adjoint, normal and unitary operators - Fundamental theorems for normed and Banach spaces: Hahn-Banach theorem. Reflexive spaces. Category theorem, uniform boundedness principle. Open mapping theorem. Closed graph theorem - Spectral theory of linear operators		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Compare and contrast (i) finite and infinite dimensional linear spaces, (ii) complete and incomplete linear space, and (iii) normed and inner product spaces; in particular, recognize the importance of completeness and discuss how vectors are represented in these spaces. 2. Understand the notions of Banach spaces and Hilbert Spaces. State and apply fundamental theorems in these spaces. 3. Discuss the dual spaces of some standard Banach spaces. 4. Discuss the boundedness of linear operators and the spectra of special linear operators. 5. Apply functional analysis in the study of differential equations and optimization problems.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2211 Multivariable calculus and MATH2241 Introduction to mathematical analysis and MATH3401 Analysis I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their

		applications, or not being able to complete the solution.
Course Type	Lecture-based course	
Course Teaching & Learning Activities		

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	Erwin Kreyszig: Introductory Functional Analysis with Applications (John-Wiley and Sons, 1978)
Course Website	http://hkumath.hku.hk/course/MATH4404/

MATH4406 Introduction to partial differential equations (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr S Wu, Mathematics *(swu@maths.hku.hk)*		
Teachers Involved	Dr S Wu, Mathematics		
Course Objectives	This course introduces students to the basic techniques for solving partial differential equations as well as the underlying theories.		
Course Contents & Topics	Laplace, heat and wave equations. Classification of partial differential equations. Boundary-value, initial-value and eigenvalue problems. Separation of variables, Fourier series, linearity and superposition, Duhamel's principle, characteristic method. Green's function, generalized functions and fundamental solutions. Maximum principle, existence, uniqueness and continuous dependence on data. If time permits Cauchy-Kowalevski theorem, variational method, nonlinear partial differential equations.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Apply the tools of calculus, linear algebra, mathematical analysis in a coherent way to PDE problems. 2. Understand the basic theory of partial differential equations and the methods to solve them. 3. Apply the knowledge of partial differential equations to physical sciences and engineering.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II, MATH2241 Introduction to mathematical analysis; and Pass in MATH3405 Differential equations, or already enrolled in this course		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended	W.A. Strauss: Partial Differential Equations: An Introduction, 2nd ed. (Wiley)

reading and online materials	D. Bleecker & G. Scordas: Basic Partial Differential Equations (International Press) L.C. Evans: Partial Differential Equations (American Mathematical Society)
Course Website	http://hkumath.hku.hk/course/MATH4406/

MATH4501 Geometry (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr P P W Wong, Mathematics *(ppwwong@maths.hku.hk)*		
Teachers Involved	Dr P P W Wong, Mathematics		
Course Objectives	As geometric forms often appear in nature, the study of geometry helps us to understand better the universe in which we live. Moreover, geometry has much intrinsic beauty and the study of it is an excellent training in intuitive thinking. In this course we study the differential geometry of curves and surfaces in 3-space. In the study of regular surfaces in 3-space we exhibit geometric notions that are definable in terms of metrical properties of these surfaces alone, leading to the intrinsic geometry of surfaces.		
Course Contents & Topics	Plane and space curves, regular surfaces in three-dimensional Euclidean space, the Gauss map, Gaussian and mean curvatures, Gauss's Theorema Egregium, Gauss-Bonnet Theorem.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the fundamental theorems on curves. 2. Be able to compute the Gaussian and mean curvatures. 3. Understand the basics of intrinsic geometry of surfaces.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I, MATH2102 Linear algebra II and MATH3401 Analysis I		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		50
Test		50

Required/recommended reading and online materials	M P Do Carmo: Differential Geometry of Curves and Surfaces (Prentice-Hall, 1976)
Course Website	http://hkumath.hku.hk/course/MATH4501/

MATH4511 Introduction to differentiable manifolds (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr P P W Wong, Mathematics *(ppwwong@maths.hku.hk)*		
Teachers Involved	Dr P P W Wong, Mathematics		
Course Objectives	The course aims at introducing students to the notion of differentiable manifolds and basic concepts and tools for their study, such as differential forms, exterior differentiation and integration; vector fields, distributions, and integrability; and covariant differentiation through affine connections. The course also aims at presenting concrete examples that are relevant to further fields of study. Especially, it introduces		

	Lie groups through the use of matrix groups.		
Course Contents & Topics	Review on functions of several variables, inverse mapping theorem, implicit function theorem. Differentiable manifolds: definitions and examples. Maps between manifolds, submanifolds. Differential forms and exterior differentiation. Integration on manifolds. The tangent bundle, distributions and Frobenius Theorem. Matrix groups as Lie groups. Covariant differentiation: affine connections.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the basic language and concepts of modern differential geometry with examples. 2. Apply the knowledge of algebra and analysis learned previously to solve geometric problems. 3. Understand the role of differential geometry in other branches of mathematics and theoretical physics.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH4402 Analysis II and MATH4501 Geometry, or already enrolled in these courses		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	Dennis Barden and Charles B. Thomas: An Introduction to Differential Manifolds, (Imperial College Press, 2003) W. Boothby: An introduction to differential manifolds and Riemannian Geometry, 2nd Ed., (Academic Press, 2002) John M. Lee: Introduction to smooth manifolds, (Springer, 2002)
Course Website	http://hkumath.hku.hk/course/MATH4511/

MATH4602 Scientific computing (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr W K Ching, Mathematics *(wching@hku.hk)*		
Teachers Involved	Dr W K Ching, Mathematics Dr M Y Yim, Mathematics		
Course Objectives	This course introduces mathematical theories and computational techniques for solving various kinds of matrix computation problems that are often encountered in scientific or industrial applications.		
Course Contents & Topics	Introduction to scientific computing, systems of linear equations, direct methods, matrix norms, von Neumann series, iterative methods, eigenvalues, power method, spectral radius, Schur's Theorem, Gershgorin's Theorem, and some selected topics: multigrid methods, projection methods, recursion methods, fast Fourier transform, linear least squares, singular values, boundary value problems, partial differential equations, parallel computing, etc.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Apply direct method in solving a linear system. 2. Analyze the complexity of a numerical algorithm. 3. Give a proof for Schur's Theorem and Gershgorin's Theorem. 4. Apply iterative methods in solving a linear system. 5. Compute the singular values of a matrix.		
Pre-requisites	Pass in MATH3601 Numerical analysis		

(and Co-requisites and Impermissible combination)	
Offer in 2013 - 2014	Y 2nd sem — **Examination**: May
Offer in 2014 - 2015	N
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and numerical algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and numerical algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems and numerical algorithms or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems and numerical algorithms, but with some inadequacies in applying them through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems and numerical algorithms, but with substantial inadequacies in applying them through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems and numerical algorithms or their applications, or not being able to complete the solution.
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 (%)** Examination: 50 Test: 50
Required/recommended reading and online materials	Michael T. Heath: Scientific Computing (McGraw Hill, 1997) Charles F. Van Loan: Introduction to Scientific Computing, Matlab Curriculum Series (Prentice Hall, 1997)
Course Website	http://hkumath.hku.hk/course/MATH4602/

MATH4902 Operations research II (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof S C K Chu, Mathematics *(schu@hku.hk)*		
Teachers Involved	Prof S C K Chu, Mathematics		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of integer programming (IP), dynamic programming (DP) and Markov decision processes (MDP) in operations research. There is emphasis on aspects of algorithms as well as applications. The course serves, together with courses on linear programming and network models, to provide essential optimization concept and algorithms for more advanced studies in operations research.		
Course Contents & Topics	Integer programming and heuristics, dynamic programming (deterministic/stochastic) and Markov decision process (discounted/average costs).		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the terminology and nomenclature appropriate to integer programming, dynamic programming and Markov decision process. 2. Explain the typical techniques employed in integer programming, dynamic programming and Markov decision process. 3. Demonstrate the knowledge on algorithms for a variety of problems in operations research.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH2101 Linear algebra I and MATH2211 Multivariable calculus; and Pass in MATH3901 Operations research I, or already enrolled in this course		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	N		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.		

	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		50

Required/recommended reading and online materials	S. Dreyfus and A. Law: The Art and Theory of Dynamic Programming (Academic Press, 1977) P. Thie: Markov Decision Processes (COMAP, Inc. 1983) G.L. Nemhauser and L.A. Wolsey: Integer and Combinatorial Optimization (Wiley, 1988)
Course Website	http://hkumath.hku.hk/course/MATH4902/

MATH4907 Numerical methods for financial calculus (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr C W Wong, Mathematics *(cwwongab@hku.hk)*		
Teachers Involved	Dr C W Wong, Mathematics Dr J Song, Mathematics		
Course Objectives	This course aims at providing effective numerical methods as well as their theoretical aspects for solving problems arisen from financial derivatives and asset pricing.		
Course Contents & Topics	Introduction to the mathematical theory of vanilla and exotic options. Numerical methods for Black-Scholes pricing differential equations together with their performance analyses. Binomial tree methods, Monte Carlo simulations and their performance analyses.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Demonstrate knowledge and understanding of the martingale theory in option pricings as well as related financial derivatives. 2. Implement and analyse various numerical methods on the Black-Scholes pricing differential equation. 3. Explain the connection between the binomial tree method and the finite difference method of the Black-Scholes pricing differential equation. 4. Implement and analyse Monte Carlo simulation methods on the martingale pricing formula.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3906 Financial calculus		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Tutorials		36
Field work		12

	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		50
	Test		50
Required/recommended reading and online materials	J. Strikwerda: Finite Difference Schemes and PDEs (Wadsworth & Brooks, 1989) Baxter and Rennie: Financial Calculus (Cambridge University Press, 1996) Wilmott, Howison and Dewynne: The mathematics of Financial Derivatives (Cambridge University Press, 1995) Fleming and Rishel: Deterministic and Stochastic Optimal Control (Springer, 1975)		
Course Website	http://hkumath.hku.hk/course/MATH4907/		

MATH6501 Topics in algebra (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof J T Yu, Mathematics *(yujt@hku.hk)*		
Teachers Involved	Prof J T Yu, Mathematics Dr S Wu, Mathematics		
Course Objectives	To provide students specializing in mathematics with the opportunity to study some topics in algebra in greater depth.		
Course Contents & Topics	A selection of advanced topics in algebra such as group theory, rings and modules, Galois theory, quadratic forms, multilinear algebra, algebraic number theory, group representation, introduction to commutative algebra, Grobner basis theory, introduction to algebraic geometry. The selection may vary from year to year.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Acquire knowledge in the covered topics to considerable depth. 2. If he/she wishes, pursue more advanced studies in areas of algebra.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH4302 Algebra II		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
	B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination	One 2.5-hour written examination	50
	Assignments	coursework assessment	50
Required/recommended reading and online materials	To be decided by the course instructor.		
Course Website	http://hkumath.hku.hk/course/MATH6303/		

MATH6503 Topics in mathematical programming and optimization (6 credits)		Academic Year	2013
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	Prof W Zang, Mathematics		
Course Objectives	A study in greater depth of some special topics in mathematical programming or optimization. It is mainly intended for students in Operations Research or related subject areas.		
Course Contents & Topics	A selection of advanced topics, which may include convex, quadratic, geometric, stochastic programming, multi-objective programming and goal programming; or discrete and combinatorial optimization. The selection may vary from year to year.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the advanced concept and approach of the mathematical programming topic(s) and/or optimization approaches as appropriate in Operations Research. 2. Demonstrate knowledge and understanding of the underlying theory and techniques of the various formulations and algorithms plus their extensions.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3901 Operations research I, MATH3904 Introduction to optimization and MATH4902 Operations research II		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	N		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	One 2.5-hour written examination	50
Assignments	coursework assessment based on assignments and two class tests	50

Required/recommended reading and online materials

M.S. Bazaraa and C.M. Shetty, Nonlinear Programming, 2nd edition (John Wiley & Sons, 1993)
S.P. Bradley, A.C. Hax and T. Magnanti, Applied Mathematical Programming (Addison-Wesley, 1977)
N. Christofides et al (ed.): Combinatorial Optimization (John Wiley & Sons, 1979)
S.S. Rao, Optimization Theory and Applications (Wiley Eastern Ltd., 1978)
G. Nemhauser and L. Wolsey, Integer and Combinatorial Optimization (John Wiley & Sons, 1988)
J.P. Ignizio: Introduction to Linear Goal Programming (Beverly Hills: Sage, 1985)

Course Website: http://hkumath.hku.hk/course/MATH6908/

MATH6504 Geometric topology (6 credits)		Academic Year	2013
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Hua, Mathematics *()*		
Teachers Involved	Dr Z Hua, Mathematics		
Course Objectives	This course gives a geometric introduction to some of the methods of algebraic topology. The emphasis throughout will be on the geometric motivations and applications of the theory.		
Course Contents & Topics	Continuity. Compactness. Connectedness. The fundamental group. Triangulations and classification of surfaces. Theory and applications of simplicial homology. Theory of covering spaces. Theory of attaching spaces.		

Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand basic ideas and constructions which are important both in pursuing the deeper theories as well as in many applications in algebraic topology. 2. Understand the ideas of attaching space, complexes, lifting and extension properties, and surgery on manifolds.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3301 Algebra I and MATH3401 Analysis I
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems. **B**: Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors. **C**: Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors. **D**: Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors. **Fail**: Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	One 2.5-hour written examination	50
Assignments	coursework assessment	50

Required/recommended reading and online materials	M.A. Armstrong, Basic Topology (Springer-Verlag UTM) J. Rotman, An Introduction to Algebraic Topology (Springer-Verlag GTM)
Course Website	http://hkumath.hku.hk/course/MATH6504/

MATH6505 Real analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof K M Tsang, Mathematics *(kmtsang@maths.hku.hk)*		
Teachers Involved	Prof K M Tsang, Mathematics		
Course Objectives	The aim of the course is to introduce the basic ideas and techniques of measure theory and the Lebesgue integral.		
Course Contents & Topics	- Lebesgue Measure on R: Measurable sets and Lebesgue measure, Measurable functions - The Lebesgue Integral: The Lebesgue integral, modes of convergence - Differentiation and Integration: Functions of bounded variation, Differentiation of an integral, absolute continuity - General Measure and Integration Theory: Measurable spaces, measurable functions, integration, convergence theorems, the Radon-Nikodym theorem - The L^p Spaces: The L^p spaces, convergence and completeness, bounded linear functionals		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Describe basic properties of Lebesgue measure and measurable functions. 2. Construct the Lebesgue integral, elucidate its basic properties and appreciate the existence of other useful integration theories besides Riemann's. 3. Understand the basic features of L^p spaces.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3401 Analysis I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

<table>
<tr><td>Grade Descriptors</td><td>
<table>
<tr><td>A</td><td>Demonstrate a thorough understanding of all concepts and ideas by being able to draw complex connections among various concepts and apply the theorems through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation, and with some innovative approaches to solving problems.</td></tr>
<tr><td>B</td><td>Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, reasoning, identifying the appropriate theorems, applications, or presentation.</td></tr>
<tr><td>C</td><td>Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with acceptable argument and presentation.</td></tr>
<tr><td>D</td><td>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.</td></tr>
<tr><td>Fail</td><td>Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.</td></tr>
</table>
</td></tr>
<tr><td>Course Type</td><td>Lecture-based course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td>
<table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>36</td></tr>
<tr><td>Tutorials</td><td></td><td>12</td></tr>
<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
</table>
</td></tr>
<tr><td>Assessment Methods
and Weighting</td><td>
<table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr>
<tr><td>Examination</td><td>One 2.5-hour written final examination</td><td>70</td></tr>
<tr><td>Assignments</td><td>coursework assessment comprising one mid-term test and assignments</td><td>30</td></tr>
</table>
</td></tr>
<tr><td>Required/recommended reading
and online materials</td><td>H.L. Royden: Real Analysis, Collier MacMillan
W. Rudin: Real and Complex Analysis, McGraw Hill</td></tr>
<tr><td>Course Website</td><td>http://hkumath.hku.hk/course/MATH6405/</td></tr>
</table>

PHYS1050 Physics for engineering students (6 credits)		Academic Year	2013
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Prof M H Xie, Physics *(mhxie@hku.hk)*		
Teachers Involved	Prof M H Xie, Physics Dr H S Wu, Physics		
Course Objectives	This course offers a comprehensive training of physics for engineers. It covers the major physical laws on mechanics, electricity and magnetism. A calculus-based approach is adopted.		
Course Contents & Topics	This course will introduce and discuss the following topics: Units and Dimensional Analysis, Motion of a Particle in One and Two Dimensions, Newton's Laws of Motion, Friction, Curvilinear and Circular Motion on a Plane, Force, Impulse and Momentum, Force Polygon and Static Equilibrium, Work and Energy, System of Particles, Moment of Inertia and Rotation of a Rigid Body, Simple Harmonic Motion and Pendulum; Electrostatic Fields and Potential, Gauss's Law, DC circuits, Magnetic field due to Moving Charges, Force on a Moving Charge in Magnetic Field, Biot-Savart law, Ampere's law, Electromagnetic Induction, Faraday's Law, Eddy Currents, AC circuits, Phases in Capacitive and Inductive Circuits, Power, DC and AC Generators, Transformer.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and explain the physical principles of mechanics, electricity and magnetism. 2. Apply these principles to situations of the physical and engineering world. 3. Analyze and solve basic problems using the calculus-based approach. 4. Acquire and interpret experimental data to examine the physical laws.		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 3 or above in HKDSE Physics or Combined Science with Physics components or equivalent (This course is exclusive for Engineering students.)		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Course Type	Lecture with laboratory component course		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		12
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	70
Test		10
Assignments		10
Laboratory reports		10

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
R. Serway and J.W. Jewett: Physics for Scientists and Engineers (Thomson, 2009, 8th edition)
R. D. Knight: Physics for Scientists and Engineers (Pearson, 2008, 2nd edition)

PHYS1055 How things work (6 credits)		Academic Year	2013
Offering Department	Physics	**Quota**	---

Course Co-ordinator	Dr M K Yip, Physics *(mankit@bohr.physics.hku.hk)*
Teachers Involved	Dr M K Yip, Physics
Course Objectives	This course is designed for students in all disciplines and all years who are curious about science in daily life. The course covers the working principles and mechanisms of the things and phenomena around us. Logical thinking and appreciation of science are emphasized with mathematics kept at a minimum. Students are trained to develop scientific intuition and to understand that many "magical" things in everyday life can be predictable.
Course Contents & Topics	Topics include: the science in the household and the science of driving, sports and amusement. Daily applications are explored with simple and lucid explanations. Developments in optical recording, medical imaging for diagnosis and the magnetic levitated trains in public transportation are introduced as examples of the modern technology. Contents of the course are constantly updated to reflect the advances in modern science and technology.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and discuss the physical principles that are behind the household appliances and the scientific issues in daily life. 2. Demonstrate their knowledge to related topics qualitatively. 3. Criticize and express views in logical and effective ways. 4. Recognize the significance of science and technology.
Pre-requisites (and Co-requisites and Impermissible combination)	NIL
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	(see below)

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Assignments		25
Presentation		25

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator L. A. Bloomfield: How Things Work: The Physics of Everyday Life (John Wiley & Sons, Inc, 2008, 3rd edition)
Course Website	http://www.physics.hku.hk/~phys1055/

PHYS1056 Weather and climate (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee, Physics Dr T C Lee, Hong Kong Observatory Dr P W Li, Hong Kong Observatory Mr W K Wong, Hong Kong Observatory		
Course Objectives	Weather and climate play an important role in human activities and history. In this course, we shall introduce to students the fundamentals of weather, climate and climate changes, to arouse their interests in the scientific and technological advancements.		

Course Contents & Topics	The course will encompass topics on: basic physical principles on weather phenomena like: wind, temperature, humidity, cold/warm fronts, thunderstorms and tropical cyclones; introductory weather analysis, forecast and climate. Through real life examples, students will get familiarized with the weather/climate science and interpretation of meteorological information, climatology and climate change. Experts from the Hong Kong Observatory (HKO) will participate in the course to cover aspects on daily weather forecasts, public weather services, local severe weather phenomena, tropical cyclones, climatology of Hong Kong, and climate change. They will also supervise course projects that involve a visit to the HKO to study the meteorological facilities and understand the operational activities on weather and climate.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Recall the basic principles of weather and climate. 2. Apply the principles to interpret weather / climate information, for example from the HKO web site, internet or media. 3. Identify and explain the differences of weather and climate in Hong Kong as compared to other parts of the world. 4. Explain the basic causes of climate change and its potential impacts. 5. Describe and discuss the daily operational activities in the HKO.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Test		25
Assignments		25

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Frederick Lutgens and Edward Tarbuck: The Atmosphere (Pearson Prentice Hall, 2013)
Course Website	http://www.physics.hku.hk/~phys0629/

PHYS1150 Problem solving in physics (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee, Physics		
Course Objectives	This course provides a basic training on the methods and tools that are commonly used in physics. It prepares students the necessary knowledge to learn the subject. Students will explore the basic ideas, methods and skills through tackling physical problems. It is complete in itself, or may also be followed by Methods in Physics I. This course can be regarded as a survival guide in physics study.		
Course Contents & Topics	This course introduces the principles and theories of various tools that are useful to read physics and solve its problems. Topics include: Dimensional analysis, algebraic method, vectorial method, graphical method, calculus approach and geometric approach, etc. Applications to physical systems and various problem solving skills are discussed.		

Course Learning Outcomes	On successful completion of this course, students should be able to: 1. State physical systems by the language of mathematics and employ mathematical logic and reasoning to read physics. 2. Apply calculus to solve problems. 3. Review the features of various solving tools in physics as well as plan and select appropriate tools when solving physical problems. 4. Describe the connections between mathematical equations and physical problems. 5. Formulate and operate physical problems both qualitatively and quantitatively. 6. Interpret and judge the physical meaning of result after calculations.
Pre-requisites (and Co-requisites and Impermissible combination)	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course.
Offer in 2013 - 2014	Y 2nd sem; **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective observation skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective observation skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		18
Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Test		20
Assignments		20
Laboratory reports		10

Required/recommended reading and online materials: Lecture notes provided by Course Coordinator

PHYS1240 Physics by inquiry (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J C S Pun, Physics *(jcspun@hkucc.hku.hk)*		
Teachers Involved	Dr J C S Pun, Physics		
Course Objectives	This course aims at providing students a solid background and knowledge in physics as well as its connection with our daily life phenomena and activities.		
Course Contents & Topics	The course has a general coverage in most physics topics and is conducted with no descriptions in differential and integral calculus. Emphasis will be stressed on the understanding of various physical phenomena in daily life through qualitative and quantitative analysis. The course contents cover: Mechanics, Heat, Optics, Waves, Electricity and Magnetism.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Describe and distinguish the concepts and principles in introductory study of physics. 2. Recognize the underlying physical principles behind various daily life phenomena. 3. Explain physical phenomena using proper physical laws and theories. 4. Apply the fundamental techniques for quantitative analysis in solving physics problems.		

	5. Collect and analyse the data of physics experiments.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL Not for students with level 3 or above in HKDSE Physics; and Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course; and Not for students who have passed in PHYS1250 Fundamental physics or already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Test		35
Assignments		15

Required/recommended reading and online materials

Lecture notes provided by Course Coordinator
John D. Cutnell and Kenneth W. Johnson: Introduction to Physics (John Wiley & Sons, Inc., 2013)
Paul G. Hewitt: Conceptual Physics (Addison Wesley, 2009, 11th edition)
Raymond A. Serway and Chris Vuille: College Physics (Brooks Cole, 2011, 9th edition)

PHYS1250 Fundamental physics (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M K Yip, Physics *(mankit@bohr.physics.hku.hk)*		
Teachers Involved	Dr M K Yip, Physics		
Course Objectives	This course covers the fundamental blocks in physics in one semester. It serves as a first course to students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics or astronomy as minor. Conceptual ideas in physics are emphasized and the mathematical treatment is moderate.		
Course Contents & Topics	Topics include: Mechanics, Wave Motions, Geometric and Physical Optics, Thermodynamics, Electromagnetism, and Modern Physics.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and explain the fundamental physical principles. 2. Apply these principles, together with logical and mathematical reasoning, to situations of the physical world. 3. Analyse and solve problems with the aids of mathematics. 4. Acquire and interpret experimental data to examine the physical laws.		
Pre-requisites (and Co-requisites and Impermissible combination)	Level 3 or above in HKDSE Physics or equivalent; Students without Level 3 or above in HKDSE Physics but having a pass in PHYS1240 Physics by inquiry may be allowed to take this course; Not for students who have passed in PHYS1050 Physics for engineering students or already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the		

		course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Assignments	assignment and quiz	35
Laboratory reports		15

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Raymond A. Serway and John W. Jewett: Physics for Scientists and Engineers (Thomson, 2011, 8th edition) James S. Walker: Physics (Prentice Hall, 2009, 4th edition)
Course Website	http://www.physics.hku.hk/~phys1250/

PHYS1650 Nature of the universe (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee, Physics		
Course Objectives	This general education course is designed for students in all disciplines and all years. No prior knowledge in astronomy, physics, and higher mathematics is required, but will help.		
Course Contents & Topics	Topics covered include the observational aspect of astronomy (including constellations and planets), the physics of our solar system, and our own Sun, stars and their evolution, galaxies, blackholes, and cosmology. It also provides students with a basic understanding of the relationship of astronomy to life and how our nature works on the macroscopic level. Students are expected to participate actively in the night sky observations.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Identify and describe the major objects in our Solar System and our universe (including stars and galaxies), and explain their main properties. 2. Use the celestial sphere model to describe the apparent trajectories of celestial objects. 3. Review the evolution of the world-view from the geocentric model to the heliocentric model and the discovery of the expansion of the universe on our world-view. 4. Apply quantitative physical laws, including Kepler's three laws of planetary motion, Newton's law of universal gravitation, Doppler shift formula and Hubble's law to calculate and solve simple astronomical problems. 5. Explain the evolution of stars and the evolution of the universe. 6. Review communicate astronomical problems and solutions using appropriate astronomical terminology and good English.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective observation skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective observation skills and techniques. Correct use of data of results to draw appropriate conclusions.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective observation skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective observation skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective observation skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		12
Tutorials		12
Reading / Self study		60

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Assignments		25
Presentation		25

Required/recommended reading and online materials	E. Chaisson and S. McMillan: Astronomy Today (Pearson, 2011)
Course Website	http://www.physics.hku.hk/~nature/

PHYS2055 Introduction to relativity (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr K M Lee, Physics *(kmlee@lily.physics.hku.hk)*		
Teachers Involved	Dr K M Lee, Physics		
Course Objectives	This course aims at introducing students the essence of special relativity. It is designed as an elective for students in all disciplines and all years with science background.		
Course Contents & Topics	Topics include: "Common-sense" concepts of space and time versus Einstein's conceptions of space and time, Examples of time dilation and space contraction, Paradoxes of relativity including the famous twin paradox and the "pole-in-the-barn", Four vectors and Lorentz invariant.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Recall the setup and significance of Michelson-Morley experiment. 2. State the basic postulates and the spacetime concept of special relativity. 3. Explain time dilation and length contraction. 4. Describe Lorentz transformation and its applications. 5. State the resolution of the twin and pole-in-the-barn paradoxes.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1250 Fundamental physics or PHYS1150 Problem solving in physics or PHYS1050 Physics for engineering students		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
		Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course

	C	learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Test		25
Assignments		25

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Robert Resnick and David Halliday: Basic Concepts in Relativity and Early Quantum Theory (MacMillan Pub., 1992, 2nd revised edition) Edwin F. Taylor and John A. Wheeler: Spacetime Physics: Introduction to Special Relativity (W. H. Freeman, 1992, 2nd edition)

PHYS2150 Methods in physics I (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F K Chow, Physics *(judychow@hkucc.hku.hk)*		
Teachers Involved	Dr F K Chow, Physics		
Course Objectives	This course provides students with experience in using mathematical tools and techniques to solve problems in physics. It is complete in itself, or may also be followed by Methods in Physics II.		
Course Contents & Topics	Solutions of ordinary differential equations in first, second and higher orders and their applications in particle dynamics, circuit theories and nuclear physics; Principles of vectors; Analytic geometry in three dimensions; Vector functions; Cartesian, cylindrical and spherical coordinates; Complex numbers, exponential functions and the mathematical representation of waves; Partial derivatives, extremes of multi-variable functions and the Taylor series in two-variable functions; Lagrange undetermined multipliers; Double and triple integrals in Cartesian, cylindrical and spherical coordinates; Change of variables and the Jacobians; Calculations of centers of mass, moments of inertia and electric potentials.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Review the theory and principles of mathematical methods and compare the features of various methods. 2. Describe the connections between mathematical equations and physical problems. 3. State and set up mathematical equations to describe the dynamics and evolution of physics systems. 4. Demonstrate knowledge of choosing correct solution of mathematical equations. 5. Solve various problems and operate the calculations with computer. 6. Interpret and judge the physical meaning of result after calculations.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		72

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2 hour written exam	50
Test		35
Assignments		15

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Riley K.F., Hobson M.P. and Bence S.J.: Mathematical Methods for Physics and Engineering (Cambridge, 2006, 3rd edition) Wylie C.R., Barrett L.C.: Advanced Engineering Mathematics (McGraw Hill, 1995)
Course Website	http://www.physics.hku.hk/~phys1315/

PHYS2155 Methods in physics II (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F C C Ling, Physics *(ccling@hkucc.hku.hk)*		
Teachers Involved	Dr F C C Ling, Physics		
Course Objectives	This course provides students with experience in using mathematical tools and techniques to solve problems in physics. It is complete in itself, or may also be taken after Methods in Physics I.		
Course Contents & Topics	A review on coordinate systems in three dimensions; Gradient, divergence, curl and Laplacian; Line integrals, surface integrals and volume integrals; Conservative fields and potentials; Green's theorem, divergence theorem and the Stokes' theorem; Curvilinear coordinates; Applications of vector calculus in classical mechanics and electrodynamics; Vector spaces and matrix algebra; Properties of some special matrices: Hermitian matrices and unitary matrices, etc; Quadratic forms; Eigenvalue problems and diagonalization of matrices; Applications of matrix theory in physical problems; Numerical methods for finding roots of equations; Numerical differentiation and integration.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Review the theory and principles of mathematical methods and compare the features of various methods. 2. Describe the connections between mathematical equations and physical problems. 3. State and set up mathematical equations to describe the dynamics and evolution of physics systems. 4. Demonstrate knowledge of choosing correct solution of mathematical equations. 5. Solve various problems and operate the calculations with computer. 6. Interpret and judge the physical meaning of result after calculations.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1150 Problem solving in physics or MATH1011 University mathematics I or MATH1013 University mathematics II or MATH1851 Calculus and ordinary differential equations		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		72

Assessment Methods and Weighting	<table><tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr><tr><td>Examination</td><td>2-hour written exam</td><td>50</td></tr><tr><td>Test</td><td></td><td>35</td></tr><tr><td>Assignments</td><td></td><td>15</td></tr></table>
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Riley K.F., Hobson M.P. and Bence S.J.: Mathematical Methods for Physics and Engineering (Cambridge, 2006, 3rd edition) Wylie C.R., Barrett L.C.: Advanced Engineering Mathematics (McGraw Hill, 1995)
Course Website	http://www.physics.hku.hk/~phys1316/

PHYS2250 Introductory mechanics (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr M K Yip, Physics *(mankit@bohr.physics.hku.hk)*		
Teachers Involved	Dr M K Yip (Sem 1), Physics Prof H F Chau (Sem 2), Physics		
Course Objectives	This course covers the foundation of mechanics in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in mechanics are emphasized.		
Course Contents & Topics	Topics include: Kinematics, Newton's Laws of Motion and Their Applications, Linear Momentum and its Conservation, Variable Mass Problems, System of Particles and Centre of Mass, Torque and Rotation, Angular Momentum and its Conservation, Work, Energy and its Conservation, Gravitation, Simple Harmonic Motions, Fluid Static and Pressure, Archimedes' Principle and Buoyancy, Bernoulli's Equation, Surface Tension and Capillary Tube.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and explain the the fundamental physical principles. 2. Apply these principles, together with logical and mathematical reasoning, to situations of the physical world. 3. Analyse and solve problems with the aids of mathematics. 4. Acquire and interpret experimental data to examine the physical laws.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	<table><tr><td>**A**</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.</td></tr><tr><td>**B**</td><td>Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.</td></tr><tr><td>**C**</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.</td></tr><tr><td>**D**</td><td>Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.</td></tr><tr><td>**Fail**</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.</td></tr></table>		
Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	<table><tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr><tr><td>Lectures</td><td></td><td>36</td></tr><tr><td>Laboratory</td><td></td><td>6</td></tr><tr><td>Tutorials</td><td></td><td>12</td></tr><tr><td>Reading / Self study</td><td></td><td>80</td></tr></table>		
Assessment Methods			

and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination	2-hour written exam	50
	Assignments	assignment & quiz	35
	Laboratory reports		15
Required/recommended reading and online materials	(1) Lecture notes provided by Course Coordinator (2) P.A Tipler and G. Mosca: Physics for Scientists and Engineers, (Freeman, 2008, 6th edition). (3) D. Kleppner and Robert J. Kolenkow: An Introduction to Mechanics (McGraw Hill, 1978, International edition)		

PHYS2255 Introductory electricity and magnetism (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr J C S Pun, Physics *(jcspun@hkucc.hku.hk)*		
Teachers Involved	Dr J C S Pun, Physics		
Course Objectives	This course covers the foundation of electricity and magnetism in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in electricity and magnetsim are emphasized.		
Course Contents & Topics	Topics include: Vector notation and vector field, Electric force and electric field, Gauss' law and electric conductors, Electric potential energy and potential, Capacitance and DC circuits, Magnetic force, Magnetic field, Faraday's law of induction, Inductance, AC circuit, Maxwell's equations and electromagnetic waves.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and explain the fundamental physical principles. 2. Apply these principles, together with logical and mathematical reasoning, to situations of the physical world. 3. Analyse and solve problems with the aids of mathematics. 4. Acquire and interpret experimental data to examine the physical laws.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type	Lecture with laboratory component course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Laboratory		6
	Tutorials		12
	Reading / Self study		80
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination	2-hour written exam	50
	Assignments	assignment & quiz	35

	Laboratory reports		15

Required/recommended reading and online materials	(1) P. A. Tipler and G. Mosca: Physics for Scientists and Engineers (Freeman, 2008, 6th edition) (2) R. D. Knight: Physics for Scientists and Engineers (Pearson, 2008, 2nd edition) (3) R. Resnick, D. Halliday, and K. Krane: Physics Volume 2 (John Wiley and Sons, 2002, 5th edition) (4) R. Serway and J. W. Jewett: Physics for Scientists and Engineers (Thomson, 2004, 5th edition)

PHYS2260 Heat and waves (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F C C Ling, Physics *(ccling@hkucc.hku.hk)*		
Teachers Involved	Dr F C C Ling, Physics		
Course Objectives	This course covers the foundation of heat and waves in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in heat and waves are emphasized.		
Course Contents & Topics	Topics include: type of waves; Sinusoidal wave including transverse velocity and phase, Wave propagation through a stretched string as an example for transverse wave, Sound wave as an example for longitudinal wave, Wave equation, Energy in wave motion, The principle of superposition, Interference of waves, Standing waves and resonance, Beats, The Doppler Effect, Light wave as an electromagnetic wave, Reflection, Refraction, Double slit interference, Interference from thin films, Single slit diffraction, Multiple slit and grating, Polarization, Temperature and equilibrium, Ideal gas law, Molecular view of pressure, Mean free path, distributions of molecular speed and energy, Concept of heat, First law of thermodynamic, Work done on or by an ideal gas, Internal energy of an ideal gas, Molar heat capacities at constant volume and constant pressure, Different thermodynamic processes including adiabatic, isothermal, constant-volume, cyclical and free expansion, Reversibility of process, definition of entropy change, The second law of thermodynamic, Carnot engine, Statistical view of entropy.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and explain the the fundamental physical principles. 2. Apply these principles, together with logical and mathematical reasoning, to situations of the physical world. 3. Analyse and solve problems with the aids of mathematics. 4. Acquire and interpret experimental data to examine the physical laws.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50

	Assignments	assignment & quiz	35
	Laboratory reports		15
Required/recommended reading and online materials	(1) P. A. Tipler and G. Mosca: Physics for Scientists and Engineers (Freeman, 2008, 6th edition) (2) R. Resnick, D. Halliday, and K. Krane: Physics Volume 1 (John Wiley and Sons, 2002, 5th edition) (3) R. Resnick, D. Halliday, and K. Krane: Physics Volume 2 (John Wiley and Sons, 2002, 5th edition)		

PHYS2265 Modern physics (6 credits)		**Academic Year**	**2013**
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr F K Chow, Physics *(judychow@hkucc.hku.hk)*		
Teachers Involved	Dr F K Chow (Sem 1 and 2), Physics		
Course Objectives	This course covers the foundation of modern physics in one semester. It serves as a core course for students who are planning to take physics, astronomy, or mathematics/physics as major. It also serves students who intend to take physics as minor. Both conceptual ideas and mathematical treatment in modern physics are emphasized.		
Course Contents & Topics	Topics include: Particle Properties of Wave, Wave Properties of Particle, The Schrodinger Equation, Some Solutions to Time Independent Schrodinger Equation, The Hydrogen Atom, Spin and Many Particles System.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and explain the fundamental physical principles. 2. Apply these principles, together with logical and mathematical reasoning, to situations of the physical world. 3. Analyse and solve problems with the aids of mathematics. 4. Acquire and interpret experimental data to examine the physical laws.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS1250 Fundamental physics or PHYS1050 Physics for engineering students		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Laboratory		6
Tutorials		12
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination	2-hour written exam	50
Assignments	assignment and quiz	35
Laboratory reports		15

Required/recommended reading and online materials

(1) R. Harris: Modern Physics (Addison-Wesley, 2008, 2nd edition)
(2) K. Krane: Modern Physics (John Wiley & Sons, 2012, 3rd edition)
(3) R. A. Serway, C. J. Moses and C. A. Moyer: Modern Physics (Brooks Cole, 2004, 3rd edition)
(4) P.A Tipler and G. Mosca: Physics for Scientists and Engineers Extended Version, (Freeman, 2008, 6th

	edition).

PHYS2850 Atomic and nuclear physics (6 credits)		Academic Year	2013
Offering Department	Physics	**Quota**	---
Course Co-ordinator	Dr S Z Zhang, Physics *(shizhong@hku.hk)*		
Teachers Involved	Dr S Z Zhang, Physics		
Course Objectives	This course will introduce students to the fundamentals of atomic physics and rudimentary nuclear physics. It aims to provide a coherent and concise coverage of traditional atomic and nuclear physics. Important topics of current research interest will be also discussed, such as laser cooling and trapping which plays an important role in the realization of Bose-Einstein condensate in atomic vapors.		
Course Contents & Topics	Topics include: Atomic structure of hydrogen and hydrogen-like atom, multi-electron atom, atom in electromagnetic field, spectroscopy, laser trapping and cooling; nuclear structure, shell model and nuclear reactions. Applications of the basic principles of atomic and nuclear physics will be mentioned when appropriate.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Apply general considerations of quantum physics to atomic and nuclear system; make general orders of magnitude of estimation of physical effects. 2. Explain how light interacting with atom; the working principle of laser trapping and cooling. 3. Recognize the general features of atomic/nuclear spectroscopy. 4. Apply quantum physics to understand the basic features of simple nuclei, binding of deuteron et al.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in PHYS2265 Modern physics		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective. Apply minimally effective or ineffective lab skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		18
Reading / Self study		80

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Test		30
Assignments		20

Required/recommended reading and online materials	Lecture notes provided by Course Coordinator W. Demtroder, Atoms, molecules and photons (Springer, 2nd, 2011) K. Krane, Introductory nuclear physics (John Wiley & Sons, 1988) B. H. Bransden and C. J. Joachain: Physics of Atoms and Molecules (Pearson, 2nd, 2003)
Course Website	http://www.physics.hku.hk/~phys2628/

SCNC1111 Scientific method and reasoning (6 credits)		Academic Year	2013
Offering Department	Faculty	**Quota**	---
Course Co-ordinator	Dr N K Tsing, Mathematics *(nktsing@hku.hk)*		
Teachers Involved	Dr N K Tsing, Mathematics Dr K F Lam, Statistics & Actuarial Science		
Course Objectives	The objectives are to give students a holistic view of the science discipline in terms of its nature, concepts and impact on civilization and society; to equip students with basic skills of logical and quantitative reasoning; and to introduce to students mathematical and statistical methods for science studies and research.		
Course Contents & Topics	Part I: The nature and methodology of science - Demarcation between science and non-science - Shared features of the sciences - Scientific method - The role of mathematics in the historical development of science Part II: Quantitative Reasoning a. Mathematics - Foundation of mathematics - Mathematics and advancement of science - an introduction - Mathematical modelling - an introduction - Guesstimation - Difference equations - Linear algebra and matrices - Calculus and differential equations - Graph theory - Fractals - Chaos b. Statistics - Probability rules - Probabilistic methods - Statistical inference - Confidence intervals estimation - Hypothesis testing - Decision making with statistics - Statistical modelling, and use and misuse of statistics		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe key aspects of scientific methodology. 2. Describe the key elements of the foundation of mathematics and statistics. 3. Identify the mathematics that underlies scientific problems. 4. Apply logical and quantitative reasoning to re-formulate both real life and scientific problems in mathematical terms, and to interpret their solutions.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, and ability to apply knowledge to a wide range of familiar and unfamiliar situations. Carry out computations carefully and correctly. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Carry out computations mostly in a careful and correct way, but commit some minor computational errors. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Commit a number of minor computational errors. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Commit some substantial computational errors. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Commit serious computational errors. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 33 Tutorials / / 8 Reading / Self study / / 100		
Assessment Methods			

and Weighting	Methods	Details	Weighting in final course grade (%)
	Examination	2-hour examination	40
	Test		20
	Assignments		20
	Project reports		20
Required/recommended reading and online materials	TBC		

SCNC1112 Fundamentals of modern science (6 credits)		**Academic Year**	**2013**
Offering Department	Faculty	**Quota**	---
Course Co-ordinator	Dr J C S Pun, Physics *(jcspun@hku.hk)*		
Teachers Involved	Dr J C S Pun (1st sem), Physics Prof A S C Cheung (1st & 2nd sem), Chemistry Prof A S T Wong (1st sem), Biological Sciences Prof K M Y Leung (2nd sem), Biological Sciences Dr M H Lee (2nd sem), Earth Sciences		
Course Objectives	This course aims to provide students an overview of the giant web of knowledge that makes up science. This course adopts an integrated approach and encompasses physics, astronomy, earth sciences, chemistry, and biology, and focuses on the general principles and unifying concepts of science used in various disciplines to describe the diverse phenomena and objects in the natural world. The fundamental laws of each discipline, the historical developments and the modern frontiers, and the interconnectedness of different science disciplines will be introduced and highlighted.		
Course Contents & Topics	(1) Universal principles and unifying concepts of science (2) Fundamental structure of matter - Structure of matter - The quantum world - Elementary particles and standard model (3) Atoms and molecules - Matters and atoms: The periodic table - Chemical bonds and chemical reactions - Important molecules: water, carbon, molecular cluster - Nanoscience and nanotechnology (4) DNA/Genetic - Molecules of life - Genomics and DNA; Genetics and inheritance (5) Cells and systems (6) Organism and environment - The origin and evolution of life - Ecology and environment (7) Earth and Beyond - Solid Earth, Earth's atmosphere and hydrosphere - Earth's motion in space - Planets, the Sun, and the solar system - Cosmology		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Acquire an understanding of the historical development of modern science, the essence and spirit of scientific inquiry methods, and the role of science in the advancement of civilization over time. 2. Understand and be familiar with the fundamental scientific principles and concepts. 3. Appreciate the diversity of different scientific disciplines and develop multidisciplinary and interdisciplinary perspectives on scientific issues. 4. Critically and creatively appraise received ideas and established knowledge. 5. Develop curiosity in science and an appreciation of sciences as related to different Science Majors and as a form of life-long learning.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL (This course is compulsory for all students taking a Science major offered by the Faculty of Science. Students should take this course in their first year.)		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective lab skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective lab skills and techniques. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course

		learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective lab skills and techniques. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply partially effective lab skills and techniques. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Apply minimally effective or ineffective lab / fieldwork skills and techniques. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture with laboratory component course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		33
Laboratory		2
Tutorials		12
Reading / Self study		94
Assessment	1 hour in-class quiz	1

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		40
Test		10
Assignments	tutorials and homework	20
Laboratory reports		10
Presentation	project presentation	20

Required/recommended reading and online materials	Textbook: Sciences: An Integrated Approach by Trefil & Hazen 7th Edition (2013, Wiley) References: Integrated Science by Tillery, Enger, & Ross 5th Edition (2011, McGrawHill) Biology: Concepts and Connections by Campbell, Mitchell, & Reece 2nd Edition (1999, Benjamin/Cummings) Chemistry: An Atoms First Approach by Zumdahl & Zumdahl (2012 Cengage)

SCNC2121 Sustainable food production (6 credits)		**Academic Year**	**2013**
Offering Department	Faculty	**Quota**	32
Course Co-ordinator	Dr H S El-Nezami, Biological Sciences *(elnezami@hku.hk)*		
Teachers Involved	Dr H S El-Nezami, Biological Sciences Dr DeLisa Lewis, UBC Faculty of Land and Food Systems		
Course Objectives	This course is designed to provide students with the opportunity to experience the inner-workings of a sustainable, campus farming operation, and to make connections between the ecosystems that nourish the thriving, urban communities surrounding the farm. Students will participate in plenary sessions with course instructors and guest lecturers from the UBC Faculty of Land and Food Systems, in guided group discussions, field trips on and off-campus, and in a variety of seasonal, hands-on farming activities.		
Course Contents & Topics	The MacMillan building, home of the UBC Faculty of Land and Food Systems, will be the site of the plenary sessions, guest speaker lectures, and morning group discussion sessions. The south campus farm in UBC is the site of the majority of farming activities, including afternoon group discussions, harvest Fridays and market Saturdays. Students will have a chance to explore the UBC campus sustainability hot-spots, including the LFS orchard garden, the world-class CIRS green building, Place Vanier, home of an innovative campus chef, Steve Golieb, and the wiggle worm project in the Student Union Building/SUB. Students will also venture off-campus to two the Vancouver Farmers' Market and to Granville Island Public Market to provide a comparative view of marketing systems and the regionally grounded food system context. The main approach to learning with this course is student-centered learning and hands-on experience. To meet course learning objectives, students are expected to attend and participate in all sessions, to contribute to group discussions and the group oral presentation, and to complete a series of reflective journals on each of the four main course themes-soils, biodiversity, seeds, marketing.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Connect underlying agroecosystem concepts and soil science fundamentals with principles and practices of sustainable farming. 2. Observe and compare multiple models of agricultural food production in an urban and campus farm setting. 3. Identify multiple strategies for creating on-farm biodiversity. 4. Demonstrate a basic understanding of composting fundamentals. 5. Demonstrate the ability to perform a select set of basic crop maintenance, harvest, washing, and packing techniques in a sustainable campus farm setting. 6. Demonstrate best practices with post-harvest handling and food safety protocols.		
Pre-requisites	Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses.		

(and Co-requisites and Impermissible combination)	Students will also need to pass an interview in order to be enrolled in the course.
Offer in 2013 - 2014	Y Summer — **Examination**: No Exam
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Clear understanding of the basics from sustainable farming to marketing strategies used by sustainable farming operations. Ability to perform crop maintenance, harvest, washing, and packing in a sustainable campus farm setting. Ability to demonstrate solid team-based skills for performance of fieldwork, and distinct performance in different assessment components. Ability to synthesize the lessons learned during the course and articulate individual learning objectives for further studies in agriculture, food and human health. **B**: Clear understanding of the basics from sustainable farming to marketing strategies used by sustainable farming operations. Ability to perform crop maintenance, harvest, washing, and packing in a sustainable campus farm setting. Ability to demonstrate solid team-based skills for performance of fieldwork, and distinct performance in different assessment components. **C**: Understanding of the basics from sustainable farming to marketing strategies used by sustainable farming operations. Ability to perform crop maintenance, harvest, washing, and packing in a sustainable campus farm setting. Satisfactory demonstration of team-based skills for performance of fieldwork, and satisfactory performance in different assessment components. **D**: Knowing some of the basics of sustainable farming. Active participation in team-based fieldwork, and satisfactory performance in different assessment components. **Fail**: Fail to follow the basics of sustainable farming as demonstrated by unsatisfactory performance in assignments and/or fieldwork.
Course Type	Field camps

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		20
Field work		50
Presentation	Group discussion / Project	10
Reading / Self study		50
Assessment	End of trip report	30

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Assignments	To be announced by UBC Faculty of Land and Food Systems	40
Report	The end of trip report should be 7-10 pages (not including the references). Please refer to Remarks for format requirements.	60

Required/recommended reading and online materials	UBC Faculty of Land and Food Systems will give reading materials to students.
Course Website	http://www.scifac.hku.hk/news/bsc/ubc-summer-course
Additional Course Information	Please note: Students have to cover their own travel costs and course fees charged by the hosting institution (prices to be announced). This course will be offered subject to a minimum enrollment number and availability of teachers. Enrolment of this course is not conducted via the online course selection system. Students will be enrolled manually by the Faculty after approval has been obtained from the course coordinator. This course is taught by staff in UBC and the end of trip report is graded by Dr H S El-Nezami. Remarks: The end of trip report should be 7-10 pages (not including the references). Please use Times New Roman (12 points), single space and 2 cm margins from all sides. The report can cover any of the areas discussed during the course. The marking criteria are the scientific quality (free from scientific jargon, well referenced, use of tables or figures to summarize important data, a conclusion section that contains own views and ideas in relation to the topic discussed in the report, and be free from typographical errors).

SCNC2122 Marine life science: a North East Pacific perspective (6 credits)		**Academic Year**	**2013**
Offering Department	Faculty	**Quota**	32
Course Co-ordinator	Dr T Vengatesen, Biological Sciences *(rajan@hku.hk)*		
Teachers Involved	Dr T Vengatesen, Biological Sciences Prof S Kwok, Faculty of Science Prof G A Williams, Biological Sciences Prof R S S Wu, Biological Sciences		
Course Objectives	Marine Life Science is an integrated study of how the oceans influence large and small scale patterns of marine biology through biophysical interactions. By studying the temperate cold waters of the NE Pacific Ocean, students will learn marine habitats as habitable planet, to appreciate the dynamics of marine biodiversity, the complex interactions between the physical and biological components, fishery, and the services the coastal oceans provide to human. This course will provide an excellent opportunity for students to experience the diversity of marine life on the other side of the Pacific.		

<table>
<tr><td>Course Contents & Topics</td><td colspan="3">Lectures from both HKU and UBC teachers will introduce 'marine life science'; with a focus on biodiversity, abundance and distribution of species, productivity, coastal pollution, fisheries, aquaculture and climate change. The course will also introduce the commercial aspects of marine life, i.e. eel-grass, aquaculture and climate change mitigation through management of coastal ecosystems. All these lectures will be discussed through a series of field observations, presentations from guest lecturers and group discussions. There will be an excellent opportunity to touch and learn about Canada's wonderful marine life diversity in the Vancouver Aquarium, and northern Vancouver Fish Hatchery. Students will be learning Canada's coastal plankton biodiversity through vising the Marina (Reed point marina) and the Sea-grass habitat. There will also be several opportunities to explore the intertidal zone, exposed and protected coastal habitats, sandy beaches and estuaries in the Vancouver Island. Marine biodiversity survey techniques and methods of studying marine life in the field will be emphasized. Students will be exposed to a different learning environment involving not only HKU teachers and students but also UBC teachers and students, bringing diverse range of expertise, cultures, and learning opportunities from both sides of the Pacific Ocean to focus on the diversity, dynamic interactions and threats to marine life.</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of this course, students should be able to:

1. Understand the basics of marine life science and the marine habitable planet.
2. Explain the major types, causes, and effects of marine threats such as pollution, overfishing, global warming and ocean acidification, and invasive species, as well as describe the consequences of these threats for marine communities and ecosystem services.
3. Describe the difference between coastal marine biodiversity and harbors in Hong Kong and Canada.
4. Discover the reasons why marine biodiversity and ecosystem services in Hong Kong are so different from the North Pacific coastal ecosystems.</td></tr>
<tr><td>Pre-requisites
(and Co-requisites and
Impermissible combination)</td><td colspan="3">Students are expected to have passed at least 30 credits of level 1 and/or level 2 science courses. Students will need to pass an interview in order to be enrolled in the course.</td></tr>
<tr><td>Offer in 2013 - 2014</td><td>Y Summer</td><td>Examination</td><td>Summer</td></tr>
<tr><td>Offer in 2014 - 2015</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3">
<table>
<tr><td>A</td><td>Demonstrate through knowledge in basics of marine science and clearly understand why and how coastal biodiversity in sub-tropical Hong Kong is different from the North Pacific coastal areas. Ability to explain how marine organisms have adapted to their particular environments. Showing strong abilities, and logical thinking, with evidence of original thought, to examine reasons why the diversity of marine life and their habitats are so important to human society. Independent critique on how human induced threats such as climate change, pollution and habitat change will affect marine life, its diversity and their ecosystem services.</td></tr>
<tr><td>B</td><td>Clear understanding of the basics of marine science. Ability to explain how marine organisms have adapted to their particular environments. Knowing the common views on the reasons why the diversity of marine life and their habitats are so important to human society. Knowing the common views on how human induced threats such as climate change, pollution and habitat change will affect marine life, its diversity and their ecosystem services.</td></tr>
<tr><td>C</td><td>Demonstrate partial and limited command of knowledge and understanding of the basics of marine science, biodiversity and coastal ecosystem services. Develop little ability to explain how marine organisms have adapted to their particular environments. Knowing the common views on the reasons why the diversity of marine life and their habitats are so important to human society. Knowing the common views on how human induced threats such as climate change, pollution and habitat change will affect marine life, its diversity and their ecosystem services.</td></tr>
<tr><td>D</td><td>Knowing some of the basics of marine science. Developing ability to explain how marine organisms have adapted to their particular environments.</td></tr>
<tr><td>Fail</td><td>Fail to follow the basics of marine science and/or how marine organisms have adapted to their particular environments.</td></tr>
</table>
</td></tr>
<tr><td>Course Type</td><td colspan="3">Field camps</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td colspan="3">
<table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td>10 sessions x 2.5 hours</td><td>25</td></tr>
<tr><td>Field work</td><td>Field observation and work: about 5 to 6 field study</td><td>36</td></tr>
<tr><td>Presentation</td><td>Group discussion / Project: 1 group project with presentation</td><td>10</td></tr>
<tr><td>Reading / Self study</td><td></td><td>70</td></tr>
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<tr><td>Assessment Methods
and Weighting</td><td colspan="3">
<table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr>
<tr><td>Test</td><td>Field observation (group activities & reports)</td><td>25</td></tr>
<tr><td>Assignments</td><td>Group project work (30-mins presentation)</td><td>25</td></tr>
<tr><td>Report</td><td>2-hour written examination</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>Required/recommended
reading
and online materials</td><td colspan="3">Reference reading materials will be put on Moodle.</td></tr>
<tr><td>Course Website</td><td colspan="3">http://www.scifac.hku.hk/news/bsc/ubc-summer-course</td></tr>
<tr><td>Additional Course Information</td><td colspan="3">Please note: Students have to cover their own travel costs and course fees charged by the hosting institution (prices to be announced).
This course will be offered subject to a minimum enrollment number and availability of teachers.
Enrolment of this course is not conducted via the online course selection system. Students will be enrolled manually by the Faculty after approval has been obtained from the course coordinator.</td></tr>
</table>

STAT1600 Statistics: ideas and concepts (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E A L Li, Statistics & Actuarial Science *(ericli@saas.hku.hk)*		
Teachers Involved	Dr E A L Li, Statistics & Actuarial Science Dr Y K Chung, Statistics & Actuarial Science Dr K P Wat, Statistics & Actuarial Science		
Course Objectives	The course aims at providing a broad overview of statistics for students who aspire to major in Statistics or Risk Management. It focuses on the roles of statistics as a scientific tool with applications to a wide spectrum of disciplines, and as a science of reasoning which has revolutionized modern intellectual endeavours. It lays a panoramic foundation for a formal study of statistics at the university level.		
Course Contents & Topics	- Data collection: observational studies versus designed experiments - Data presentation: tables; graphs; frequency distributions; correlations; trends - Probability: randomness; probability models; distributions; measures of central tendency and dispersion - Inference: estimation; tests of significance and hypotheses; confidence intervals; regression; prediction - Further issues: controversies; misuse of statistics; ethics.		
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the role of statistics as a tool for scientific reasoning. 2. Present data in a useful and informative way. 3. Acquire basic concepts and perspectives of statistical modelling and inference. 4. Distinguish between good and bad statistical practices. 5. Pursue a major study in Statistics or Risk Management with a well-established conceptual foundation.		
Pre-requisites (and Co-requisites and Impermissible combination)	NIL		
Offer in 2013 - 2014	Y 1st sem 2nd sem	**Examination**	Dec May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		50
Assignments	Coursework (assignments, class test(s) and project(s))	50

Required/recommended reading and online materials	Heckard, R.F. and Utts, J.M. (2012). Statistics (International edition, 4th edition). Cengage Learning. Albright, S. C., Winston, W. L. and Zappe, C. J. (2009). Data Analysis and Decision Making with Microsoft Excel. Cengage Learning. Moore, D. S. and Notz, W. I. (2006). Statistics: Concepts and Controversies. Freeman: New York.
Course Website	moodle.hku.hk

STAT1601 Elementary statistical methods (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Mrs G M Jing, Statistics & Actuarial Science *(gmjing@saas.hku.hk)*		
Teachers Involved	Mrs G M Jing, Statistics & Actuarial Science		
Course Objectives	Research findings are usually supported by data. Data collected in an experiment/survey are often concerned with situations involving variability and uncertainty. They are used to estimate the true value of a certain quantity or to test the acceptability of a certain new hypothesis. Valid methods of analysing the		

	data are thus essential to any successful investigation. The course aims to present the fundamentals of statistical methods widely used by researchers. Microsoft Excel might be used to carry out some statistical analysis. There is no demand of sophisticated technical mathematics.
Course Contents & Topics	The course will introduce and study the following topics: Presentation of data, Measures of Central Tendency, Measures of Variability and Uncertainty, Basic Probability Laws, Common Probability Distributions such as Uniform, Binomial, Poisson, Hyper-geometric, Geometric and Normal distributions, Random Sampling, Distribution of the Mean, Normal Sampling Theorem, Point Estimation, Confidence Intervals, Sample Size Determination, Hypothesis Testing, Inferences for Mean and Proportion, Chi-squared tests, Simple Regression and Correlation
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Select and use appropriate statistical methods to analyze data. 2. Perform statistical analysis with calculator and Microsoft Excel. 3. Understand and apply basic concepts of probability. 4. Gain familiarity with the fundamental concepts of random variables. 5. Make inferences on a population based on sample data. 6. Determine the most appropriate statistical method to use for a given statistical problem. 7. Write appropriate conclusions based on the statistical results. 8. Understand the basic principles of simple linear regression and correlation and their applications to practical problems.
Pre-requisites (and Co-requisites and Impermissible combination)	Level 2 or above in HKDSE Mathematics or equivalent; and Not for students with Level 2 or above in HKDSE Mathematics Extended Module 1 or 2; and Not for students who have passed or already enrolled in any of the following courses: STAT2901 Probability and statistics: foundations of actuarial science, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, ECON1280 Analysis of economic data
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	Chiu W. K.: Basic Statistics (Pearson (Asia), 2007) Larson, R. & Farber, B.: Elementary Statistics, Picturing the World (Prentice Hall, 2008, 4th ed.) Berk, K.N. & Carey, P.: Data Analysis with Microsoft EXCEL (Duxbury press, Update Office 2007) Freund, J. E. & Perles, B. M.: Statistics - A First Course (Prentice Hall, 2004, 8th ed.)
Course Website	moodle.hku.hk
Additional Course Information	Calculator: CASIO fx-50FH (This model has SD-MODE, REG-MODE, nCr and Normal Probability Function which is very suitable for this course.)

STAT1602 Business statistics (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr R W L Wong, Statistics & Actuarial Science *(rwong@hku.hk)*		
Teachers Involved	Dr R W L Wong, Statistics & Actuarial Science		
Course Objectives	The discipline of statistics is concerned with situations involving uncertainty and variability. Variability greatly affects the interpretation of data. Thus statistics forms an important descriptive and analytical tool. This elementary course, which is taught without much technical mathematics, presents many		

	standard situations of data analysis and interpretation with emphases on business examples. The statistical tests of these situations are presented. Microsoft Excel might be used to carry out some statistical analysis.
Course Contents & Topics	The course will introduce and discuss the following topics: Presentation of Data, Measures of Central Tendency, Measures of Variability and Uncertainty, Elementary Probability Rules and Basic Probability Distributions such as Binomial, Normal, Poisson, Hyper-geometric and Geometric, Random Sampling, the Normal Sampling Theorem, Point Estimation, Confidence Intervals and Sample Size Determination, Hypothesis Testing involving Inferences for Means and Proportions as well as the Chi-square tests, Simple Regression and Correlation, Elementary Time Series and Index Numbers
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the methods for describing sets of data. 2. Perform statistical analysis with calculator and Microsoft Excel. 3. Draw conclusions from data using numerical summaries. 4. Understand and apply basic concepts of probability. 5. Gain familiarity with the fundamental concepts of random variables. 6. Make inferences on a population based on sample data. 7. Determine the most appropriate statistical method to use for a given statistical problem. 8. Gain familiarity with the fundamental concepts of statistical inference as they apply to a variety of problems. 9. Understand the basic principles of simple linear regression and correlation and their applications to practical problems in today's society.
Pre-requisites (and Co-requisites and Impermissible combination)	NIL Not for students who have passed or already enrolled in any of the following courses: STAT1601 Elementary statistical methods, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science, ECON1280 Analysis of economic data (This course is exclusive for School of Business students.)
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting	

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	Gerald Keller: Managerial Statistics (Cengage Learning, 2009, 8th edition) Freund, J. E. & Perles, B. M.: Modern Elementary Statistics (Prentice Hall, 2006, 12th ed.) Berk, K.N. & Carey, P.: Data Analysis with Microsoft EXCEL (Duxbury press, Update Office 2007) Bowerman, B.L. & O'Connell, E.S.: Business Statistics in Practice (McGraw-Hill International Edition, 2008, 5th ed.)
Course Website	moodle.hku.hk

STAT1603 Introductory statistics (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E K F Lam, Statistics & Actuarial Science *(hrntlkf@hku.hk)*		
Teachers Involved	Dr E K F Lam, Statistics & Actuarial Science		

Course Objectives	The discipline of statistics is concerned with situations involving uncertainty and variability. The interpretation of data needs special techniques when variability plays a role, as it usually does. Thus statistics forms an important descriptive and analytical tool of many scientific disciplines. Candidates with a mathematical background will find this course suitable, because the language of mathematics allows the subject of statistics to be presented with economy and clarity.
Course Contents & Topics	Presentation of data, Variability and Uncertainty, Measures of Central Tendency, Measures of Dispersion, Basic Probability Theory and Techniques, Random Variables and Probability Distributions, Random Samples, Point Estimation, Normal Sampling Theorem, Confidence Intervals, Hypotheses Testing, Simple Linear Regression and Correlation.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Compute different measures of central tendency and dispersion. 2. Make use of the basic probability theory and techniques to solve practical problem. 3. Know how to construct confidence intervals and use hypotheses testing to carry out inference on the population. 4. Use linear regression and correlation methods to solve problems in science and in social and business environment.
Pre-requisites (and Co-requisites and Impermissible combination)	(Level 2 or above in HKDSE Mathematics Extended Module 1 or 2 or equivalent) or (Pass in MATH1011 University Mathematics I, or already enrolled in this course); and Not for students who have passed or already enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT2901 Probability and statistics: foundations of actuarial science
Offer in 2013 - 2014	Y 1st sem — **Examination** Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	Miller, I. and Miller, M.: John E. Freund's Mathematical Statistics with Applications (Prentice Hall, New Jersey, 2004, 7th edition) Larson, R. and Farber, B.: Elementary Statistics - Picturing the World (Prentice Hall, 2006, 3rd edition) Bluman, A. G.: Elementary Statistics - A Step by Step Approach (The McGraw-Hill Companies, Inc., 2004, 5th edition) Triola, M. F.: Elementary Statistics (Addiso Wesley Longman, Inc., 1998, 7th edition)
Course Website	moodle.hku.hk
Additional Course Information	Students who intend to major in "Risk Management" or "Statistics" should take STAT2601 instead of this course. Other references: Wonnacott, T. H. and Wonnacott, R. J.: Introductory Statistics (Wiley, New York, 1972, 2nd edition) Dixon, W. J. and Massey, Jr, F. J.: Introduction to Statistical Analysis (McGraw Hill, 1983, 4th edition)

STAT2601 Probability and statistics I (6 credits)		**Academic Year**	2013
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 (Course coordinator of 1st sem), Statistics & Actuarial Science		

	Dr Y K Chung (Course coordinator of 2nd sem), Statistics & Actuarial Science
Course Objectives	The discipline of statistics is concerned with situations in which uncertainty and variability play an essential role and forms an important descriptive and analytical tool in many practical problems. Against a background of motivating problems this course develops relevant probability models for the description of such uncertainty and variability.
Course Contents & Topics	Sample spaces; Operations of events; Probability and probability laws; Conditional probability; Independence; Discrete random variables; Cumulative distribution function (cdf); Probability mass function (pmf); Bernoulli, binomial, geometric, and Poisson distributions; Continuous random variables; Cumulative distribution function (cdf); Probability density function (pdf); Exponential, Gamma, and normal distributions; Functions of a random variable; Joint distributions; Marginal distributions; Independent random variables; Functions of jointly distributed random variables; Expected value; Variance and standard deviation; Covariance and correlation.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the basic concepts in probability theory. 2. Gain some insights to statistics and inference. 3. Solve real-world problem by using probability calculations. 4. Pursue their further studies in statistics.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH1013 University mathematics II, or already enrolled in this course; or Pass in MATH1851 Calculus and ordinary differential equations and MATH1853 Linear algebra, probability and statistics; and Not for students who have passed in STAT1603 Introductory statistics, or already enrolled in this course; Not for students who have passed in STAT2901 Probability and statistics: foundations of actuarial science, or already enrolled in this course; and Not for BSc(ActuarSc) students.
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and class test(s))	25

Required/recommended reading and online materials	DeGroot, M.H. and Schervish, M.J.: Probability and Statistics (Boston: Addison-Wesley, 2012, 4th ed.) Sheldon, R.: A First Course in Probability (Upper Saddle River: Prentice Hall, 2010, 8th ed.) Miller, I. and Miller, M.: John E. Freund's Mathematical Statistics with Applications (Upper Saddle River: Prentice Hall, 2004, 7th ed.) Hogg, R.V., McKean J.W., and Craig, A.T.: Introduction to Mathematical Statistics (Upper Saddle River: Prentice Hall, 2013, 7th ed.) Hogg, R. V. & Tanis E. A.: Probability and Statistical Inference (Upper Saddle River: Prentice Hall, 2010, 8th ed.)
Course Website	moodle.hku.hk

STAT2602 Probability and statistics II (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K S Chong, Statistics & Actuarial Science *(kschong@hku.hk)*		
Teachers Involved	Dr K S Chong, Statistics & Actuarial Science		

Course Objectives	This course builds on STAT2601, introducing further the concepts and methods of statistics. Emphasis is on the two major areas of statistical analysis: estimation and hypothesis testing. Through the disciplines of statistical modelling, inference and decision making, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of real-life data.
Course Contents & Topics	1. Overview: random sample; sampling distributions of statistics; moment generating function; large-sample theory: laws of large numbers and Central Limit Theorem; likelihood; sufficiency; factorisation criterion; 2. Estimation: estimator; bias; mean squared error; standard error; consistency; Fisher information; Cramer-Rao Lower Bound; efficiency; method of moments; maximum likelihood estimator; 3. Hypothesis testing: types of hypotheses; test statistics; p-value; size; power; likelihood ratio test; Neyman-Pearson Lemma; generalized likelihood ratio test; Pearson chi-squared test; Wald tests; 4. Confidence interval: confidence level; confidence limits; equal-tailed interval; construction based on hypothesis tests.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Apprehend the objectives of statistics and its relation to probability theory. 2. Relate a real-life problem to a formal framework for statistical inference. 3. Conduct standard parametric statistical inference by means of estimation and hypothesis testing. 4. Reckon the general applicability of statistics in a broad range of subject areas.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2601 Probability and statistics I
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination** Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	(see below)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials and a class test)	25

Required/recommended reading and online materials	Berry, D.A. & Lindgren, B.W. (1996). Statistics: Theory and Methods. Duxbury: Belmont. Bickel, P.J. & Doksum, K.A. (2001). Mathematical Statistics: Basic Ideas and Selected Topics. Prentice Hall: Upper Saddle River, N.J. Hogg, R.V. & Craig, A.T. (1989). Introduction to Mathematical Statistics. Macmillan: New York. Miller, I. & Miller, M. (2004). John E. Freund's Mathematical Statistics with Applications. Pearson Prentice Hall: Upper Saddle River.
Course Website	moodle.hku.hk

STAT2603 Data management with SAS (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr C W Kwan, Statistics & Actuarial Science *(cwkwan@hku.hk)*		
Teachers Involved	Dr G C S Lui (Course coordinator of 1st sem), Statistics & Actuarial Science Dr C W Kwan (Course coordinator of 2nd sem), Statistics & Actuarial Science		
Course Objectives	This course is designed for students who want to learn a statistical software (SAS) for data management and elementary data analysis. This course focuses on using SAS to manage data set input and output, work with different data types, manipulate and transform data, perform random sampling and descriptive data analysis, and create summary reports and graphics.		

Course Contents & Topics	Data management system for statistical projects. Data validation and cleaning techniques. SAS programming topics, including the following: Data set input and output. Working with different data types. Data manipulation. Data transformation. File manipulation. File management. Data reporting, summarization, presentation and graphics. Basic data analysis.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Access online help and document. 2. Use Data Step to create data files. 3. Summarize data by PROC MEANS, PROC FREQ, and PROC UNIVARIATE. 4. Work with numeric, character, and date variables and functions in Data Step. 5. Perform conditional processing in Data Step. 6. Perform iterative processing in Data Step - work with arrays in Data step - restructure SAS data sets by Data Step and PROC TRANSPOSE - subset and merge data sets by Data Step and PROC APPEND - present data in a readable way by PROC TABULATE - produce high-resolution graphics by PROC SGPLOT - produce HTML output by ODS
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT1600 Statistics: ideas and concepts, or already enrolled in this course
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		60
Assignments	Coursework (assignments, tutorials, and class test(s))	40

Required/recommended reading and online materials	Cody, R.P.: Learning SAS by Example: A Programmer's Guide (North Carolina: SAS Institute Inc., 2007) SAS: SAS Certification Prep Guide: Base Programming for SAS 9. Third Edition. (SAS Institute Inc., 2011) Bailer, J.: Statistical Programming in SAS. North Carolina: (SAS Institute Inc., 2010) Delwiche, L. and Slaughter, S.: The Little SAS Book: A Primer. Fourth Edition. (SAS Institute Inc, 2008) Cody, R. P.: Cody's Data Cleaning Techniques Using SAS System (North Carolina: SAS Institute, 2008, 2nd edition) SAS: Step by Step Programming with Base SAS Software (North Carolina: SAS Publishing, 2001)
Course Website	moodle.hku.hk

STAT2605 Introduction to demographic and socio-economic statistics (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Ms L M S Kwan, Statistics & Actuarial Science *(lucykwan@hku.hk)*		
Teachers Involved	Ms L M S Kwan, Statistics & Actuarial Science		
Course Objectives	The course is an introduction to the basic methods for studying demographic and socio-economic statistics, which provide quantitative information on population size and structure, as well as major aspects of citizens' lives. The course aims at providing students with 1) basic knowledge including the underlying principles of the pertinent methods and statistical indicators; and 2) skills in the statistical descriptions of a territory and their interpretation and application to planning, policy-making and commercial endeavours.		

Course Contents & Topics	Population structure, fertility, mortality, migration, life tables, population projections; Social statistics on education, health, housing, labour, and other social characteristics; Economic statistics on national accounts, price indices; Sources, theory and methods of official statistics; Examples would be especially drawn from Hong Kong, and Mainland China.
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Describe and interpret major official & other publicly disseminated socio-economic statistics of a territory. 2. Further appraise and analyse the socio-economic well-being of a territory with particular reference to Hong Kong and mainland China. 3. Predict a future situation by assimilating and deriving from appropriate statistics. 4. Critically assess statistics reporting.
Pre-requisites (and Co-requisites and Impermissible combination)	(Level 2 or above in HKDSE Mathematics or Level 2 or above in HKDSE Mathematics Exended Module 1 or 2 or equvialent); and Pass in or already enrolled in any of these courses: BIOL2102 Biostatistics, ECON1280 Analysis of economic data, STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics, STAT2901 Probability and statistics: foundations of actuarial science
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	see below

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials and a test)	25

Required/recommended reading and online materials	Living with Statistics (Cenus & Statistics Department, HKSAR, 2012 edition) Annual Digest of Statistics (Census & Statistics Department, Hong Kong SAR, latest issue) Pollard A. H., Yusuf F., & Pollard G. N.: Demographic Techniques (Pergamon Press, 1990, 3rd edition) Giovannini E.: Understanding Economic Statistics - an OECD Perspective (OECD, 2008)
Course Website	moodle.hku.hk

STAT2901 Probability and statistics: foundations of actuarial science (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr Y K Chung, Statistics & Actuarial Science *(yukchung@hku.hk)*		
Teachers Involved	Dr Y K Chung, Statistics & Actuarial Science		
Course Objectives	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 - Basic elements of probability in set notation - Mutually exclusive events - Addition and multiplication rules - Independence of events - Combinatorial probability		

	- Conditional probability and expectations - Bayes Theorem / Law of total probability - Random variables 2. Univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, chi-square, beta, Pareto, lognormal, gamma, Weibull and normal) and bivariate normal distribution - Probability functions and probability density functions - Cumulative distribution functions - Mode, median, percentiles and moments - Variance and measures of dispersion - Central Limit Theorem 3. Sampling distributions and introduction of estimation
Course Learning Outcomes	On successful completion of this course, students should be able to: 1. Understand the mathematical theory underlying the modern practice of statistics. 2. Develop skills in probabilistic analysis for problems involving randomness. 3. Apply techniques in probability and statistics to solve actuarial science problems.
Pre-requisites (and Co-requisites and Impermissible combination)	(Pass in MATH1821 Mathematical methods for actuarial science I (for BSc(ActuarSc) students) or already enrolled in this course) or (Pass in MATH1013 University mathematics II or already enrolled in this course (for students outside the BSc(ActuarSc) programme); and Not for students who have passed or enrolled in any of these courses: STAT1601 Elementary statistical methods, STAT1602 Business statistics, STAT2601 Probability and statistics I, STAT1603 Introductory statistics
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/example classes	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	I. Miller & M. Miller: John E. Freund's Mathematical Statistics with applications (Pearson Education International, 2004, 7th edition) M. A. Bean: Probability: The Science of Uncertainty with Applications to Investments, Insurance, and Engineering (Brooks/Cole, Thomas Learning) S. Ghahramani: Fundamentals of Probability, with Stochastic Processes (2005, 3rd edition) M. Hassett & D. Stewart: Probability for Risk Management (2006, 2nd edition) S.M. Ross: A First Course in Probability (2005, 7th edition) D. Wackerly, W. Mendenhall III & R. Scheaffer: Mathematical Statistics with Applications (2008, 7th edition)
Course Website	moodle.hku.hk

STAT2902 Financial mathematics (6 credits)		**Academic Year**	**2013**
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: 1. Understand the fundamental concepts of financial mathematics. 2. Learn standard actuarial notations for a variety of annuities. 3. Do simple discounted cashflow analysis using basic annuities. 4. Learn the operations of some commonly-encountered financial instruments such as bonds, mortgages, short sales, and so on. 5. Quote interest in various modes and determine interest rate based on a series of financial transactions. 6. Deal with Exam FM of the Society of Actuaries.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2901 Probability and statistics: foundations of actuarial science or already enrolled in this course; and Not for students who have passed in STAT3615 Practical mathematics for investment, or already enrolled in this course.
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials	tutorials/example classes	12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and class test(s))	25

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

STAT3600 Linear statistical analysis (6 credits)	**Academic Year**	**2013**
Offering Department — Statistics & Actuarial Science	**Quota**	---

Course Co-ordinator	Prof T W K Fung, Statistics & Actuarial Science *(wingfung@hku.hk)*
Teachers Involved	Prof T W K Fung, Statistics & Actuarial Science
Course Objectives	The analysis of variability is mainly concerned with locating the sources of the variability. Many statistical techniques investigate these sources through the use of 'linear' models. This course presents the theory and practice of these models.
Course Contents & Topics	(1) Simple linear regression: least squares method, analysis of variance, coefficient of determination, hypothesis tests and confidence intervals for regression parameters, prediction. (2) Multiple linear regression: least squares method, analysis of variance, coefficient of determination, reduced vs full models, hypothesis tests and confidence intervals for regression parameters, prediction, polynomial regression. (3) One-way classification models: one-way ANOVA, analysis of treatment effects, contrasts. (4) Two-way classification models: interactions, two-way ANOVA for balanced data structures, analysis of treatment effects, contrasts, randomised complete block design. (5) Universal approach to linear modelling: dummy variables, 'multiple linear regression' representation of one-way and two-way (unbalanced) models, ANCOVA models, concomitant variables.

	(6) Regression diagnostics: leverage, residual plot, normal probability plot, outlier, studentized residual, influential observation, Cook's distance, multicollinearity, model transformation.
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand linear regression model with one or multiple independent variables. 2. Understand ANOVA models for one and two factors. 3. Understand general linear model with categorical and continuous independent variables.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II; and Not for students who have passed in STAT3907 Linear models and forecasting, or have already enrolled in this course.
Offer in 2013 - 2014	Y 1st sem 2nd sem — **Examination**: Dec May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials and a test)	25

Required/recommended reading and online materials	Michael H Kutner, Christopher J. Nachtsheim, John Neter, William Li: Applied Linear Statistical Models (McGraw-Hill/Irwin; 5th edition) Berry, D. A. & Lindgren, B. W.: Statistics: Theory and Methods (Duxbury Belmont, 1996) Draper, N. R. & Smith, H.: Applied Regression Analysis (Wiley, New York, 1998) Krzanowski, W. J.: An Introduction to Statistical Modelling (Arnold, London, 1998) Montgomery, D. C. & Peck, E. A.: Introduction to Linear Regression Analysis (Wiley, New York, 1992)
Course Website	moodle.hku.hk

STAT3602 Statistical inference (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof S M S Lee, Statistics & Actuarial Science *(smslee@hku.hk)*		
Teachers Involved	Prof S M S Lee, Statistics & Actuarial Science		
Course Objectives	This course covers the advanced theory of point estimation, interval estimation and hypothesis testing. Using a mathematically-oriented approach, the course provides a solid and rigorous treatment of inferential problems, statistical methodologies and the underlying concepts and theory. It is suitable in particular for students intending to further their studies or to develop a career in statistical research.		
Course Contents & Topics	1. Paradigms of inference: frequentist, Bayesian, Fisherian. 2. Decision theory: loss function; risk; decision rule; admissibility; minimaxity; unbiasedness; Bayes' rule. 3. Estimation theory: exponential families; likelihood; sufficiency; minimal sufficiency; ancillarity; completeness; UMVU estimators; information inequality; large-sample theory of maximum likelihood estimation. 4. Hypothesis testing: uniformly most powerful test; monotone likelihood ratio; unbiasedness; UMP unbiased test; maximal invariants; most powerful invariant test; large-sample theory of likelihood ratio.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Form a panoramic view of classical developments in mathematical statistics. 2. Gain thorough insight into the essentials of statistical inference. 3. Build a solid foundation for future research studies in statistics and related areas.		

Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course
Course Teaching & Learning Activities	

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting	

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	Berry, D. A. & Lindgren, B. W.: Statistics: Theory and Methods (Duxbury, Belmont, 1996) Bickel, P. J. & Doksum, K. A.: Mathematical Statistics: Basic Ideas and Selected Topics, Vol. 1 (Prentice Hall, Upper Saddle River, N.J., 2001) Freund, J. E.: Mathematical Statistics (Prentice Hall, Englewood Cliffs, N.J., 1992) Hogg, R. V. & Craig, A. T.: Introduction to Mathematical Statistics (Macmillan, New York, 1989) Pace, L. & Salvan, A.: Principles of Statistical Inference: from a neo-Fisherian perspective (World Scientific: Singapore, 1997). Young, G.A. & Smith, R.L.: Essentials of Statistical Inference (Cambridge University Press: Cambridge, 2005).
Course Website	moodle.hku.hk

STAT3603 Probability modelling (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K S Chong, Statistics & Actuarial Science *(kschong@hku.hk)*		
Teachers Involved	Dr K S Chong, Statistics & Actuarial Science		
Course Objectives	This is an introductory course in probability modelling. A range of important topics in stochastic processes will be discussed.		
Course Contents & Topics	Introduction to probability theory, conditional probability and expectation, Markov chains, random walk models, classification of states in a Markov chain, calculation of limiting probabilities and mean time spent in transient states, Poisson process, distribution of interarrival time and waiting time, conditional distribution of the arrival time, Brownian Motion, hitting time and maximum variable, geometric Brownian motion, the Black-Scholes option pricing formula, Gaussian bridge, and stationary processes. Birth-and-death process, branching process and renewal process may also be covered (if time permits).		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Apply the conditioning method to calculate the mean and probability. 2. Understand the essentials of Markov chains, the Poisson process, and Brownian motion. 3. Understand how stochastic models can be applied to the study of real-life phenomena.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2601 Probability and statistics I; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3903 Stochastic models, or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		

Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures: 36 Tutorials: 12 Reading / Self study: 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination: 75 Assignments — Coursework (assignments, tutorials, and a class test): 25
Required/recommended reading and online materials	S. M. Ross: Introduction to Probability Models (9th edition)
Course Website	moodle.hku.hk

STAT3604 Design and analysis of experiments (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Li, Statistics & Actuarial Science *(gdli@hku.hk)*		
Teachers Involved	Dr G Li, Statistics & Actuarial Science		
Course Objectives	Scientific research often requires proper design and analysis of experiments. This course aims to introduce the basic principles of experimental design; to explain the concepts and to develop the statistical skills in model-based analysis of experiment.		
Course Contents & Topics	Basic principles and guidelines for designing experiments. Analysis for experiments with a single factor, randomised block, crossed and nested factorial structure. Balanced incomplete factorial experiments. Latin squares and related designs. Fixed/random effects models.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Develop a conceptual understanding of experimental design. 2. Acquire the fundamental statistical tools of experimental design and the understanding to use them appropriately. 3. Select appropriate experimental designs for different problems. 4. Select appropriate statistical model and to know how to validate the model.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3611 Computer-aided data analysis		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and		

		presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials

D. C. Montgomery: Design and Analysis of Experiments (Wiley, 1997, 4th edition)
D. R. Cox: Planning of Experiments (Wiley, 1958)
A. L. Edwards: Experimental Design in Psychological Research (Harper & Row, 1985, 5th edition)
G. A. Ferguson & Y. Takane: Statistical Analysis in Psychology and Education (McGraw Hill, 1989, 6th edition)
C. R. Hicks & K. V. Turner Jr.: Fundamental Concepts in the Design of Experiments (Oxford, 1999, 5th edition)
P. W. M. John: Statistical Design and Analysis of Experiments (Macmillan, 1971)
R. L. Moson, R. F. Gungst, & J. L. Hess: Statistical Design and Analysis of Experiments (Wiley, 1989)

Course Website	moodle.hku.hk

STAT3605 Quality control and management (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K S Chong, Statistics & Actuarial Science *(kschong@hku.hk)*		
Teachers Involved	Dr K S Chong, Statistics & Actuarial Science		
Course Objectives	The successful control of quality in production is a matter of primary importance to a company's prosperity. This course provides an overview of quality compromise which involves both the producer and the consumer. It presents a variety of statistical solutions including control charts, acceptance and sequential sampling plans, reliability, and life-testing. Contemporary quality management systems such as total quality control, zero defects, six-sigma, and ISO-9000 will be introduced. The student is brought to the frontier of today's quality control and management ideas.		
Course Contents & Topics	Probability distributions and their applications, process variability, sampling and statistical inference. Process control, variables and attributes control charts. Operating characteristic curves. Single, double and sequential sampling plans. MIL-STD-105D and Dodge-Romig schemes. Variables sampling. Reliability and life-testing. Elementary experimental designs. Management of quality control, total quality control, zero defects, six-sigma, and ISO 9000.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Appreciate the practicality of statistical concepts and methods in general. 2. Understand how certain specific statistical methods can benefit various production situations. 3. Know the traditional and modern systems of quality management.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science or STAT3902 Statistical models		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply

		knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials

A. J. Duncan: Quality Control and Industrial Statistics (Irwin, Homewoor, 1986, 5th edition)
D. C. Montgomery: Statistical Quality Control (New York: Wiley, 1996, 3rd edition)
J. Banks: Principles of Quality Control (New York: Wiley, 1989)
E. L. Grant & R. S. Leavenworth: Statistical Quality Control (New York: McGraw-Hill, 1988, 6th edition)
I. D. Hill: An Introduction to Sampling Inspection (The Institute of Engineering Inspection Monograph, London, 1961)
G. B. Wetherill: Sampling Inspection and Quality Control (London: Methuen, 1977, 2nd edition)
A. V. Feigenbaum: Total Quality Control (New York: McGraw-Hill, 1983, 3rd edition)

Course Website: moodle.hku.hk

STAT3606 Business logistics (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Ms O T K Choi, Statistics & Actuarial Science *(ochoi@saas.hku.hk)*		
Teachers Involved	Ms O T K Choi, Statistics & Actuarial Science		
Course Objectives	Modern business corporations are increasingly using logistics as a management tool, for example, in capital budgeting problems, production planning, scheduling, transportations and deciding location for a new factory. This course addresses the business applications of logistics.		
Course Contents & Topics	In this course, students will apply the analytical skills with aid of computer techniques in solving the business logistic problems. Topics include optimization techniques applied in allocation of resources, financial planning, transportation, assignment, inventory control and queuing problems.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Solve linear programming with Graphical approach, Simplex method and hands-on Excel Solving function. 2. Set-up and solve network flow problems using least-cost approach, MODI method and Vogel's approximation. 3. Understand decision theory and its applications. 4. Evaluate the cost and effectiveness of service systems.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed MATH3901 Operations research I, or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching

& Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures — 36 Tutorials — 12 Reading / Self study — 100

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials and a test)	25

Required/recommended reading and online materials	B. Render, R. Stair, M. Hanna: Quantitative Analysis for Management, 10th edition, Pearson Wayne L. Winston: Operations Research, 4th edition, Thomson Learning H. Taha: An Introduction to Operations Research, 8th edition, Pearson International Edition F.S. Hillier and G, J. Lieberman: An Introduction to Operations Research Robert F.V. Anderson, Holt, Rinehart and Winston: Introduction to Linear Algebra
Course Website	moodle.hku.hk

STAT3607 Statistics in clinical medicine and bio-medical research (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Yin, Statistics & Actuarial Science *(gyin@hku.hk)*		
Teachers Involved	Dr G Yin, Statistics & Actuarial Science		
Course Objectives	In clinical research, medical data are often observed which motivates the application of statistical methodology to the clinical observational and decision-making process. Also, statistical problems often arise from clinical trial designs. It involves phase I, II, III and IV clinical trial designs, both Bayesian and frequentist approaches, sample size and power calculation. No knowledge in biology or medicine is assumed; the course provides the necessary biomedical background when the statistical problems are introduced.		
Course Contents & Topics	The contents of the course include contingency tables, regression models, survival analysis, categorical data analysis, Bayesian designs, dose-finding methods, sample size and power calculation, phase I, II and III trial designs, hypothesis testing, adaptive designs.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the basic concepts in medical statistics. 2. Design clinical trials and compute sample sizes. 3. Conduct statistical inference and apply regression models. 4. Solve medical problems by using various statistical tests.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final

			course grade (%)
	Examination		75
	Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	NIL J. Aitchison, J. W. Kay & I. J. Lauder: Statistical Concepts and Applications in Clinical Medicine (Chapman & Hall/CRC, 2004) J. Aitchison & J. Dunsmore: Statistical Prediction Analysis (Cambridge University Press, 1976) P. Armitage: Statistical Methods in Medical Research (Oxford: Blackwell, 1971) P. Armitage: Sequential Medical Trials (Oxford: Blackwell, 1975, 2nd edition) D. Altman: Practical Statistics for Medical Research (London: Chapman & Hall, 1991) N. E. Breslow & N. E. Day: Statistical Methods in Cancer Research Volume 1 - The analysis of case-control studies (Lyon: IARC, 1980) D. R. Cox & E. J. Snell: The Analysis of Binary Data (London: Chapman and Hall, 1989, 2nd edition) D. R. Cox & D. V. Hinkley: Theoretical Statistics (London: Chapman and Hall, 1974)
Course Website	moodle.hku.hk
Additional Course Information	Other references: E. K. Harris & A. Albert: Survivorship Analysis for Clinical Studies (New York: Marcel Dekker, 1991) B. Jones & M. G. Kenward: Design and Analysis of Cross-Over Trials (London: Chapman and Hall, 1990) B. J. T. Morgan: Analysis of Quantal Response Data (London: Chapman and Hall, 1992) S. J. Pocock: Clinical Trials. A Practical Approach (Chickestes: John Wiley & Sons, 1991) P. McCullagh & J. A. Nelder: Generalised Linear Models (London: Chapman and Hall, 1989, 2nd edition)

STAT3608 Statistical genetics (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof T W K Fung, Statistics & Actuarial Science *(wingfung@hku.hk)*		
Teachers Involved	Prof T W K Fung, Statistics & Actuarial Science		
Course Objectives	This course aims to provide students with a fundamental knowledge of DNA profiling in human identification and genetic epidemiology in gene mapping and to understand how statistical theory and methods are applied to solve forensic DNA and genetic problems.		
Course Contents & Topics	This course will cover the following topics: background of genetics; Mendelian inheritance; Hardy-Weinberg equilibrium; linkage equilibrium; chi-square test; likelihood ratio test; exact test; match probability; paternity testing and kinship analysis; DNA mixed stain; relatedness; population structure; gene mapping; parametric linkage analysis; non-parametric linkage analysis; linkage disequilibrium; association designs; case-control analysis; family-based association study; quantitative traits.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the fundamental principles in statistical DNA forensics and genetic epidemiology. 2. Know the usefulness and possible limitations of statistical methodology in human identification and gene mapping. 3. Provide statistical solutions to specific problems in the field.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 75 Assignments / Coursework (assignments, tutorials, and a class test) / 25
Required/recommended reading and online materials	Klug, W. S. and Cummings, M. R.: Essentials of Genetics (Prentice Hall, 2002) Ott, J.: Analysis of Human Genetic Linkage (The Johns Hopkins University Press, 1999, 3rd ed.) Ziegler, A. and Konig, I.R.: A Statistical Approach to Genetic Epidemiology (Wiley-VCH, 2006) Evett, I. W. and Weir, B. S.: Interpreting DNA Evidence (Sinauer Associates, Inc. Publishers, 1998) Fung, W. K. and Hu, Y. Q.: Statistical DNA Forensics: Theory, Methods and Computation (Wiley, Sussex, 2008)
Course Website	moodle.hku.hk

STAT3609 The statistics of investment risk (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	Dr K P Wat, Statistics & Actuarial Science		
Course Objectives	Most investments involve some risk. The decision to invest or not is usually made against a background of uncertainty. Whilst prediction of the future is difficult, there are statistical modelling techniques which provide a rational framework for investment decisions, particularly those relating to stock markets and the markets for interest rates, commodities and currencies. Building upon research, both in Hong Kong and abroad, this course presents the prevailing statistical theories for prices and price-change in these vital markets.		
Course Contents & Topics	Concept of market efficiency, mean-variance portfolio theory, capital asset pricing model, arbitrage pricing theory, portfolio performance and management, behavioural finance.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Measure risk and return of portfolios. 2. Apply different approaches in constructing optimal investment portfolios. 3. Explain and apply asset pricing models and evaluate investment performance. 4. Explain the concepts of market efficiency and apply appropriate testing procedures to assess different forms of market efficiency.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3611 Computer-aided data analysis or STAT3614 Business forecasting; and Not for students who have passed in FINA2320 Investments and portfolio analysis, or have already enrolled in this course; and Not for BSc(Actuarial Science) students		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 70 Assignments / Coursework (assignments, tutorials and class test(s)) / 30		

Required/recommended reading and online materials	Bodie, Z., Kane, A., and Marcus, A. J. (2011). Investments and Portfolio Management (9th Edition). McGraw-Hill. Elton, E. J., Gruber, M. J., Brown, S. J., and Goetzmann, W. N. (2011). Modern Portfolio Theory and Investment Analysis (8th Edition). John Wiley. Luenberger, D. G. (2009). Investment Science (International Edition). Oxford University Press. Defusco, R. A., McLeavey, D. W., Pinto, J. E., and Runkle D. E. (2007). Quantitative Investment Analysis, CFA Institute Investment Series (2nd Edition). New Jersey: Wiley. Fabozzi, F. J., Focardi, S. M., and Kolm, P. N. (2006). Financial Modelling of the Equity Market: From CAPM to Cointegration. New Jersey: Wiley. Ruppert, D. (2004). Statistics and Finance: An Introduction. New York: Springer. Young, L. S. F. and Chiang, R. C. P. (1997). The Hong Kong Securities Industry (3rd Edition). The Stock Exchange of Hong Kong.
Course Website	moodle.hku.hk

STAT3610 Risk management and insurance (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr R W L Wong, Statistics & Actuarial Science *(rwong@hku.hk)*		
Teachers Involved	Dr R W L Wong, Statistics & Actuarial Science		
Course Objectives	To provide knowledge on basic risk and its management, as well as basic financial planning though insurance products, to students. To allow students to understand the statistical, financial and legal principles underlying the techniques for managing the insurable risks faced by organisations and individuals. Aiming at students who have minimal background in quantitative methods, it involves very minimal quantitative calculations and is not available to students majoring in Actuarial Science.		
Course Contents & Topics	The course introduces and explains: - risk in our society, - insurance and risk, - introduction to risk management, - fundamental legal principles, and analysis of insurance contracts, - life insurance, their contractual provisions, - individual health insurance coverages.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the general risks faced by organisations and individuals and the generic risk management principle. 2. Demonstrate knowledge and understanding of the underlying financial and legal principles of the insurance industry. 3. Understand how risk can be managed through insurance. 4. Compare and contrast different types of commercial and personal insurance products. 5. Plan for and arrange their own personal insurance needs.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science. (Not available to Actuarial Science students)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			
Course Type	Lecture-based course		

Grade Descriptors:

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final

			course grade (%)
	Examination		75
	Assignments	Coursework (assignments, tutorials, and a class test)	25
Required/recommended reading and online materials	Rejda, G. E.: Principles of Risk Management and Insurance (Pearson Addison Wesley, 10th edition) Trieschmann, J., Hoyt, R. E. and Sommer, D.: Risk Management and Insurance (South-Western, 2005, 12th edition)		
Course Website	moodle.hku.hk		

STAT3612 Data mining (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	48
Course Co-ordinator	Dr G C S Lui, Statistics & Actuarial Science *(csglui@hku.hk)*		
Teachers Involved	Dr G C S Lui, Statistics & Actuarial Science		
Course Objectives	With an explosion in information technology in the past decade, vast amounts of data appear in a variety of fields such as finance, customer relations management and medicine. The challenge of understanding these data with the aim of creating new knowledge and finding new relationships among data attributes has led to the innovative usage of statistical methodologies and development of new ones. In this process, a new area called data mining is spawned. This course provides a comprehensive and practical coverage of essential data mining concepts and statistical models for data mining.		
Course Contents & Topics	Data pre-processing, association rules, classification and regression trees, neural networks and cluster analysis.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Implement data mining process summarized in the acronym SEMMA which stands for sampling, exploring, modifying, modeling, and assessing data. 2. Understand and apply a wide range of data mining techniques, and recognize their characteristics, strengths and weaknesses. 3. Be proficient with the leading data mining software---SAS Enterprise Miner. 4. Identify and use appropriate data mining techniques for a data mining project, taking into account both the nature of the data to be mined and the goals of the user of the discovered knowledge. 5. Evaluate the quality of discovered knowledge, taking into account the requirements of the data mining task being solved and the goals of the user.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or (STAT1603 Introductory statistics and any University level 2 course) or STAT3902 Statistical models		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	No Exam
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Test		40
Assignments		30
Project reports		30

Required/recommended: Tan, P. N., Steinback, M. and Kumar, V.: Introduction to Data Mining (Addison Wesley, 2006)

reading and online materials	T. Hastie, R. Tibshirani, & J. Friedeman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (Springer, New York, 2008, 2nd edition) M. Kantardzic: Data Mining: Concepts, Models, Methods, and Algorithms (Wiley, 2003) A. Webb: Statistical Pattern Recognition (Wiley, 2002, 2nd edition) Shmueli, G., Patel, N.R. & Bruce, P.C.: Data Mining for Business intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner (Wiley, 2010, 2nd edition) J. Han & M. Kamber: Data Mining: Concepts and Techniques (Morgan Kaufmann, 2006, 2nd edition) Larose, D. T.: Discovering Knowledge in Data: An Introduction to Data Mining (Wiley, 2005)
Course Website	moodle.hku.hk
Additional Course Information	Other references: M. J. A. Berry & G. S. Linoff: Data Mining Techniques: For Marketing, Sales and Customer Relationship Management (Wiley, 2011, 3rd edition) Larose, D. T.: Data Mining: Methods and Models (Wiley, 2006)

STAT3613 Marketing engineering (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr C W Kwan, Statistics & Actuarial Science *(cwkwan@hku.hk)*		
Teachers Involved	Dr C W Kwan, Statistics & Actuarial Science		
Course Objectives	This course is designed to provide an overview and practical application of trends, technology and methodology used in the marketing survey process including problem formulation, survey design, data collection and analysis, and report writing. Special emphasis will be put on statistical techniques particularly for analysing marketing data including market segmentation, market response models, consumer preference analysis and conjoint analysis. Students will analyse a variety of marketing case studies.		
Course Contents & Topics	Marketing decision models, Market response models, Survey research, Statistical methods for segmentation, Statistical methods for positioning, Statistical methods for new product design		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Develop the hands-on skills of curve fitting and analyzing data with SAS procedures including PROC MODEL, PROC NLP, PROC CLUSTER, PROC FASTCLUS, PROC FACTOR, PROC MDS, PROC PRINQUAL, PROC TRANSREG, PROC LOGISTIC, PROC MDC, PROC DISCRIM and PROC CALIS. 2. Understand marketing decision models. 3. Understand cluster analysis, factor analysis, multidimensional scaling, correspondence analysis, conjoint analysis, choice models, confirmatory factor analysis, and discriminant analysis in market segmentation, positioning and new product design.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in BIOL2102 Biostatistics or (ECON1280 Analysis of economic data and any University level 2 course) or (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 100		
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 50 Assignments / Coursework (assignments, a class test and a group project) / 50		

Required/recommended reading and online materials	Lattin J., Carroll J.D. and Green P.E.: Analysing multivariate data (Thomson) Malhotra, Naresh: Marketing Research: An Applied Orientation (Pearson, 2010, 6th ed.) Johnson R., Wichern D.: Applied Multivariate Statistical Analysis (Prentice Hall, 5th ed.) Lilien G.L. and Rangaswamy A.: Marketing Engineering (Prentice Hall, 2003, 2nd ed.)
Course Website	moodle.hku.hk

STAT3615 Practical mathematics for investment (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E C K Cheung, Statistics & Actuarial Science *(eckc@hku.hk)*		
Teachers Involved	Dr E C K Cheung, Statistics & Actuarial Science		
Course Objectives	The main focus of this course is built on the concepts on financial mathematics. Practical applications of these concepts are also considered.		
Course Contents & Topics	This course covers: simple and compound interest; annuities certain; discounted cash flow analysis; amortization schedules and sinking funds; yield rates; bonds and related securities; practical applications such as real estate mortgage, short sales and term structure of interest rates.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Solve practical problems relating to annuities certain, simple and compound interest. 2. Carry out discounted cash flow analysis. 3. Apply amortization schedules and sinking funds to the practical problems such as real estate mortgage.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in (STAT1601 Elementary statistical methods and any University level 2 course) or (STAT1602 Business statistics and any University level 2 course) or STAT2601 Probability and statistics I or (STAT1603 Introductory statistics and any University level 2 course) or STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in STAT2902 Financial mathematics, or have already enrolled in this course.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		75
	Assignments	Coursework (assignments, tutorials, and a class test)	25
Required/recommended reading and online materials	Kellison, S. G.: The Theory of Interest (Irwin: Illinois, 2008, 3rd edition) Broverman, S. A.: Mathematics of Investment and Credit (ACTEX Publications - Mad River Books: Connecticut, 2004, 3rd edition)		
Course Website	moodle.hku.hk		

STAT3617 Sample survey methods (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Ms O T K Choi, Statistics & Actuarial Science *(ochoi@hku.hk)*		

Teachers Involved	Ms O T K Choi, Statistics & Actuarial Science Prof F W H Ho, Statistics & Actuarial Science
Course Objectives	This course will cover design and implementation of sample surveys and analysis of statistical data thus obtained. Survey design includes overall survey design, design of sampling schemes and questionnaires, etc. Sampling methods include sample size determination, sampling and non-sampling errors and biases, methods of estimation of parameters from survey data, imputation for missing data etc.
Course Contents & Topics	Topics may include: survey design and planning; survey quality and ethics; implementation matters like management of survey staff, respondent relationship and logistical issues ; and sampling methods like simple random sampling, systematic sampling, stratified sampling, cluster sampling, multi-stage sampling, sample size determination, post-stratification, ratio and regression estimation methods, non-sampling errors and biases, non-responses and missing data. Case studies of major applications of sample survey methods in the public and private sectors, with some examples on the analysis and application of the statistical data thus produced, will be discussed.
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Demonstrate knowledge and understanding of the various steps to be taken in the planning and implementation of sample surveys. 2. Design different sample schemes and select the most efficient and suitable one for adoption for a particular survey - make statistical inference on parameters based on a sample. 3. Judge whether the statistics presented by other survey takers are trustworthy.
Pre-requisites (and Co-requisites and Impermissible combination)	Pass or already enrolled in: BIOL2102 Biostatistics, or (ECON1280 Analysis of economic data and any University level 2 course), or (STAT1601 Elementary statistical methods and any University level 2 course), or (STAT1602 Business statistics and any University level 2 course), or STAT2601 Probability and statistics I, or (STAT1603 Introductory statistics and any University level 2 course), or STAT2901 Probability and statistics: foundations of actuarial science.

Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	S. L. Lohr: Sampling: Design and Analysis, 2nd edition (Duxbury Press, 2010) R. L. Scheaffer, W. Mendenhall, & R. L. Ott: Elementary Survey Sampling (Duxbury Press, 2011, 7th edition) W. G. Cochran: Sampling Techniques (John Wiley & Sons Ltd., 1997) R. M. Groves, F. J. Fowler, M. P. Couper, J. M. Lepkowski, E. Singer, R. Tourangeau: Survey Methodology (John Wiley & Sons Ltd., 2009, 2nd edition) L. Kish: Survey Sampling (John Wiley & Sons, Inc., 1995) P. Salant & D. A. Dillman: How to Conduct Your Own Survey (John Wiley & Sons, Inc., 1994)
Course Website	moodle.hku.hk

STAT3901 Life contingencies (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E C K Cheung, Statistics & Actuarial Science *(eckc@hku.hk)*		
Teachers Involved	Dr E C K Cheung, Statistics & Actuarial Science		

Course Objectives	The major objectives of this course are to integrate life contingencies into a full probabilistic framework. The time-until-death random variable is the basic building block by which models for life insurances, designed to reduce the financial impact of the random event of untimely death, are developed. This course introduces the concepts of life contingencies and the basic mathematical skills for modelling life insurance products.
Course Contents & Topics	Key topics include: survival distributions; life table functions; select and ultimate tables; life insurance models; life annuity models; benefit premiums; benefit reserves.
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Calculate the expected values, variances, probabilities, and percentiles for survival-time random variables. 2. Define the continuous survival-time random variable that arises from the discrete survival-time random variable using some assumptions for fractional ages. 3. Define present-value-of-benefit random variables defined on survival-time random variables. 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. 5. Calculate benefit premiums for life insurances and annuities. 6. Calculate benefit reserves for life insurances and annuities. 7. Cover part of Exam MLC of the Society of Actuaries.
Pre-requisites (and Co-requisites and Impermissible combination)	(Pass in STAT2601 Probability and statistics II and STAT3615 Practical mathematics for investment) or (Pass in STAT2902 Financial mathematics and (Pass in STAT3902 Statistical models, or already enrolled in this course)) or (Pass in STAT2602 Probability and statistics II and STAT2902 Financial mathematics)
Offer in 2013 - 2014	Y 1st sem — **Examination** Dec
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Course Type	Lecture-based course
Course Website	moodle.hku.hk

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials

Bowers. N.L., Gerber, H.U., Hickman, J.C., Jones, D.A. & Nesbitt, C.J.: Actuarial Mathematics (1997, 2nd edition), Itasca, Illinois: The Society of Actuaries
Dickson, C.M.D., Hardy, M.R., and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge: Cambridge University Press, 2009)

STAT3902 Statistical models (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Tian, Statistics & Actuarial Science *(gltian@hku.hk)*		
Teachers Involved	Dr G Tian, Statistics & Actuarial Science		
Course Objectives	This course is on the basis of 'STAT2901 Probability and Statistics: Foundation of Actuarial Science'. It will further study the concepts and methods of statistics. The course will lay emphasis on the estimation and hypothesis testing, the two major areas of statistical inference. Through the study of this course, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of data.		

Course Contents & Topics	Distribution and density of function of random variables; Order statistics, central limit theorem, Maximum likelihood estimator (MLE), moment estimator, Bayesian estimator, properties of estimators, limiting properties of MLE; Confidence interval estimations for normal mean, the difference of two normal means, normal variance, the ratio of two normal variances, and large-sample confidence intervals; Power function, Neyman-Pearson Lemma, likelihood ratio test, and goodness of fit test.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the importance of sufficient statistic(s) in data reduction and statistical inferences such as point estimation, confidence interval estimation, and testing hypothesis. 2. Derive maximum likelihood estimators of parameters to calculate maximum likelihood estimates. 3. Locate pivotal quantity to construct confidence intervals of parameters. 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 combination)	Pass in STAT2901 Probability and statistics: foundations of actuarial science; and For BSc(Actuarial Science) students only.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	see below		
Course Type	Lecture-based course		

Grade Descriptors:

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	Miller I. & Miller M.: John E. Freund's Mathematical Statistics with Applications (Pearson Education International, 2004, 7th edition) Hogg R. V., McKean J. W. & Craig A. T.: Introduction to Mathematical Statistics (Pearson Prentice Hall, 2005, 6th edition) Arnold S. F.: Mathematical Statistics (Prentice-Hall, 1990) Larsen R. J. and Marx M. L.: An Introduction to Mathematical Statistics and Its Appications (Pearson International Edition, 4th edition)
Course Website	moodle.hku.hk

STAT3903 Stochastic models (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K S Chong, Statistics & Actuarial Science *(kschong@hku.hk)*		
Teachers Involved	Dr K S Chong, Statistics & Actuarial Science		
Course Objectives	This is an introductory course in probability modelling. A range of important topics in stochastic processes will be discussed.		
Course Contents & Topics	Introduction to probability theory, Conditional probability and expectation, Markov chains, random walk models, classification of states in a Markov chain, calculation of limiting probabilities and mean time spent in transient states, Poisson process, distribution of interarrival time and waiting time, conditional distribution of the arrival time, Brownian Motion, hitting time and maxium variable, geometric Brownian motion, the Black-Scholes option pricing formula, Gaussian bridge, and stationary processes. Birth-and-death process, branching process and renewal process may also be covered (if time permits).		
Course Learning Outcomes	On successful completion of the course, students should be able to:		

	1. Apply the conditioning method to calculate the mean and probability. 2. Understand the essentials of Markov chains, the Poisson process, and Brownian motion. 3. Understand how stochastic models can be applied to the study of real-life phenomena.
Pre-requisites (and Co-requisites and Impermissible combination)	For BSc(Actuarial Science) students only; and Pass in STAT2901 Probability and statistics: foundations of actuarial science; and Not for students who have passed in MATH3603 Probability theory, or have already enrolled in this course; and Not for students who have passed in STAT3603 Probability modelling, or have already enrolled in this course.
Offer in 2013 - 2014	Y 2nd sem — **Examination**: May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	S. M. Ross: Introduction to Probability Models (9th edition)
Course Website	moodle.hku.hk

STAT3904 Corporate finance for actuarial science (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J K Woo, Statistics & Actuarial Science *(jkwoo@hku.hk)*		
Teachers Involved	Dr J K Woo, Statistics & Actuarial Science		
Course Objectives	This course is designed for actuarial science students to receive VEE-Corporate Finance from Society of Actuaries. The objective of this course is to introduce students to the fundamental principles of corporate finance. The course will provide students with a systematic framework within which to evaluate investment and financing decisions for corporations.		
Course Contents & Topics	The first part of the course will give an introduction to corporate finance and provide an overview of some topics covered in STAT2902 and STAT3615. These include: financial markets and companies; present value and net present value, financial instruments and dividends derivatives market, no-arbitrage pricing theory, binomial model and Black-Scholes option pricing formula. The main part of the course will focus on some important topics of corporate finance including: capital structure and dividend policy, financial leverage and firm value, market efficiency, risk and return, investment decision using Markowitz mean variance analysis, CAPM, long term financing, measures and performance assessment of financial performance using various measures.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the factors to be considered by a company when deciding on its capital structure and dividend policy, and also the impact of financial leverage and long/short term financing policies on capital structure. 2. Calculate the value of bonds and stocks. 3. Assess financial performance using various measures. 4. Understand the mean-variance portfolio theory.		
Pre-requisites	[(Pass in ACCT1101 Introduction to accounting and STAT2902 Financial mathematics) or (Pass in		

(and Co-requisites and Impermissible combination)	STAT3610 Risk management and insurance and STAT3615 Practical mathematics for investment)]; and Not for students who have passed in FINA1310 Corporate finance, or have already enrolled in this course.
Offer in 2013 - 2014	Y 2nd sem — **Examination** May
Offer in 2014 - 2015	Y
Course Grade	A+ to F
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail** Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course
Course Teaching & Learning Activities	**Activities** / **Details** / **No. of Hours** Lectures / / 36 Tutorials / / 12 Reading / Self study / / 100
Assessment Methods and Weighting	**Methods** / **Details** / **Weighting in final course grade (%)** Examination / / 75 Assignments / Coursework (assignments, tutorials, and a class test) / 25
Required/recommended reading and online materials	Brealey R. A., Myers S. C. and Allen, F.: Principles of Corporate Finance (2006, 8th edition) Ross, S. A., Westerfield, R. W. and Jaffe, J.: Corporate Finance (2005, 7th edition) Luenberger, D. G.: Investment Science (1998)
Course Website	moodle.hku.hk

STAT3905 Introduction to financial derivatives (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E C K Cheung, Statistics & Actuarial Science *(eckc@hku.hk)*		
Teachers Involved	Dr E C K Cheung, Statistics & Actuarial Science		
Course Objectives	This course aims at providing an understanding of the fundamental concepts of financial derivatives. Emphases are on basic trading and hedging strategies, and the concept of no-arbitrage.		
Course Contents & Topics	Derivatives; short-selling; forward contracts; call options; put options; equity-linked CD; spreads and collars; hedging; financial forwards and futures; commodity swaps; interest rate swaps; put-call parity.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Define and recognize the definitions of terms commonly used in derivatives markets. 2. Evaluate the payoff and profit of basic derivative contracts, including forwards, futures, options, and swaps. 3. Explain how derivative securities can be used as tools to manage financial risk.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2902 Financial mathematics; and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course		

	C	learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course	

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	McDonald, R. L.: Derivatives Markets (Addison Wesley, 2006, 2nd edition), Chapters 1-5, 8.
Course Website	moodle.hku.hk

STAT3906 Risk theory I (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K C Cheung, Statistics & Actuarial Science *(kccg@hku.hk)*		
Teachers Involved	Dr K C Cheung, Statistics & Actuarial Science		
Course Objectives	Risk theory is one of the main topics in actuarial science. Risk theory is the applications of statistical models and stochastic processes to insurance problems such as the premium calculation, ruin probability, etc.		
Course Contents & Topics	Severity models; frequency models; collective risk models;coverage modifications; ruin theory; risk measures; simulation.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the individual risk model and the collective risk model, evaluate the distribution and expectation of the total claim amounts. 2. Estimate the premium of a policyholder and the total claim amounts using the information of the claim amounts made in previous years. 3. Calculate some commonly used risk measures and explain their use and limitation. 4. Apply simulation methods within the context of actuarial models.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3903 Stochastic models, or already enrolled in this course; or Pass in STAT3603 Probability modelling or MATH3603 Probability theory		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36

	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		75
	Assignments	Coursework (assignments, tutorials, and a class test)	25
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., 2008, 3rd edition)		
Course Website	moodle.hku.hk		

STAT3907 Linear models and forecasting (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E A L Li, Statistics & Actuarial Science *(ericli@saas.hku.hk)*		
Teachers Involved	Dr E A L Li, Statistics & Actuarial Science		
Course Objectives	This course deals with applied statistical methods of linear models and investigates various forecasting procedures through using linear models and time series analysis.		
Course Contents & Topics	Regression and multiple linear regression; predicting; generalised linear model; time series models including autoregressive, moving average, autoregressive-moving average and integrated models; forecasting.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Fit a simple or multiple linear regression model to real data. 2. Do ANOVA analysis. 3. Fit a generalized linear model to the real data. 4. Identify and fit a suitable AR, MA or ARMA model to real data. 5. Perform residual analysis. 6. Do forecasting with these fitted models.		
Pre-requisites (and Co-requisites and Impermissible combination)	(Pass in STAT2602 Probability and statistics II; or Pass in STAT3902 Statistical models, or already enrolled in this course); and For BSc(Actuarial Science) students only; and Not for students who have passed in STAT3600 Linear statistical analysis, or have already enrolled in this course; and Not for students who have passed in STAT4601 Time-series analysis, or have already enrolled in this course; and Not for students who have passed in ECON2280 Introductory econometrics, or have already enrolled in this course.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors		
	A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based course	

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		75

	Assignments	Coursework (assignments, tutorials, and a class test)	25
Required/recommended reading and online materials	R. S. Pindyck & D. L. Rubinfeld: Econometric Models and Economic Forecasts (McGraw-Hill, 1998, 4th edition) Abraham & J. Ledolter: Statistical Methods for Forecasting (John Wiley & Sons, 2005, 2nd edition) G. E. P. Box, G. M. Jenkins & G. Reinsel: Time Series Analysis: Forecasting and Control (Prentice Hall, 1994, 3rd edition)		
Course Website	moodle.hku.hk		

STAT3908 Credibility theory and loss distributions (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K C Cheung, Statistics & Actuarial Science *(kccg@hku.hk)*		
Teachers Involved	Dr K C Cheung, Statistics & Actuarial Science		
Course Objectives	Credibility is an example of a statistical estimate. The idea of credibility is very useful in premium calculation. Insurance loss varies according to the business nature, what distribution should be used to fit a particular loss is both of theoretical interest and practical importance. This course covers important actuarial and statistical methods.		
Course Contents & Topics	Limited fluctuation approach; Buhlman's approach; Bayesian approach; empirical Bayes parameter estimations; construction and selection of parametric models; properties and estimation of failure time and loss distributions, determination of the acceptability of a fitted model; comparison of fitted models; simulation of both discrete and continuous random variables.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility. 2. Perform Bayesian analysis using both discrete and continuous models. 3. Apply Buhlmann and Buhlmann-Straub models and understand the relationship of these to the Bayesian model. 4. Apply conjugate priors in Bayesian analysis and in particular the Poisson-gamma model. 5. Apply empirical Bayesian methods in the nonparametric and semiparametric cases. 6. Construct and select empirical models. 7. Determine the acceptability of a fitted model and/or compare models.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models or STAT3906 Risk theory		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			
	A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		75
	Assignments	Coursework (assignments, tutorials, and a class test)	25
Required/recommended reading and online materials	Klugman S. A., Panjer H. H., & Willmot G. E.: Loss Models: From Data to Decisions (John Wiley & Sons, 2008, 3rd edition), Chapters 12-16, 20-21.		

Course Website	moodle.hku.hk

STAT3909 Advanced life contingencies (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr L F K Ng, Statistics & Actuarial Science *(flouisng@hku.hk)*		
Teachers Involved	Dr L F K Ng, Statistics & Actuarial Science		
Course Objectives	The objective of the course is to prepare students for the Non-traditional Life Insurance parts of the Models for Life Contingencies (MLC) course of the Society of Actuaries. Emphasis will be placed on applications of more advanced theories of life contingencies.		
Course Contents & Topics	This course is a continuation of the materials covered in STAT3901. We shall discuss the following topics: Loss-at-issue random variable, Benefit premium, Future loss random variable, Benefit reserves, Cash flow projection, Present value of cash flows, Expenses and asset shares.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. extend concepts presented for traditional life insurances and annuities to non-interest sensitive insurances. 2. model cash flows for basic Non-traditional life insurances and calculate contract level values. 3. model cash flows of basic Non-traditional life insurance and calculate the present values of the cash flows. 4. calculate benefit policy values for basic Non-traditional life insurances. 5. incorporate expenses in gross premium and calculate policy values based on the gross premium for life insurances and annuities.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3901 Life contingencies, or already enrolled in this course; and For BSc(Actuarial Science) students only.		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organizational and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials	Bowers, N. L. et al.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd ed) Dickson, C.M.D., Hardy, M.R. and Waters, H.R.: Actuarial Mathematics for Life Contingent Risks (Cambridge University Press, 2009)
Course Website	moodle.hku.hk

STAT3910 Financial economics I (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof H L Yang, Statistics & Actuarial Science *(hlyang@hku.hk)*		
Teachers Involved	Prof H L Yang, Statistics & Actuarial Science Dr J Song, Statistics & Actuarial Science		

Course Objectives	This course is a basic course on the derivative market. The course covers discrete-time models, volatility estimation, and Black-Scholes formula and its variations. The course also includes some basic risk management ideas and methods. This course and STAT3911 will cover all the concepts, principles and techniques needed for SoA Exam MFE.		
Course Contents & Topics	Option market; European and American options; conditional expectation and discrete-time martingale, discrete-time option-pricing theory; binomial model and its Greeks; true probabilities vs. risk-neutral probabilities; estimating volatility; the Black-Scholes formula; implied volatility; Greeks again; market-making and hedging; exotic options.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Calculate option price using binomial tree. 2. Understand the risk neutral probability. 3. Understand basic probability theory, include probability space, random variable, conditional probability, conditional expectation and discrete time martingale. 4. Understand the Black-Scholes formula and its assumptions, the Greek letters, option elasticity, and implied volatility. 5. Understand the hedging strategies and portfolio, market-maker risk, self-financing portfolio. 6. Understand exotic options.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT2602 Probability and statistics II or STAT3902 Statistical models; and Not for students who have passed in STAT4603 Derivatives and risk management, or have already enrolled in this course; and Not for students who have passed in FINA2322 Derivatives, or have already enrolled in this course.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A**: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B**: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C**: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D**: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. **Fail**: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		75
	Assignments	Coursework (assignments, tutorials, and a class test)	25
Required/recommended reading and online materials	Robert L. McDonald: Derivatives Markets (2nd edition), Chapters 10-14 Lecture notes on conditional expectations and martingale John Hull: Options, Futures and other Derivatives (2008, 7th edition)		
Course Website	moodle.hku.hk		

STAT3911 Financial economics II (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof H L Yang, Statistics & Actuarial Science *(hlyang@hku.hk)*		
Teachers Involved	Prof H L Yang, Statistics & Actuarial Science		
Course Objectives	This course is an advanced course on the option pricing theory. The course covers Black-Scholes equation and stochastic calculus, and interest models. This course and STAT3910 will cover all the concepts, principles and techniques needed for SoA Exam MFE.		
Course Contents & Topics	Brownian motion; introduction to stochastic calculus; arithmetic and geometric Brownian motion; Ito formula; Sharpe ratio and risk premium; Black-Scholes equation; risk-neutral stock-price process and option pricing; option's elasticity and volatility; Vasicek, Cox-Ingersoll-Ross, and Black-Derman-Toy models; delta-hedging for bonds and the Sharpe-ratio equality constraint; Black's model; options on zero-coupon bonds; interest-rate caps and caplets.		

Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand Brownian motion and its properties. 2. Understand the Ito calculus and Ito formula. 3. Understand the Black-Scholes model and option pricing theory. 4. Understand the delta hedging and some basic risk management methods. 5. Understand some basic interest rate models.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in MATH3603 Probability theory or STAT3903 Stochastic models or STAT3910 Financial economics I		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

Grade	Descriptor
A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

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

STAT3951 Advanced contingencies (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Prof H L Yang, Statistics & Actuarial Science *(hlyang@hku.hk)*		
Teachers Involved	Prof H L Yang, Statistics & Actuarial Science		
Course Objectives	This course serves as a continuation of STAT3909 and extends the coverage to include statistical models and actuarial techniques used in the field of life and non-life insurance. [Students are reminded that this course is a part of the requirement for the exemption from the Subject CT5 Contingencies of the Faculty and Institute of Actuaries, U.K.]		
Course Contents & Topics	Topic covers further analysis of the multiple state model; unit-linked contracts; cost of guarantees and options; applications of actuarial techniques to a wide range of insurance problems. Equity linked insurance products and valuation of these products.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Value the cashflow contingent upon more than one risk. 2. Understand how to use multiple decrement tables to evaluate expected cashflows dependent upon more than one decrement. 3. Understand the equity linked insurance products, and the method and idea of valuing the equity linked insurance products. 4. Understand the Esscher transform and its application to option pricing. 5. Value equity-linked death benefits.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3909 Advanced life contingencies; and For BSc(Actuarial Science) students only.		

Offer in 2013 - 2014	Y 1st sem	**Examination**	Dec
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
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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 (%)
Examination		75
Assignments	Coursework (assignments, tutorials, and a class test)	25

Required/recommended reading and online materials

Bowers, N. L. et al.: Actuarial Mathematics (Society of Actuaries, 1997, 2nd ed.)
Dickson, D. et al.: Actuarial Mathematics for Life Contingent Risks (Cambridge, 2010)
CT5 Contingencies Core Technical Core Reading (Institute of Actuaries, 2010)
Lecture note on equity linked insurance products.

Course Website: moodle.hku.hk

STAT3953 Fundamentals of actuarial practice (6 credits)

STAT3953 Fundamentals of actuarial practice (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr L F K Ng, Statistics & Actuarial Science *(flouisng@hku.hk)*		
Teachers Involved	Dr L F K Ng, Statistics & Actuarial Science		
Course Objectives	This course teaches students about the business environment and exposes them to practical real-world situations using the actuarial control cycle as a framework.		
Course Contents & Topics	This course provides an overview on selected materials relating to the following topics: Role of the Professional Actuary, External Forces, Risk in Actuarial Problems, Design and Pricing of Actuarial Solutions. Emphasis will be placed on applications to various financial security programmes including individual life insurance, group insurance, social security plans, retirement plans, investment funds and property & casualty insurance.		

Course Learning Outcomes

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

1. Provide introductory description of financial security systems, common actuarial techniques and practical experiences.
2. Describe actuarial practices, principles, approaches, methods, commonalities, problems and solutions.
3. Explain actuarial practices across the traditional areas of practice.
4. Explain actuarial practices as applied directly on behalf of financial security system providers or as a consultant to those providers.
5. Apply actuarial skills in nontraditional and emerging areas of practice.
6. Provide context for the specific mathematical and technical skills developed in the basic actuarial courses.
7. Prepare for the professional role as an Associate of the Society of Actuaries.

Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3909 Advanced life contingencies; and For BSc(Actuarial Science) students only.		
Offer in 2013 - 2014	Y 1st sem	**Examination**	No Exam
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original

		thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
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Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Project work		12

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)
Test	in-class quizzes	25
Project reports	written report	50
Presentation	oral presentation	25

Required/recommended reading and online materials	Klugman, S.: Understanding Actuarial Practice (Society of Actuaries, 2012) Bellis, C., Klugman, S., Shepherd, J., and Lyon, R.: Understanding Actuarial Management: The Actuarial Control Cycle (Institute of Actuaries of Australia, 2010, 2nd ed.) Brown, R.L. and Gottlieb, L.R.: Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance (ACTEX Publications, Inc., 2007, 3rd ed.) Segal, S.: Corporate Value of Enterprise Risk Management: The Next Step in Business Management (Wiley, 2011)
Course Website	moodle.hku.hk

STAT3955 Survival analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr E K F Lam, Statistics & Actuarial Science *(hrntlkf@hku.hk)*		
Teachers Involved	Dr E K F Lam, Statistics & Actuarial Science		
Course Objectives	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 the course, students should be able to: 1. Acquire a clear understanding of the nature of failure time data or survival data, a generalization of the concept of death and life. 2. Perform estimation for some commonly used survival models under different types of censoring mechanisms. 3. Analyze survival data using the Cox's semiparametric proportional hazards model. 4. Extend the Cox's model to a multivariate setup to accommodate multivariate survival data.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3902 Statistical models, or already enrolled in this course; or Pass in STAT3600 Linear statistical analysis or STAT3901 Life contingencies		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.

<table>
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<tr><td>C</td><td>Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.</td></tr>
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<tr><td>Course Type</td><td>Lecture-based course</td></tr>
<tr><td>Course Teaching
& Learning Activities</td><td><table>
<tr><th>Activities</th><th>Details</th><th>No. of Hours</th></tr>
<tr><td>Lectures</td><td></td><td>36</td></tr>
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<tr><td>Reading / Self study</td><td></td><td>100</td></tr>
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<tr><td>Assessment Methods
and Weighting</td><td><table>
<tr><th>Methods</th><th>Details</th><th>Weighting in final course grade (%)</th></tr>
<tr><td>Examination</td><td></td><td>75</td></tr>
<tr><td>Assignments</td><td>Coursework (assignments, tutorials, and a class test)</td><td>25</td></tr>
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<tr><td>Required/recommended reading
and online materials</td><td>Cox, D. R. and Oakes, D.: Analysis of Survival Data (Chapman and Hall, 1984)
Hosmer, D. W. and Lemeshow, S.: Applied Survival Analysis: Regression Modeling of Time to Event Data (Wiley, 1999)
Klein, J. P. and Moeschberger, M. L.: Survival Analysis: Techniques for Censored and Truncated Data (Springer Verlag, New York, 2005, 2nd ed.)</td></tr>
<tr><td>Course Website</td><td>moodle.hku.hk</td></tr>
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<table>
<tr><td colspan="2">STAT3956 Pension funds and pension mathematics (6 credits)</td><td>Academic Year</td><td>2013</td></tr>
<tr><td>Offering Department</td><td>Statistics & Actuarial Science</td><td>Quota</td><td>---</td></tr>
<tr><td>Course Co-ordinator</td><td colspan="3">Dr G Ma, Statistics & Actuarial Science (gma328@hku.hk)</td></tr>
<tr><td>Teachers Involved</td><td colspan="3">Dr G Ma, Statistics & Actuarial Science</td></tr>
<tr><td>Course Objectives</td><td colspan="3">This course covers the basics of pension plan design and pension fund management, as well as the fundamentals of pension plan valuations using different actuarial cost methods. The students will be introduced to the application of actuarial valuation techniques to the funding and accounting of pension plans.</td></tr>
<tr><td>Course Contents & Topics</td><td colspan="3">The following topics will be covered: Fundamentals of private pension plans; pricing and valuation of pension obligations; actuarial cost methods and their effects on cost patterns; selection of actuarial assumptions; principles of asset and liability management.</td></tr>
<tr><td>Course Learning Outcomes</td><td colspan="3">On successful completion of the course, students should be able to:

1. Calculate the pension benefits in accordance with the provisions of a pension plan.
2. Calculate the normal cost and actuarial liabilities using different actuarial cost methods.
3. Perform gain and loss analyses for pension valuations.
4. Select appropriate assumptions and methods for funding or accounting purposes.
5. Interpret the valuation results presented in actuarial valuation reports.
6. Develop models for asset and liability projections.</td></tr>
<tr><td>Pre-requisites
(and Co-requisites and
Impermissible combination)</td><td colspan="3">Pass in STAT3909 Advanced life contingencies</td></tr>
<tr><td>Offer in 2013 - 2014</td><td>Y 1st sem</td><td>Examination</td><td>Dec</td></tr>
<tr><td>Offer in 2014 - 2015</td><td colspan="3">Y</td></tr>
<tr><td>Course Grade</td><td colspan="3">A+ to F</td></tr>
<tr><td>Grade Descriptors</td><td colspan="3"><table>
<tr><td>A</td><td>Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.</td></tr>
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<tr><td>Fail</td><td>Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr>
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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 (%)** Examination — 75 Assignments — Coursework (assignments, tutorials, and a class test) — 25
Required/recommended reading and online materials	Arthur W. Anderson: Pension Mathematics for Actuaries (2006, 3rd edition). McGill, D.M., Brown, K.N. , Haley, J.J., Schieber, S.J.: Fundamentals of Private Pensions (2010, 9th Edition) William H. Aitken: Problem-Solving Approach to Pension Funding and Valuation, (2nd edition). Morneau Sobeco: Handbook of Canadian Pension & Benefit Plans (2008, 14th Edition) Actuarial Standard of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations Actuarial Standard of Practice No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations Actuarial Standard of Practice No. 44, Selection and Use of Asset Valuation Methods for Pension Valuations David Farber, ASA, EA, MSPA, William Farrimond, FSPA, Duane Mayer, MSPA, George Matray, FSPA: Actuarial Cost Methods-A Review, 3rd Edition, 1999, ACTEX Publications 2001 Supplement to Actuarial Cost Methods-A Review, ACTEX Publications
Course Website	moodle.hku.hk

STAT4602 Multivariate data analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	3
Course Co-ordinator	Prof T W K Fung, Statistics & Actuarial Science *(wingfung@hku.hk)*		
Teachers Involved	Prof T W K Fung, Statistics & Actuarial Science		
Course Objectives	In many designed experiments or observational studies, the researchers are dealing with multivariate data, where each observation is a set of measurements taken on the same individual. These measurements are often correlated. The correlation prevents the use of univariate statistics to draw inferences. This course develops the statistical methods for analysing multivariate data through examples in various fields of application and hands-on experience with the statistical software SAS.		
Course Contents & Topics	Problems with multivariate data. Multivariate normality and transforms. Mean structure for one sample. Tests of covariance matrix. Correlations: Simple, partial, multiple and canonical. Multivariate regression. Principal components analysis. Factor analysis. Problems for means of several samples. Multivariate analysis of variance. Discriminant analysis. Classification. Multivariate linear model.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 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. 2. Compare the mean structure of multiple measurements for one or more than one population(s) by multivariate MANOVA and profile analysis. 3. Investigate the linear associations among one/two group(s) of variables by multiple, partial and canonical correlation and multivariate regression. 4. Explore the latent linear structure of a data set with multiple measurements by principal components analysis and factor analysis. 5. Classify observations of a population with one or more than one measurements by discriminant analysis.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3600 Linear statistical analysis or STAT3907 Linear models and forecasting		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors	**A** — Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. **B** — Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. **C** — Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. **D** — Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning		

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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 (%)
Examination		50
Assignments	Coursework (assignments, tutorials, and a class test)	50

Required/recommended reading and online materials	Johnson, R. A. & Wichern, D. W.: Applied Multivariate Statistical Analysis (Prentice-Hall, 2007, 6th edition) Mardia K. V., Kent J. T., and Bibby J. M.: Multivariate Analysis (Academic Press, 1979) Seber G. A. F.: Multivariate Observations (John Wiley & Sons, 1984) Morrison D. F.: Multivariate Statistical Methods (McGraw-Hill, 1990, 3rd ed.) Hair J. F., Anderson R. E., Tatham R. L., & Black W. C.: Multivariate Data Analysis (Prentice-Hall, 2006, 6th edition) Srivastava M. S.: Methods of Multivariate Statistics (John Wiley and Sons, 2002) SAS Manuals on-line: Use the HELP button.
Course Website	moodle.hku.hk

STAT4606 Risk management and basel accords in banking and finance (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Mr P K Y Pang, Statistics & Actuarial Science *(the_pang@yahoo.com)*		
Teachers Involved	Mr P K Y Pang, Statistics & Actuarial Science		
Course Objectives	To provide comprehensive knowledge and in-depth understanding of risk management in the banking and finance industry to students. The focus is on management with basic measurement fundamentals only forming a part of the course. Accordingly, minimal background in quantitative methods will be required and involved. However, basic financial product (eg: bonds, swaps, options) knowledge will be required.		
Course Contents & Topics	The course introduces and explains: - the importance of risk management, - risk nature and types, - design and establishment of a risk management framework, - the importance of people and corporate culture, - the complete risk management cycle, - measurement and management of credit, market and operational risks, - Basel accords and the capital treatments for credit, market and operational risks, - key developments (eg: Know-Your-Customers, Anti-Money laundering, Sarbanes-Oxley) and critical issues, - the importance of business continuity, - design and implementation of a business continuity plan.		
Course Learning Outcomes	On successful completion of the course, students should be able to (in the context of banking and finance industry): 1. Understand the importance, nature and classification of various risks, and the risk management principle and cycle. 2. Design and establish a risk management framework. 3. Demonstrate knowledge and understanding of the measurements of credit, market and operational risks. 4. Explain and describe Basel accords and its capital treatments for credit, market and operational risks. 5. Appreciate the importance of, design and implement a business continuity plan.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass in STAT3910 Financial economics I or STAT3905 Introduction to financial derivatives or STAT3618 Derivatives and risk management or (FINA2322 Derivatives and any University level 3 course).		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		

Grade Descriptors

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.

	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100
Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**
	Examination		60
	Assignments	Coursework (assignments, tutorials, and a class test)	40
Required/recommended reading and online materials	Crouhy, M., Galai, D. and Mark, R.: The Essentials of Risk Management (McGraw-Hill, 2006) Jorion, P.: Financial Risk Manager Handbook + Test Bank: FRM part I/Part II (Wiley, 2010, 6th edition) Hull, J. C.: Risk Management and Financial Institutions (Pearson Higher Education, 2010, 2nd edition) Gallati, R.: Risk Management and Capital Adequacy (McGrawHill, 2003)		
Course Website	moodle.hku.hk		
Additional Course Information	This course is previously called STAT2320 as the prerequisite changed to STAT3303.		

STAT4607 Credit risk analysis (6 credits)		**Academic Year**	**2013**
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	Dr K P Wat, Statistics & Actuarial Science		
Course Objectives	For a commercial bank, credit risk has always been the most significant. It is the risk of default on debt, swap, or other counterparty instruments. Credit risk may also result from a change in the value of an asset resulting from a change in the counterparty's creditworthiness. This course will introduce students to quantitative models for measuring and managing credit risk. It also aims to provide students with an understanding of the credit risk methodology used in the financial industry and the regulatory framework in which the credit risk models operate.		
Course Contents & Topics	Probabilities of default, recovery rates and loss given default; Default and credit migration; credit scoring and internal rating models; Credit portfolio models such as CreditMetrics, CreditPortfolioView, KMV and actuarial approach; Credit derivatives.		
Course Learning Outcomes	On successful completion of the course, students should be able to: 1. Understand the Basel requirements for credit risk. 2. Estimate credit scores using the logit model. 3. Understand and estimate default probabilities using various approaches such as Moody's, the KMV and the mortality method. 4. Understand the concept of credit value-at-risk and the CreditMetrics approach. 5. Estimate default correlations. 6. Assess rating systems.		
Pre-requisites (and Co-requisites and Impermissible combination)	Pass or already enrolled in STAT3910 Financial economics I or STAT3618 Derivatives and risk management or STAT3905 Introduction to financial derivatives or (FINA2322 Derivatives and any University level 3 course)		
Offer in 2013 - 2014	Y 2nd sem	**Examination**	May
Offer in 2014 - 2015	Y		
Course Grade	A+ to F		
Grade Descriptors			

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.

	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**
Examination		60
Assignments	Coursework (assignments, tutorials, and class test(s))	40

Required/recommended reading and online materials

Resti, A. and Sironi, A. (2007). Risk Management and Shareholders' Value in Banking: From Risk Measurement Models to Capital Allocation Policies. Wiley.
Saunders, A. and Allen, L. (2010). Credit Risk Measurement In and Out of the Financial Crisis: New Approaches to Value at Risk and Other Paradigms (3rd Edition). Wiley.
Loffler, G. and Posch, P. N. (2010). Credit Risk Modeling using Excel and VBA (2nd Edition). Wiley.
Jorion, P. (2011). Financial Risk Manager Handbook (6th Edition). Wiley.
Crouhy, M., Galai, D., and Mark, R. (2001). Risk Management. McGraw-Hill.
Hull, J. C. (2012). Risk Management and Financial Institutions (3rd Edition). Wiley.
Hull, J. C. (2012). Options, Futures, and Other Derivatives (8th Edition). Prentice Hall.
Gujarati, D. N. and Porter, D. C. (2009). Basic Econometrics (5th Edition). McGraw-Hill.
Bohn, J. R. and Stein, R. M. (2009). Active Credit Portfolio Management in Practice. Wiley.
Smithson, C. W. (2003). Credit Portfolio Management. Wiley.

Course Website	moodle.hku.hk

SECTION IX

Degree Regulations

SCIENCE

SECTION IX Degree Regulations

REGULATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE (BSc)

These regulations apply to students admitted under the 4-year ‘2012 curriculum’ to the BSc degree curriculum in the academic year 2012-2013 and thereafter.
(See also General Regulations and Regulations for First Degree Curricula)

Definitions

Sc1[1] For the purpose of these regulations and the syllabuses for the BSc degree, unless the context otherwise requires:

“Science course” means any course offered by the Faculty of Science, and the Department of Biochemistry.

“Advanced Science course” means any level 3, 4 or above course offered by the Faculty of Science and the Department of Biochemistry.

“Course” means a course of study, with a credit value expressed as a number of credit-units as specified in the syllabuses for a degree curriculum.

“Syllabus” means courses taught by departments, centres, and schools, offered under a degree curriculum.

“Credits” or “credit-units” means the value assigned to each course to indicate its study load relative to the total study load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classroom, and includes contact hours and time spent on assessment tasks and examinations. Candidates who satisfactorily complete courses with a credit value earn the credits assigned to these courses.

Admission to the BSc degree

Sc2 To be eligible for admission to the BSc degree, candidates shall:

(a) comply with the General Regulations;

(b) comply with the Regulations for First Degree Curricula; and

(c) satisfy all the requirements of the curriculum in accordance with these regulations and the syllabuses.

Period of study

Sc3 The curriculum for the BSc degree shall normally require eight semesters of full-time study, extending over not fewer than four academic years, and shall include any assessment to be held during and/or at the end of each semester. Candidates shall not in any case be permitted to extend their studies beyond the maximum period of registration of six academic years.

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[1] This regulation should be read in conjunction with UG1 of the Regulations for First Degree Curricula.

Selection of courses

Sc4 Candidates shall select their courses in accordance with these regulations and the guidelines specified in the syllabuses before the beginning of each semester. Any change to the selection of courses shall be made only during the add/drop period of the semester in which the course begins, and such changes shall not be reflected in the transcript of the candidate. Requests for changes after the designated add/drop period of the semester shall not be considered.

Curriculum requirements and progression in curriculum

Sc5

(a) Candidates shall satisfy the requirements prescribed in UG5 of the Regulations of First Degree Curricula.

(b) Candidates shall take not fewer than 240 credits, in the manner specified in these regulations and the syllabuses.

(c) Candidates shall take at least 96 credits of Science courses including all required courses of the major programme of the BSc degree curriculum.

(d) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of outstanding credits required to complete the curriculum requirements may be fewer than 24 credits.

(e) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load of 288 credits for the normative period of study specified in the curriculum regulations, save as provided for under Sc5(f).

(f) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load of 432 credits for the maximum period of registration specified in the curriculum regulations.

(g) Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The number of transferred credits will be recorded on the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

(h) Candidates shall be recommended for discontinuation of their studies if they have:

  (i) failed to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters, or

  (ii) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester), or

  (iii) exceeded the maximum period of registration specified in Sc3,

  unless otherwise permitted by the Board of the Faculty.

Advanced standing

Sc6 Advanced standing may be granted to candidates in recognition of studies completed successfully in an approved institution of higher education elsewhere in accordance with UG2 of the Regulations for First Degree Curricula. Credits granted for advanced standing will be recorded on the transcript of the candidate but shall not be included in the calculation of the GPA.

Assessment

Sc7

(a) Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

(b) Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate’s absence from any examination. Any supplementary examination shall be part of that academic year’s examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

(c) Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

(d) Candidates are required to make up for failed courses in the following manner: repeating the failed course by undergoing instruction and satisfying the assessment, or for elective courses, taking another course in lieu and satisfying the assessment requirements.

(e) There shall be no appeal against the results of examinations and all other forms of assessment.

Award of BSc Degree

Sc8 To be eligible for the award of the BSc degree, candidates shall have:

(a) satisfied the requirements in UG5 of the Regulations for First Degree Curricula;

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

Honours classification

Sc9 .

(a) Honours classifications shall be awarded in five divisions: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, and Pass. The classification of honours shall be determined by the Board of Examiners for the Degree of BSc in accordance with the following Cumulative GPA scores, with all courses taken (including failed courses, but not including courses approved by the Senate graded as ‘Pass’, ‘Fail’ or ‘Distinction’) carrying equal weighting:

Class of honours	*CGPA range*
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate's Cumulative GPA and the Board of Examiners for the Degree of BSc may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Cumulative GPA falls below the range stipulated in UG9(a) of the higher classification by not more than 0.05 Grade Point.

(c) A list of candidates who have successfully completed all degree requirements shall be posted on Faculty noticeboards.

REGULATIONS FOR FIRST DEGREE CURRICULA[1]

These regulations are applicable to candidates admitted under the 4-year '2012 curriculum' to the first year of first degree curricula in 2012-13 and thereafter.

(See also General Regulations)

UG 1 Definitions:

For the purpose of regulations and syllabuses for all first degree curricula unless otherwise defined —

An 'academic year' comprises two semesters, the first semester to commence in September and end in December, and the second semester to commence in January and end in May/June, on dates as prescribed by the Senate. It includes, normally at the end of each semester, a period during which candidates are assessed. For some curricula, a 'summer semester' may be organized in addition to the normal two semesters. Clinical curricula have extended semesters.

A 'summer semester' normally comprises seven to eight weeks of intensive timetabled teaching and assessment to commence four weeks after the end of the second semester assessment period, and to conclude about one week before the start of the next academic year.

The 'maximum period of registration' is equivalent to a period which is 150% of the curriculum's normative period of study as specified in the degree regulations, provided that where this results in a residual fraction of an academic year, the fractional period shall be extended to one full academic year.

'Degree curriculum' means the entire study requirements for the award of an undergraduate degree.

'Major programme' means the study requirements, including a capstone experience, for a single major area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 72 credits nor more than 96 credits, as prescribed in the syllabuses for a degree curriculum.

'Minor programme' means the study requirements for a single minor area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 36 credits nor more than 48 credits, as prescribed in the syllabuses for a degree curriculum.

'Professional core' refers to the study requirements, including a capstone experience, prescribed in the regulations and syllabuses for disciplinary studies in degree curricula which are not structured as major/minor programmes for reasons relating to professional qualification and/or accreditation.

'Course' means a course of study, with a credit value expressed as a number of credit-units as specified in the syllabuses for a degree curriculum.

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[1] These regulations are applicable to candidates admitted under the 4-year '2012 curriculum' (the 2-year curriculum in respect of the BSc(IM), the 5-year curriculum in respect of the BA&BEd(LangEd), BEd&BSc, BEd&BSocSc, BSc(Sp&HearSc), and BNurs, and the 6-year curriculum in respect of the BChinMed, BDS and MBBS) to the first year of first degree curricula in 2012-13 and thereafter. Reference in these regulations to the powers of the Boards of Faculties shall be applicable to Senate Boards of Studies which administer first degree curricula.

(Please refer to the Calendar for 2011-12 for the Regulations for First Degree Curricula applicable to cohorts admitted in 2010-11 and 2011-12 under the 3-year '2010 curriculum'.)

'Disciplinary elective course' or 'Disciplinary Elective' means any course offered in the same major or minor programme or the professional core which can be taken by candidates to fulfill the curriculum requirements as specified in the syllabuses of the degree curriculum.

'Elective course' or 'Elective' means any course offered within the same or another curriculum, other than compulsory courses in the candidate's degree curriculum, that can be taken by the candidate in order to complete the credit requirements of the degree curriculum.

'Capstone experience' refers to one or more courses within the major programme or professional core which are approved by the Board of the Faculty for the purpose of integrating knowledge and skills acquired, and which are prescribed in the syllabuses of the degree curriculum.

'Syllabus' means courses taught by departments, centres, and schools, offered under a degree curriculum.

'Prerequisite' means a course or a group of courses which candidates must have completed successfully or a requirement which candidates must have fulfilled before being permitted to take the course in question.

'Corequisite' means a course which candidates must take in conjunction with the course in question.

'Credits' or 'credit-units' means the value assigned to each course to indicate its study load relative to the total study load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classroom, and includes contact hours and time spent on assessment tasks and examinations. Candidates who satisfactorily complete courses with a credit value earn the credits assigned to these courses.

'Grade Points' are standardized measurements of candidates' academic achievement in courses taken to satisfy the requirements of the degree curriculum and are expressed as a scale prescribed in these regulations.

'Grade Point Average' is a numerical measure of a candidate's academic achievement over a specified period of time. Each course attempted (including each failed course) is assigned a numerical value, with all courses carrying equal weighting. This numerical value is the product of grade points earned for the course and the credit value of that course. The 'Grade Point Average' is the sum of these numerical values divided by the total number of credits attempted:

$$GPA = \frac{\sum_{i} \textit{Course Grade Point} \times \textit{Course Credit Value}}{\sum_{i} \textit{Course Credit Value}}$$

(where 'i' stands for all passed and failed courses taken by the student over a specified period)

'Semester Grade Point Average' or 'Semester GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given semester.

'Year Grade Point Average' or 'Year GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given academic year.

'Cumulative Grade Point Average' or 'Cumulative GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) at the time of calculation.

'Assessment' refers to judgment about the quality and extent to which a student has achieved the stated learning objectives or learning outcomes. It includes all types of assessment activities which allow for such a judgment to be made. For the purpose of interpreting the relevant provisions of the Ordinance and the Statutes and where appropriate, reference to 'examination' or 'examinations' in the Ordinance and the Statutes shall include and cover all forms of 'assessment' and its related processes.

A 'transcript' refers to a transcript of the record of study of a candidate, issued by the Registry of the University.

UG 2 Advanced standing:

Advanced standing may be granted to candidates in recognition of studies completed successfully elsewhere before admission to the University. Candidates who are awarded Advanced Standing will not be granted any further credit transfer for those studies for which Advanced Standing has been granted. The amount of credits to be granted for advanced standing shall be determined by the Board of the Faculty, in accordance with the following principles:

(a) at least half the number of credits of the degree curriculum normally required for award of the degree shall be accumulated through study at this University or from transfer of credits for courses completed at other institutions in accordance with Regulation UG 4(d); and

(b) in accordance with Statute III.5 and notwithstanding the granting of advanced and/or transfer credits, a minimum of two semesters of study at this University shall be required before a candidate is considered for the award of a first degree, other than a degree in medicine or surgery, and a minimum of four semesters of study at this University shall be required before a candidate is considered for a first degree in medicine or surgery.

Credits granted for advanced standing shall not normally be included in the calculation of the GPA unless permitted by the Board of the Faculty but will be recorded on the transcript of the candidate.

UG 3 Period of study:

The period of study of the curriculum shall be specified in the regulations governing the degree. To be eligible for award of the degree, a candidate shall fulfill all curriculum requirements within the maximum period of registration, unless otherwise permitted or required by the Board of the Faculty.

UG 4 Progression in curriculum:

(a) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of outstanding credits required to complete the curriculum requirements is fewer than 24 credits.

(b) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load for the normative period of study specified in the curriculum regulations, save as provided for under UG4(c).

(c) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load for the maximum period of registration specified in the curriculum regulations.

(d) Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The number of transferred credits may be recorded in the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

(e) Unless otherwise permitted by the Board of the Faculty, candidates shall be recommended for discontinuation of their studies if they have:

(i) failed to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters, or
(ii) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester), or
(iii) exceeded the maximum period of registration specified in the regulations of the degree.

UG 5 Requirements for graduation:

To be eligible for admission to the degree, candidates shall fulfill the following requirements in addition to the requirements prescribed in the regulations and syllabuses governing the degree curriculum within the maximum period of registration:

(a) successful completion of 12 credits in English language enhancement, including 6 credits in Core University English[2] and 6 credits in an English in the Discipline course[3];
(b) successful completion of 6 credits in Chinese language enhancement[4];
(c) successful completion of 36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and not more than two courses from each Area of Inquiry[5] during the whole period of study; and
(d) successful completion of a capstone experience as specified in the syllabuses of the degree curriculum.

UG 6 Exemption:

Candidates may be exempted, with or without special conditions attached, from any of the requirements in UG 5 by the Senate in exceptional circumstances. Candidates who are so

[2] Candidates who have achieved Level 5** in English Language in the Hong Kong Diploma of Secondary Education Examination, or equivalent, may at the discretion of the Faculty be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

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

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

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

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

[5] Candidates registered for double degree studies are required to successfully complete 24 credits of courses in the Common Core Curriculum, selecting one course from each Area of Inquiry, within the curriculum of the first degree, as appropriate.

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

UG 7 Assessment:

(a) Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

(b) Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

(c) Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

(d) Candidates are required to make up for failed courses in the following manner as prescribed in the curriculum regulations:

(i) undergoing re-assessment/re-examination in the failed course to be held no later than the end of the following semester (not including the summer semester); or

(ii) re-submitting failed coursework, without having to repeat the same course of instruction; or

(iii) repeating the failed course by undergoing instruction and satisfying the assessments; or

(iv) for elective courses, taking another course *in lieu* and satisfying the assessment requirements.

(e) There shall be no appeal against the results of examinations and all other forms of assessment.

UG 8 Grading system:

(a) The grades, their standards and the grade points for assessment shall be as follows[6]:

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

(b) Special permission may be given by Senate for courses in individual curricula to be graded as 'Pass', 'Fail' or 'Distinction'. Such courses will not be included in the calculation of the GPA.

6 UG 8 is not applicable to the BDS and MBBS curricula.

UG 9 Honours classifications:

(a) Honours classifications shall be awarded in five divisions[7]: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, and Pass. The classification of honours shall be determined by the Board of Examiners for the degree in accordance with the following Cumulative GPA scores, with all courses taken (including failed courses) carrying equal weighting:

Class of honours	*CGPA range*
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate’s Cumulative GPA and the Board of Examiners for the degree may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Cumulative GPA falls below the range stipulated in UG9(a) of the higher classification by not more than 0.05 Grade Point.

(c) A list of candidates who have successfully completed all degree requirements shall be posted on Faculty noticeboards.

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

SECTION X

Teaching Weeks

SCIENCE

SECTION X Teaching Weeks

Teaching Weeks 2013-2014 for Undergraduate and Taught Postgraduate Students

	SUN	MON	TUE	WED	THUR	FRI	SAT	Week No.	**FIRST SEMESTER: SEP 2 - DEC 23, 2013**
SEP-13	1	2	3	4	5	6	7	1	First Day of Teaching: Sep 2, 2013
	8	9	10	11	12	13	14	2	
	15	16	17	18	19	[20]	21	3	
	22	23	24	25	26	27	28	4	
	29	30							
OCT-13			[1]	2	3	4	5	5	
	6	7	8	9	10	11	12	6	
	13	[14]	15	16	17	18	19	7 (Reading)	Reading/Field Trip Week: Oct 14-19, 2013
	20	21	22	23	24	25	26	8	
	27	28	29	30	31			9	
NOV-13						1	2		
	3	4	5	6	7	8	9	10	
	10	11	12	13	14	15	16	11	
	17	18	19	20	21	22	23	12	
	24	25	26	27	28	29	30	13	Last Day of Teaching: Nov 30, 2013
DEC-13	1	2	3	4	5	6	7	14 (Revision)	Revision Period: Dec 2 - 6, 2013
	8	9	10	11	12	13	14	15	Assessment Period: Dec 7 - 23, 2013
	15	16	17	18	19	20	21	16	
	22	23	(24)	[25]	[26]	27	28	17	
	29	30	<31>					18 (Break)	
JAN-14				[1]	2	3	4		
	5	6	7	8	9	10	11	19 (Break)	
	12	13	14	15	16	17	18	20 (Break)	**SECOND SEMESTER: JAN 20 - MAY 31, 2014**
	19	20	21	22	23	24	25	21	First Day of Teaching: Jan 20, 2014
	26	27	28	29	<30>	[31]		22	Class Suspension Period for the Lunar New Year: Jan 31 - Feb 6, 2014
FEB-14							[1]		
	2	[3]	4	5	6	7	8	23 (Suspension)	
	9	10	11	12	13	14	15	24	
	16	17	18	19	20	21	22	25	
	23	24	25	26	27	28		26	
MAR-14							1		
	2	3	4	5	6	7	8	27	
	9	10	11	12	13	14	15	28 (Reading)	Reading/Field Trip Week: Mar 10 - 15, 2014
	16	17	18	19	20	21	22	29	
	23	24	25	26	27	28	29	30	
	30	31							
APR-14			1	2	3	4	[5]	31	
	6	7	8	9	10	11	12	32	
	13	14	15	16	17	[18]	[19]	33	
	20	[21]	22	23	24	25	26	34	
	27	28	29	30				35	
MAY-14					[1]	2	3		Last Day of Teaching: May 3, 2014
	4	5	[6]	7	8	9	10	36 (Revision)	Revision Period: May 5 - 10, 2014
	11	12	13	14	15	16	17	37	Assessment Period: May 12 - 31, 2014
	18	19	20	21	22	23	24	38	
	25	26	27	28	29	30	31	39	
JUN-14	1	[2]	3	4	5	6	7	40 (Break)	
	8	9	10	11	12	13	14	41 (Break)	
	15	16	17	18	19	20	21	42 (Break)	
	22	23	24	25	26	27	28	43 (Break)	**OPTIONAL SUMMER SEMESTER**
	29	30							JUN 30 - AUG 23, 2014
JUL-14			[1]	2	3	4	5	44	
	6	7	8	9	10	11	12	45	
	13	14	15	16	17	18	19	46	
	20	21	22	23	24	25	26	47	
	27	28	29	30	31			48	
AUG-14						1	2		
	3	4	5	6	7	8	9	49	
	10	11	12	13	14	15	16	50	
	17	18	19	20	21	22	23	51	
	24	25	26	27	28	29	30	52 (Break)	
	31							53 (Break)	

[ ] General Holiday

( ) University Holiday (Full Day)

< > University Holiday (afternoon only)

Reading/Field Trip Week

Revision Period

Class Suspension Period for the Lunar New Year

Assessment Period

Notes:

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

Useful contacts and websites

SCIENCE

Useful contacts and websites

Faculty of Science	Office Location	:	G12, Ground Floor, Chong Yuet Ming Physics Building
	Tel	:	2859 2683
	Fax	:	2858 4620
	Email	:	science@hku.hk
	Website	:	http://www.scifac.hku.hk/

(Please visit http://www.scifac.hku.hk/ for the latest updates of BSc courses, timetables, notices and forms)

Departments/School			
Biochemistry	Website	:	http://www.biochem.hku.hk/
Biological Sciences	Website	:	http://www.biosch.hku.hk/
Chemistry	Website	:	http://chem.hku.hk/
Earth Sciences	Website	:	http://www.earthsciences.hku.hk/
Mathematics	Website	:	http://www.math.hku.hk/
Physics	Website	:	http://www.physics.hku.hk/
Statistics & Actuarial Science	Website	:	http://www.saasweb.hku.hk/
Academic Advising Office	Tel	:	2219 4686
	Website	:	http://aao.hku.hk
Academic Services Office	Office Location	:	G4, Run Run Shaw Building
	Tel	:	2859 2433
	Fax	:	2540 1405
	Email	:	asoffice@hku.hk
	Website	:	http://www.asa.hku.hk/
Common Core courses	Website	:	http://commoncore.hku.hk
HKU Worldwide Undergraduate Exchange Programme	Website	:	http://www.als.hku.hk/admission/exchange/
Centre of Development and	Tel	:	2859 2305
Resources for Students (CEDARS)	Website	:	http://cedars.hku.hk
University Health Service	Tel	:	2859 2501 (General enquiries)
			2549 4686 (Medical appointments only)
	Website	:	http://www.uhs.hku.hk/
Plagiarism	Website	:	http://www.hku.hk/plagiarism