

FACULTY OF SCIENCE

Faculty Language Requirement

A. Applicable to S7 entrants

1. English

All Science Major students are required to complete one of the following courses:

- (1) Students with Grade “C” or above in HKALE AS “Use of English”

ELT2201	Listening and Response
ELT2392	International Stories
ELT2402	Academic Writing I
ELT2500	Improving Pronunciation
ELT2501	Effective Oral Communication I
ELT3102	English Through Nature and the Environment
ELT3103	English Through Current Affairs and Issues
ELT3112	Business Communication
ELT3402	Academic Writing II
ELT3501	Effective Oral Communication II
- (2) Students with Grade “D” or “E” in HKALE AS “Use of English”

ELT1106	Grammar for University Studies
ELT1110	Communication for Business Studies
- (3) Students not in possession of HKALE AS “Use of English” result
As determined by the Major Department/Programme in consultation with the English Language Teaching Unit.

2. Chinese

- (1) Science Major students are not required to take Chinese language course, except for those exempted from the Chinese language requirement for admission by the Senate.
- (2) Science Major students exempted from the Chinese language requirement for admission by the Senate are required to complete, as determined by the Faculty (by a small group convened by the Associate Pro-Vice-Chancellor and Registrar from 2006-07 onwards):
 - (i) 3 units of Chinese, OR
 - (ii) 3 or 6 units of Elementary Chinese, OR
 - (iii) 3 units of Chinese or Elementary Chinese and 3 units of Cantonese, OR
 - (iv) 3 units of Chinese or Elementary Chinese and 3 units of Putonghua.

The courses for selection are as follows:

Elementary Chinese

CHI1210	University Elementary Chinese
CHI1530	Oral Communication Skills

Chinese

CHI1510	Business Chinese
CHI1520	Chinese for Executives
CHI1586	Creative Writing in Chinese

Cantonese

CAN2013	Cantonese
CAN3013	Intermediate Cantonese

Putonghua

PTH1001	Putonghua I (1 unit)
PTH2001	Putonghua II (1 unit)
PTH2003	Elementary Putonghua
PTH3001	Putonghua III (1 unit)
PTH3031	Putonghua in Current Affairs (1 unit)

Note: The above courses are 3-unit courses, unless otherwise specified.

B. Applicable to S6 entrants**1. Expository Writing**

All Science Major students are required to complete *ELT2450 Expository Writing for Students of Science or ELT2456 Expository Writing (ERG/MED/SCI).

2. English

All Science Major students are required to complete two of the following courses:

- (1) Students with Grade “A” or “B” in HKCEE “English Language”

ELT2201	Listening and Response
ELT2392	International Stories
ELT2500	Improving Pronunciation
ELT2501	Effective Oral Communication I
ELT3102	English Through Nature and the Environment
ELT3103	English Through Current Affairs and Issues
ELT3112	Business Communication
ELT3402	Academic Writing II
ELT3501	Effective Oral Communication II
- (2) Students with Grade “C” or below in HKCEE “English Language”

ELT1106	Grammar for University Studies
ELT1110	Communication for Business Studies
- (3) Students not in possession of HKCEE “English Language” result (excluding Mainland students)

Students who do not have HKCEE “English Language” results are required to complete two English language courses as determined by the Major Department/ Programme in consultation with the English Language Teaching Unit.
- (4) Mainland students with a score of 130 or above (max. 150) in the Joint Entrance Examination - English and students with a score of 700 and above (max. 900) in the Guangdong/Hainan Entrance Examination - English

ELT2201	Listening and Response
ELT2392	International Stories
ELT2402	Academic Writing I
ELT2500	Improving Pronunciation
ELT2501	Effective Oral Communication I
ELT3102	English Through Nature and the Environment
ELT3103	English Through Current Affairs and Issues
ELT3112	Business Communication

* *Course offered in 2006-07 and before.*

- (5) Mainland students with a score of less than 130 (out of 150) in the Joint Entrance Examination - English and students with a score of less than 700 (out of 900) in the Guangdong/Hainan Entrance Examination - English
- | | |
|---------|-----------------------------------------------------------|
| ELT1106 | Grammar for University Studies |
| ELT1107 | English Improvement Strategies for Listening and Speaking |
| ELT1109 | Vocabulary Expansion Strategies |
| ELT1110 | Communication for Business Studies |

Where there are timetable clashes, students may enrol on other ELT courses, subject to the advice of the English Language Teaching Unit and approval of the Department/ Programme concerned.

3. Chinese

- (1) All Science Major students excluding those in (2) and (3) below, are required to complete one of the following courses:

CHI1510	Business Chinese
CHI1520	Chinese for Executives
CHI1586	Creative Writing in Chinese
CHI1814	Professional Chinese (ERG & SCI)

- (2) Mainland students not proficient in Cantonese are required to complete 3 units of Chinese and 3 units of Cantonese. The courses for selection are as follows:

Chinese

CHI1510	Business Chinese
CHI1520	Chinese for Executives
CHI1586	Creative Writing in Chinese
CHI1814	Professional Chinese (ERG & SCI)

Cantonese

CAN2013	Cantonese
CAN3013	Intermediate Cantonese

- (3) Science Major students exempted from the Chinese language requirement for admission by the Senate are required to complete, as determined by the Faculty (by a small group convened by the Associate Pro-Vice-Chancellor and Registrar from 2006-07 onwards), 6 to 12 units of Chinese, Elementary Chinese, Cantonese or Putonghua. The courses for selection are as follows:

Elementary Chinese

CHI1210	University Elementary Chinese
CHI1530	Oral Communication Skills

Chinese

CHI1510	Business Chinese
CHI1520	Chinese for Executives
CHI1586	Creative Writing in Chinese
CHI1814	Professional Chinese (ERG & SCI)

Cantonese

CAN2013	Cantonese
CAN3013	Intermediate Cantonese

Putonghua

PTH1001	Putonghua I (1 unit)
PTH2001	Putonghua II (1 unit)
PTH2003	Elementary Putonghua
PTH3001	Putonghua III (1 unit)
PTH3031	Putonghua in Current Affairs (1 unit)

Note: The above courses are 3-unit courses, unless otherwise specified.

Major / Faculty Requirement for S6 Entrants

A. Applicable to S6 entrants including non-local students/students admitted through the Early Admissions Scheme in 2005-06 and thereafter

Programme	Requirement
(1) Biochemistry	<p>A. <i>Applicable to students admitted in 2007-08 and thereafter</i></p> <p>(a) BCH1002</p> <p>(b) Two courses from BCH1000, BIO1002, 1010, CHM1070/1870, 1280, 2200, MAT1320, PHY1001, STA1310</p> <p>B. <i>Applicable to students admitted in 2005-06 and 2006-07</i></p> <p>(a) BCH1002 (Note 1)</p> <p>(b) CHM1070/1870 (Note 1)</p> <p>(c) BIO1002 (Note 2)</p> <p>Note 1: With the consent of the department, students may take a course from BIO1010, BCH1000, CHM2200, MAT1320, PHY1001 and STA1310 as a substitute to fulfill the requirement.</p> <p>Note 2: With the consent of the department, students may be exempted from BIO1002.</p>
(2) Biology	<p>(a) BIO1010</p> <p>(b) BIO1001 or CHM1070/1870</p> <p>(c) BIO1002 or one course from BCH1000, MAT1320 and STA1310</p>
(3) Chemistry	<p>(a) CHM1070/1870</p> <p>(b) one course from BIO1010, MAT1320 and PHY1001</p> <p>(c) one elective course (3 units)</p>
(4) Chinese Medicine	<p>(a) BIO1010</p> <p>(b) BIO1001 (Note 1)</p> <p>(c) BIO1002 (Note 2)</p> <p>Note 1: With the consent of the School, students may take the courses CHM1070/1870 as a substitute to fulfill the requirement.</p> <p>Note 2: With the consent of the School, students may take the course STA1310 as a substitute to fulfill the requirement.</p>
(5) Environmental Science	<p>(a) CHM1070/1870</p> <p>(b) BIO1001 (Note 1)</p> <p>(c) BIO1010 (Note 2)</p> <p>Note 1: With the consent of the programme, students may be exempted from BIO1001.</p> <p>Note 2: Students who have taken BIO1001 may take one course from BIO1002, PHY1001 and STA1310 as a substitute to fulfill the requirement.</p>

(6) Food and Nutritional Sciences	Three courses from (BIO1002 or 1010), (BCH1000 or 1002), CHM1070/1870, MAT1320 and STA1310
(7) Mathematics	(a) MAT1010 (b) one course from PHY1001, STA1310 and CSC1110 (c) one elective course (3 units)
(8) Molecular Biotechnology	With the consent of the programme, students may take three of the following courses: BCH1000, 1002, BIO1002, 1010, CHM1070/1870, 2200, MAT1320, PHY1001, STA1310, an elective course (3 units).
(9) Physics	(a) PHY1001 (Note 1) (b) MAT1010 (Note 2) (c) one course from BIO1010, CHM1070/1870 and STA1310 Note 1: With the consent of the department, students may be exempted from PHY1001. Note 2: With the consent of the department, students may take another course offered by Mathematics Department to substitute for MAT1010.
(10) Risk Management Science	(a) STA1310 (b) MAT1010 or 1320 (c) one elective course (3 units)
(11) Statistics	(a) STA1310 (b) MAT1010 or 1320 (c) one course from MGT1010, 1020, DSE1035, ECO1010, CSC1740, BIO1001, 1010, BCH1002 and PHY1001

Note: Except CHM1070 (2 units) and CHM1870 (1 unit), all courses are 3-unit courses.

B. Applicable to S6 entrants admitted in 2004-05

All Science Major students are required to complete the courses as determined by their Major Programmes in the following table to fulfil the Major/Faculty requirement for S6 entrants:

Programme	Requirement
(1) Biochemistry	(a) BCH1002 (b) CHM1070/1870 (c) one course from BIO1010, MAT1320, PHY1001 and STA1310
(2) Biology	(a) BIO1010 (b) CHM1070/1870 (c) one course from BCH1002, MAT1320, STA1310 and CSC1500

(3) Chemistry	(a) CHM1070/1870 (b) PHY1001
(4) Chinese Medicine	Three courses from BCH1002, BIO1010, 2010, 2110, CHM2200, and CHM2400/2408
(5) Environmental Science	(a) BIO1010 (b) CHM1070/1870 (c) one elective course (3 units)
(6) Food and Nutritional Sciences	(a) BIO1010 (b) BCH1002 (c) one course from CHM1070/1870, MAT1320 and STA1310
(7) Mathematics	(a) MAT1010 (b) two electives courses (6 units)
(8) Molecular Biotechnology	(a) BIO1010 (b) one elective course (3 units) (c) one course from MAT1320, CHM1070/1870 and STA1310
(9) Physics	(a) PHY1002 (b) MAT1010 (c) one course from BIO1010, CHM1070/1870 and STA1310
(10) Risk Management Science	(a) STA1310 (b) MAT1010 or 1320 (c) one elective course (3 units)
(11) Statistics	(a) STA1310 (b) two elective courses (6 units)

SCI Coded Course

Course Description

SCI2400

Introduction to Astronomy and Astrophysics

3 U; 3 Lect.; 2nd term

An introductory survey of major ideas in astronomy. Topics covered will include: time and calendar, celestial sphere, light spectrum and telescope structures, solar system, celestial mechanics, relativity, structure of stars and stellar evolution, neutron stars and black holes, galaxies, quasars, and basic cosmology. This course aims at introducing basic concepts of astronomy and astrophysics to students with only secondary school physics and mathematics background. Lectures are designed not only to present a volume of knowledge, but also to arouse students' curiosity in how nature works. Optional star-gazing trips will be arranged. (Not for students who have taken UGB240M.)

Biochemistry

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
BCH0430	Selected Topic in Biochemistry	2
BCH0440	Guided Study in Biochemistry	2
BCH0441	Supervised Research in Biochemistry	4
BCH1000	Biochemical Basis of Life and Disease	3
BCH1002	Biochemical Aspects of Health and Disease	3
BCH1700	Biochemical Basis of Life and Disease Laboratory	2
BCH2000	Frontiers in Biochemistry	2
BCH2001	Current Topics in Biochemistry	2
BCH2010	Cellular Basis of Biochemistry	3
BCH2710	Cellular Basis of Biochemistry Laboratory	2
BCH2020	Introduction to Biomolecules	3
BCH2720	Introduction to Biomolecules Laboratory	2
BCH2030	Fundamentals of Biochemistry	3
BCH2730	Fundamentals of Biochemistry Laboratory	2
BCH2070	Research Internship	2
*BCH2080	Basic Skills in Biochemical Studies	2
BCH3010	Bioenergetics	3
BCH3610	Bioenergetics Laboratory	2
BCH3020	Metabolism and Its Regulation	3
BCH3620	Metabolism and Its Regulation Laboratory	2
BCH3030	Methods in Biochemistry	3
BCH3630	Methods in Biochemistry Laboratory	2
BCH3040	Proteins and Enzymes	3
BCH3640	Proteins and Enzymes Laboratory	2
BCH4010	Molecular Biology	3
BCH4610	Molecular Biology Laboratory	2
BCH4020	Molecular Biology on the Web	3
BCH4030	Clinical Biochemistry	3
BCH4630	Clinical Biochemistry Laboratory	2
BCH4040	Aspects of Neurosciences	3
BCH4640	Aspects of Neurosciences Laboratory	2
BCH4050	Fermentation and Bio-processing	3
BCH4650	Fermentation and Bio-processing Laboratory	2
BCH4060	Basic and Applied Immunology	3
BCH4660	Basic and Applied Immunology Laboratory	2
BCH4130	Molecular Endocrinology	3
BCH4730	Molecular Endocrinology Laboratory	2

* Course offered in 2006-07 and before.

Course Description

BCH0430

Selected Topic in Biochemistry

2 U; STOT; 1st term

Students are required to do a literature survey and give a comprehensive report on a current topic in biochemistry under the supervision of a faculty member. The course is only open to final-year students.

BCH0440

Guided Study in Biochemistry

2 U; STOT; 2nd term

Students are required to submit a written report on the topic that they selected in BCH0430. The course is only open to final-year students.

BCH0441

Supervised Research in Biochemistry

4 U; STOT; 2nd term

In this course, students undertake a research project related to the topic that they selected in BCH0430 under the supervision of a faculty member. Research work starts in the first term. The results of the project are presented in the form of an oral presentation and a written report in the second term. The course is only open to final-year students.

BCH1000

Biochemical Basis of Life and Disease

3 U; 3 Lect.; 2nd term

Life activity is the summation and regulation of chemical reactions in a living organism. This course teaches the biochemical basis of life and emphasizes the application of biochemistry in diagnosis and treatment of disease. The topics include proteins and enzymes, metabolism and energy, neural and hormonal regulation, nutrition, drug action and molecular biology. (Not for Biochemistry Majors and Minors, and Majors of Food and Nutritional Sciences, Environmental Science, Molecular Biotechnology and Pharmacy.)

BCH1002

Biochemical Aspects of Health and Disease

3 U; 3 Lect.; 1st term

This course provides a general introduction to the biochemistry of health and disease. Emphasis will be placed on the application of biochemical principle in the understanding of the etiology, diagnosis, pathogenic mechanism and treatment of genetic, metabolic and infectious diseases as well as cancer. Contents may vary from year to year to reflect issues of current scientific, medical and biotechnological significance, with an aim to stimulate and foster students' interest in biochemistry. Materials covered will be set at an elementary level similar to other general education courses. This course is opened to non-Major students and S6 entrants.

BCH1700

Biochemical Basis of Life and Disease Laboratory

2 U; 3 Lab.; 2nd term

This course covers laboratory exercises that serve to illustrate the principles enunciated in BCH1000. (Not for Biochemistry Majors and Minors, and Majors of Food and Nutritional Sciences, Environmental Science, Molecular Biotechnology and Pharmacy.)

BCH2000

Frontiers in Biochemistry

2 U; 2 Lect.; 1st term

This course presents the latest developments and advancements in biochemistry and molecular biology. It aims to alert students the trends and recent breakthroughs in biochemical and biomedical research. Contents will vary from year to year. (For Biochemistry Majors only.)

BCH2001

Current Topics in Biochemistry

2 U; 2 Lect.; 2nd term

This course illustrates topics in the field of biochemistry and molecular biology with scientific, medical and social significance. It introduces students to recent developments in these fields and their relevance to daily life. Contents will vary from year to year. Materials covered will be at an elementary level similar to other general education courses. (Not for Majors of Biochemistry, Biology, Food and Nutritional Sciences, Molecular Biotechnology, and students from Faculty of Medicine.)

BCH2010

Cellular Basis of Biochemistry

3 U; 3 Lect.; 2nd term

A beginner's course on cellular organization and function, this course introduces students to structural and functional concepts of cellular and subcellular components, including cell wall, plasma membrane, cytosol, endoplasmic reticulum, Golgi apparatus, mitochondria, lysosomes, ribosomes, chloroplasts, cytoskeletons, etc. The characteristics of prokaryotes versus eukaryotes, unicellular versus multicellular organisms, cell division, cell cycles, cell-cell and subcellular communications will be discussed.

BCH2710

Cellular Basis of Biochemistry Laboratory

2 U; 3 Lab.; 2nd term

This laboratory course concerns the isolation and characterization of major cellular components by using various biochemical techniques. Cytological and histochemical techniques will also be introduced.

BCH2020

Introduction to Biomolecules

3 U; 3 Lect.; 1st term

Basic principles of organic chemistry relevant to the understanding of the structures and chemical properties of biomolecules (carbohydrates, proteins, lipids and nucleic acids), including their basic constituent molecules and functional groups, will be covered. Spectroscopic methods for analyses of the structures of biomolecules will also be discussed. Certain biological functions of these biomolecules will be discussed in relation to their structures and their importance in the living system.

BCH2720

Introduction to Biomolecules Laboratory

2 U; 3 Lab.; 1st term

This laboratory course is designed for beginning students to acquaint themselves with the basic biochemical techniques and methods. The application of these techniques in the study of the structures and properties of carbohydrates, lipids, proteins and nucleic acids will be illustrated in the experiments. Quantitative aspects are emphasized whenever applicable.

BCH2030

Fundamentals of Biochemistry

3 U; 3 Lect.; 1st and 2nd term

This course introduces the general principles of biochemistry to Food and Nutritional Sciences (BCH2030A), Environmental Science (BCH2030B) and other Biochemistry Minor students. The topics include acid-base concept, structures of biomolecules, properties of proteins and enzymes, and metabolism of carbohydrates, proteins, nucleotides and lipids. The molecular mechanisms for the transmission of genetic information including nucleic acid and protein biosynthesis will also be discussed. (Not for Biochemistry Majors.)

BCH2730

Fundamentals of Biochemistry Laboratory

2 U; 3 Lab.; 1st and 2nd term

This course is designed to provide students with an opportunity to practise the basic concepts of experimental biochemistry. The experiments complement the topics taught in BCH2030. (Not for Biochemistry Majors.)

BCH2070

Research Internship

2 U; STOT; summer section; 6-8 weeks

This course is designed to provide students to gain some practical experience on scientific research project in a laboratory or biotechnology firm during summer period. All research or internship projects are to be held either locally or overseas, and approved by the department. (For Biochemistry Majors only.)

BCH3010

Bioenergetics

3 U; 3 Lect.; 2nd term

This course introduces the principles of bioenergetics. The following biochemical processes underlying energy transformation in living organisms will be discussed: glycolysis, citric acid cycle, electron transport, oxidative phosphorylation, fatty acid oxidation, photosynthesis and muscle contraction.

BCH3610

Bioenergetics Laboratory

2 U; 3 Lab.; 2nd term

This course gives students practical experience in analyses of mitochondrial functions and other aspects of biochemical energetics.

BCH3020

Metabolism and Its Regulation

3 U; 3 Lect.; 1st term

This course presents an in-depth study on metabolism and its control. The topics covered include the biosynthesis of carbohydrates, lipids, DNA, RNA and proteins; the metabolism of amino acids and components of nucleic acids; prokaryotic gene regulation; DNA mutation and repair. The integration of metabolic pathways will also be discussed. Prerequisite: BCH3010.

BCH3620

Metabolism and Its Regulation Laboratory

2 U; 3 Lab.; 1st term

This course covers laboratory exercises that serve to illustrate the principles enunciated in BCH3020.

BCH3030

Methods in Biochemistry

3 U; 3 Lect.; 1st term

This course aims at introducing quantitative analyses of biochemical reactions and subcellular components to students. Methods for purification and studies on biomolecules will also be introduced. Techniques including chromatography, gel electrophoresis, centrifugation, fluorescent spectrophotometry and microscopy will be covered. The use of radioisotopes and non-radioactive labelling methods will also be included. Prerequisite: BCH2010 or equivalent.

BCH3630

Methods in Biochemistry Laboratory

2 U; 3 Lab.; 1st term

This laboratory course serves to provide basic training in biochemical techniques. Students will learn the application of different biochemical methods in the qualitative and quantitative analyses of biologically active molecules.

BCH3040

Proteins and Enzymes

3 U; 3 Lect.; 2nd term

Three-dimensional conformations of proteins and protein folding will be discussed with emphasis on structure-function relationships. Basic concepts of proteomic techniques and the investigations of protein structures will be covered. Enzyme catalysis will be introduced with respect to coenzyme requirements, kinetics, catalytic mechanism and regulation of enzymatic activities. Prerequisite: BCH2010 or equivalent.

BCH3640

Proteins and Enzymes Laboratory

2 U; 3 Lab.; 2nd term

This course serves to illustrate the principles enunciated in BCH3040. It consists of a set of experiments to illustrate pertinent aspects of practical enzymology. Structural analysis of proteins will also be illustrated.

BCH4010

Molecular Biology

3 U; 3 Lect.; 2nd term

This course discusses areas of molecular biology. Basic methodologies in recombinant DNA will be introduced first, followed by the structure, function and regulation of eukaryotic genes. Other topics including human genome, genetic diseases and molecular biology of viruses, cancer and development will also be covered. (Not for students who have taken BCH4020 or 4510.)

BCH4610

Molecular Biology Laboratory

2 U; 3 Lab.; 2nd term

A set of experiments to illustrate various techniques in molecular biology will be performed, including the preparation of DNA and RNA and hybridisation studies.

BCH4020

Molecular Biology on the Web

3 U; 3 Lect; 2nd term

This course is the Internet version of BCH4010 and the teaching will be conducted via the Internet. Basic methodologies in recombinant DNA will be introduced first, followed by the structure, function and regulation of eukaryotic genes. Other topics include human genome, genome, genetic diseases and molecular biology of viruses, cancer and development. Students are expected to have knowledge in DNA replication, transcription, translation and prokaryotic gene regulation. (Not for Biochemistry Majors and Minors, Molecular Biotechnology Majors, and students who have taken BCH4010 or 4510.)

BCH4030

Clinical Biochemistry

3 U; 3 Lect.; 2nd term

This course presents the basic principles in clinical biochemistry and its methodology. Tests of functions will be described. Prerequisites: BCH2010 and 2020.

BCH4630

Clinical Biochemistry Laboratory

2 U; 3 Lab.; 2nd term

Relevant assays of biochemical constituents in body fluids will be performed.

BCH4040

Aspects of Neurosciences

3 U; 3 Lect.; 1st term

This course will discuss the structure and components of nervous tissue in relation to its functions. Aspects of metabolism special to the nerve and brain will be examined. These include energy metabolism, water and electrolyte balance, exchanges between blood and brain, and between brain and cerebrospinal fluid, neurotransmitters and modulators, nutrition and development of the nervous system, neuroendocrinology and the biochemistry of mental diseases. Prerequisite: BCH2010 or equivalent.

BCH4640

Aspects of Neurosciences Laboratory

2 U; 3 Lab.; 1st term

This course consists of a set of experiments to illustrate various biochemical techniques for the study of neurochemistry.

BCH4050

Fermentation and Bio-processing

3 U; 3 Lect.; 2nd term

General concepts in microbial and mammalian cell culture techniques, fermentation and bioprocessing will be covered. Additional topics including applied enzymology, cell and enzyme immobilizations, protein engineering, bioreactor design and instrumentation will be introduced. Regulatory issues in product quality control and assurance as well as GMP manufacturing standards will be discussed. Prerequisite: BCH3010 or equivalent. (Prerequisite not applicable to Food and Nutritional Sciences Major students.)

BCH4650

Fermentation and Bio-processing Laboratory

2 U; 3 Lab.; 2nd term

The practicals in this course consist of videos, tours and actual experiments, designed to familiarize students with various aspects of modern biotechnology. Students will have opportunities to perform fermentation studies to simulate an industrial setting.

BCH4060

Basic and Applied Immunology

3 U; 3 Lect.; 1st term

This course aims at providing students with the essential concepts of basic and applied immunology. Topics to be covered include architecture and development of the immune system, antigens and antibodies, immunoglobulin genes and diversity, the major histocompatibility system and T cell receptors, tolerance and autoimmunity, and integration of immune responses. The effector mechanisms of the immune system will be introduced, with special emphasis on the role of innate and acquired immunity in health and disease. The relationship of immunology to clinical problems of infectious disease, immunodeficiency, hypersensitivity, transplantation and cancer will be discussed. The applications of immunology to modern medicine and biotechnology, including vaccination, monoclonal antibody production and antibody engineering will also be covered. Prerequisite: BCH2010 or equivalent. (Prerequisite not applicable to Biology Major students.)

BCH4660

Basic and Applied Immunology Laboratory

2 U; 3 Lab.; 1st term

This laboratory course serves to provide students with basic training in immunological techniques at both the molecular and cellular levels. Various aspects and practical applications of the methodology in immunochemistry, cellular immunology and molecular immunology will be illustrated.

BCH4130

Molecular Endocrinology

3 U; 3 Lect.; 1st term

This course describes the chemical structures and biological functions of hormones in vertebrates with special emphasis on human subjects. The evolution of hormonal regulation in vertebrates, as compared with neural control, will be discussed. The organization and operation of different hypothalamus-pituitary-peripheral endocrine gland axes will be discussed. Emphasis will be placed on the molecular aspects of endocrine action. Current advances in molecular endocrinology techniques will be introduced.

BCH4730

Molecular Endocrinology Laboratory

2 U; 3 Lab.; 1st term

This course aims at developing laboratory skill for students to isolate, characterize and quantitatively determine various animal hormones. Modern methods in chemical analysis and assays of hormones including radioimmunoassays and competitive protein binding assays will be attempted.

Study Scheme

1. Major Programme

A. Applicable to students admitted in 2007-08 and thereafter

Students are required to complete 61-63 units of courses as follows:

- | | | |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Notes 1 and 2):
BCH0430, 0440 (or 0441), 2000, 2010/2710, 2020/
2720, 3010/3610, 3020/3620, 3030/3630, 3040/3640,
4010/4610 | 41-43 units |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|

(ii) Elective Courses:	20 units
Students are required to take at least two courses with laboratories from Group A:	
<u>Group A</u>	
BCH4030/4630, 4040/4640, 4050/4650, 4060/4660, 4130/4730	
<u>Group B</u>	
ENS3320#/3920#, 4250#/4252#, 4310#/4510#, FNS3010#/3011#, 4150#/4151#, 4160#/4161#, MBT4520#	
	Total: 61-63 units

To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	17 units
1st term : BCH2000, 2020/2720	
2nd term : BCH2010/2710, 3010/3610	
<i>Second Year of Attendance</i>	20 units
1st term : BCH3020/3620, 3030/3630	
2nd term : BCH3040/3640, 4010/4610	
<i>Third Year of Attendance</i>	4-6 units
1st term : BCH0430	
2nd term : BCH0440 (or 0441)	
<i>Elective Courses</i>	20 units
Students are required to take at least two courses with laboratories from Group A:	
<u>Group A</u>	
BCH4030/4630, 4040/4640, 4050/4650, 4060/4660, 4130/4730	
<u>Group B</u>	
ENS3320/3920, 4250/4252, 4310/4510, FNS3010/3011, 4150/4151, 4160/4161, MBT4520	
	Total: 61-63 units

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

Notes: Applicable to students admitted in 2007-08 and thereafter

- Students should obtain Grade "D" or above in each of the courses of BCH2000, 2010/2710, and 2020/2720. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
- Only Major courses at 3000 and above level will be included in the calculation of the Major GPA for honours classification.

B. Applicable to students admitted in 2006-07 and before

Students are required to complete 63-65 units of courses as follows:

(i) Required Courses (Notes 1 and 2):	43-45 units
BCH0430, 0440 (or 0441), 2000, 2010/2710, 2020/2720, 2080, 3010/3610, 3020/3620, 3030/3630, 3040/3640, 4010/4610	

(ii)	Elective Courses:	20 units
	Students are required to take at least two courses with laboratories from Group A:	
	<u>Group A</u>	
	BCH4030/4630, 4040/4640, 4050/4650, 4060/4660, 4130/4730	
	<u>Group B</u>	
	ENS3320#/3920#, 4250#/4252#, 4310#/4510#	
	FNS3010#/3011#, 4150#/4151#, 4160#/4161#	
	MBT4520#	
		Total: 63-65 units

To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	19 units
1st term : BCH2000, 2020/2720, 2080	
2nd term : BCH2010/2710, 3010/3610	
<i>Second Year of Attendance</i>	20 units
1st term : BCH3020/3620, 3030/3630	
2nd term : BCH3040/3640, 4010/4610	
<i>Third Year of Attendance</i>	4-6 units
1st term : BCH0430	
2nd term : BCH0440 (or 0441)	
<i>Elective Courses</i>	20 units
Students are required to take at least two courses with laboratories from Group A:	
<u>Group A</u>	
BCH4030/4630, 4040/4640, 4050/4650, 4060/4660, 4130/4730	
<u>Group B</u>	
ENS3320/3920, 4250/4252, 4310/4510, FNS3010/3011, 4150/4151, 4160/4161, MBT4520	
	Total: 63-65 units

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

Notes: Applicable to students admitted in 2006-07 and before

- Students should obtain Grade "D" or above in each of the courses of BCH2000, 2010/2710, 2020/2720 and 2080. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
- Only Major courses at 3000 and above level will be included in the calculation of the Major GPA for honours classification.
- Minor Programme*

Students are required to complete a minimum of 20 units as follows:

BCH2010/2710, 2020/2720, 2030/2730 and at least 5 units from courses in biochemistry at 3000 and above level with accompanied laboratory. Those who have taken BCH2030/2730 are not allowed to take BCH3010/3610 or BCH3020/3620 to fulfil their Minor

requirement. Among the 20 units, no more than 5 should overlap with the requirement of the student's Major Programme. For the purpose of exemption, BCH3010/3610 and BCH3020/3620 are regarded as equivalent to BCH2030/2730. Biology Majors are not required to take BCH2010/2710 and BCH2020/2720 but are required to take BCH2030/2730 and at least 10 units from biochemistry courses at 3000 and above level with accompanied laboratory. These courses should not overlap with those taken for fulfilment of their Major elective requirement.

3. *Faculty Language Requirement*
4. *Major/Faculty Requirement for S6 Entrants*

Biology

Biology Stream

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
BIO0430/0440	Literature Senior Seminar I/II	1/2
BIO0431/0451	Experimental Senior Seminar I/II	3/3
BIO1001	Introduction to Biology: Cell Biology and Genetics	3
BIO1002	Introduction to Biology: Organismal Biology and Ecology	3
BIO1010	Current Concepts in Bioscience and Biotechnology	3
BIO2010	Diversity of Life	3
BIO2012	Diversity of Life Laboratory	2
BIO2110	Cellular Biochemistry	3
BIO2120	Cell Biology	3
BIO2152	Methods in Cell Biology and Biochemistry	2
BIO2210	Ecology	3
BIO2212	Ecology Laboratory	2
BIO2310	General and Molecular Genetics	3
BIO2312	General and Molecular Genetics Laboratory	2
BIO2910	Biological Research and Communication Skills	1
BIO3310	Human Biology	3
BIO3410	General Microbiology	3
BIO3412	General Microbiology Laboratory	2
BIO3530	Plant Physiology	3
BIO3532	Plant Physiology Laboratory	2
BIO3550	Plant Biology	4
BIO3552	Plant Biology Laboratory	2
BIO3610	Invertebrate Structure and Function	2
BIO3620	Vertebrate Life	2
BIO3630	Animal Physiology	3
BIO3632	Animal Physiology Laboratory	2
BIO3652	Animal Biology Laboratory	2
BIO3710	Marine Biology	3
BIO3712	Marine Biology Laboratory	2
BIO4010	Evolutionary Biology	3
BIO4120	Developmental Biology	3
BIO4210	Environmental Pollution and Toxicology	3
BIO4212	Environmental Pollution and Toxicology Laboratory	2
BIO4220	Environmental Biotechnology	3
BIO4222	Environmental Biotechnology Laboratory	2
BIO4310	Human Genetics	3
BIO4320	Molecular Biology and Genetic Engineering	3
BIO4322	Molecular Biology and Genetic Engineering Laboratory	2
BIO4330	Bioinformatics and Proteomics	3
BIO4410	Microbial Biotechnology	3

BIO4510	Hong Kong Flora and Vegetation	3
BIO4512	Hong Kong Flora and Vegetation Laboratory	2
BIO4710	Fish Biology and Mariculture	3
BIO4712	Fish Biology and Mariculture Laboratory	2

Course Description

BIO0430/0440

Literature Senior Seminar I/II

1/2 U; 1/2 STOT; 2-term

In this course, students will review the literature on selected topics under the supervision of a faculty member. The literature search should begin during the summer vacation preceding the final year of attendance. Students are required to discuss their progress with their supervisors. The requirements include a written report in the first term and a seminar presentation in the second term.

BIO0431/0451

Experimental Senior Seminar I/II

3/3 U; 3 STOT; 2-term

In this course, students will undertake a research project (either laboratory or field investigation) under the supervision of a faculty member. Research work should begin during the summer vacation preceding the final year of attendance. Students are required to submit a research proposal and a progress report in the first term. In the second term, students will continue to work on their research project and discuss their research data with their supervisors. The results of the research project will be presented in the form of an oral presentation and a written report.

BIO1001

Introduction to Biology: Cell Biology and Genetics

3 U; 2 Lect. 1 Tut.; 1st term

This course provides an introduction to basic biochemistry, cell biology and genetics. In addition to lectures, this course includes small group tutorials and discussions. The main purpose is to prepare students for Major Programmes in biological sciences. (Not for students who have taken courses leading to HKALE "Biology".)

BIO1002

Introduction to Biology: Organismal Biology and Ecology

3 U; 2 Lect. 1 Tut.; 2nd term

This is a foundation course suitable for students of secondary 6 or equivalent. It covers the basic concepts of classification, evolution, ecology and behaviour and reviews some aspects of animal physiology, including an introduction to the structure and function of nervous, endocrine, excretory and immune systems. This course is taught mostly using an interactive lecture format. There are also some cooperative learning tasks and an opportunity to develop data analysis skills in relation to the topics covered. (Not for students who have taken courses leading to HKALE "Biology".)

BIO1010

Current Concepts in Bioscience and Biotechnology

3 U; 3 Lect.; 2nd term

This course is designed for first year science students without HKALE "Biology". It presents current advances and issues of bioscience and biotechnology with emphasis on the biological concepts and principles underlining these developments and their

social significance. Topics to be included are genetic engineering (including genetically modified food), human genome project, reproductive technologies (including animal cloning), modernization of Chinese medicine, infectious diseases, cancer biology, evolution and biodiversity conservation. In addition, the lack of basic knowledge in specific fields of biology of the students will be identified through diagnostic tests. Appropriate reading materials will be assigned for individual students for presentation and discussion in class.

BIO2010

Diversity of Life

3 U; 3 Lect.; 1st term

This course introduces the basic features of different groups of living organisms, including: viruses, bacteria, plants, fungi and animals. Emphasis will be placed on their evolutionary and phylogenetic relationships. The significance of some selected organisms to health, food and environment will be discussed. (Not for Biology Majors with HKALE "Biology".)

BIO2012

Diversity of Life Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This laboratory course emphasizes on two main aspects: 1) learning of biodiversity by observation; and 2) comparing phylogenetic relationships using different approaches. Field trips may be included if necessary. Corequisite: BIO2010. (Not for Biology Majors with HKALE "Biology".)

BIO2110

Cellular Biochemistry

3 U; 3 Lect.; 1st term

This course includes the survey of the biochemical activities of cells, supply of energy in the cells, and regulation and compartmentalization of these metabolic activities in different cell organelles. Basic principles in proteomics and metabolomics are also briefly discussed. In addition to the lectures, students have to attend tutorials. (Not for Biochemistry Majors.)

BIO2120

Cell Biology

3 U; 3 Lect.; 2nd term

This course introduces students to the cell as the basic structural and functional unit of living organism and to the main experimental methods of cellular study. The structural and physiological characteristics of animal and plant cells, as well as their main organelles, are considered. The mechanisms of regulation of cellular activities, such as cell metabolism, cell growth and cell death, will be examined. An integrated approach to the structural and functional relationships in cellular processes will be emphasized. In addition to the lectures, students have to attend tutorials.

BIO2152

Methods in Cell Biology and Biochemistry

2 U; 1 Tut. 3 Lab.; 2nd term

This experimental course introduces some fundamental concepts and practical skills commonly used in modern cell biology and biochemistry laboratories. Corequisite: BIO2120. Prerequisite: BIO2110.

BIO2210

Ecology

3 U; 3 Lect.; 1st term

This course provides students with an overview of the general principles of ecology. The course covers three broad areas: behavioural ecology, population ecology, and community ecology. Behavioural ecology examines how behaviour contributes to survival and reproduction. The relationship between behaviour, ecology and evolution is emphasized. Population ecology concerns how populations grow and how they are limited by food, competition and predation. Community ecology focuses on the link between community function and species richness. In particular, factors important in determining the number of species in an area will be examined. Mathematical models will be used to illustrate the theoretical background for topics discussed. In addition to the lectures, students have to attend tutorials.

BIO2212

Ecology Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This experimental course is designed to illustrate key ecological concepts. Corequisite: BIO2210.

BIO2310

General and Molecular Genetics

3 U; 3 Lect.; 2nd term

This course deals with the fundamental principles of heredity in prokaryotes and eukaryotes with emphasis on the molecular basis of Mendelian inheritance, gene expression, gene regulation, and protein synthesis. In addition to the lectures, students have to attend tutorials.

BIO2312

General and Molecular Genetics Laboratory

2 U; 1 Tut. 3 Lab.; 2nd term

Laboratory work is devoted to the genetics studies in different organisms, which include bacteria, yeast, fruitfly and human. Some basic molecular techniques and their application in modern genetics are covered. Corequisite: BIO2310.

BIO2910

Biological Research and Communication Skills

1 U; 1 Lect.; 2nd term

This course will prepare the beginning Biology students with basic skills in biological research, including an introductory treatment of the scientific method of investigation, hypothesis formulation and testing, design of experiments, data interpretation, statistical analysis, searching biological literature and the use of information technology in biological research. Students will also be trained to develop proper communication skills required for modern biological research, including oral presentation skills and the art of scientific writing.

BIO3310

Human Biology

3 U; 3 Lect.; 2nd term

This course introduces the study of man as a zoological species, through the examination of the extant primates and fossils, biochemical microevolution of mankind and embryonic development. The concept that humans, like all other biological species, exhibit variations will be dealt with. The importance of these

variations in adapting to environmental stress will be discussed. Much of this course, therefore, will outline the wide range of adaptive power that humans possess with particular emphasis on the plasticity of human adaptability as a factor contributing to the success of mankind. The final part will treat man as a social animal and discuss the possible future of man in the light of his present activities.

BIO3410

General Microbiology

3 U; 3 Lect.; 1st term

This course includes the history and scope of microbiology, the importance of microorganisms, structures and functions of microorganisms, microbial physiology and nutrition, microbial growth and application, control of microorganisms and antibiotics, regulation of gene expression and application, microbial evolution and systematics, microbial genomics, environmental and industrial microbiology, genetic engineering, virology, immunology and microbial diseases, and metabolic diversity and microorganisms.

BIO3412

General Microbiology Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This laboratory course includes the following hands-on experimental topics: microbial techniques, staining technique and microscopic observation, culture methods for isolation, growth curve, effects of various factors on micro-organisms, biochemical activity of bacteria, fermentation, and identification of unknown bacteria. Corequisite: BIO3410.

BIO3530

Plant Physiology

3 U; 3 Lect.; 2nd term

This course provides students with a basic understanding of the various processes involved in growth and development of plants. Topics include plant and water relation, mineral nutrition, transport, photosynthesis and other metabolic processes unique to plant functioning, secondary metabolites and chemical defence, and hormonal and environmental control of plant development.

BIO3532

Plant Physiology Laboratory

2 U; 1 Tut. 3 Lab.; 2nd term

This course is designed to illustrate some key physiological phenomena discussed in the lectures. Corequisite: BIO3530

BIO3550

Plant Biology

4 U; 4 Lect.; 2nd term

A study of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms with emphasis on their functional morphology, life cycle, evolutionary features and ecological adaptation, this course includes anatomical study on structure and development of selected higher plants. Economic importance of plants will also be discussed.

BIO3552

Plant Biology Laboratory

2 U; 1 Tut. 3 Lab.; 2nd term

This laboratory course leads students, in a problem-solving approach, to study the forms and structures of algae, fungi, bryophytes, ferns, gymnosperms and angiosperms.

Corequisite: BIO3550.

BIO3610

Invertebrate Structure and Function

2 U; 2 Lect.; 1st term

The morphology, anatomy, ecology, reproduction and development, life history and phylogenetic relationships of major groups of invertebrates will be examined. The function of organ systems will be discussed with reference to the adaptations in relation to the mode of life of the animal emphasizing local animals and their economic importance.

BIO3620

Vertebrate Life

2 U; 2 Lect.; 2nd term

The morphology, anatomy, ecology, development and life history and phylogenetic relationships of various groups of vertebrates will be examined. The function of some organ systems will be emphasized with reference to the adaptations, leading to success, in relation to the mode of life of the animal.

BIO3630

Animal Physiology

3 U; 3 Lect.; 1st term

Physiology is the study of body functions. Using both integrative and comparative approaches, this course covers different functions of animals such as neural conduction and integration, endocrine communication, muscle contraction, circulation, respiration, excretion, reproduction, etc., and the maintenance of a stable internal environment. The adaptive and evolutionary changes in different groups of animals are also discussed and compared. (Not for students who have taken FNS2010.)

BIO3632

Animal Physiology Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This course is designed to illustrate some key physiological phenomena covered in BIO3630. Corequisite: BIO3630.

BIO3652

Animal Biology Laboratory

2 U; 1 Tut. 3 Lab.; 2nd term

The course introduces students to 1) the diversity of animals through the examination of a wide variety of specimens and 2) the body plan and structure of major groups of animals through dissection of selected organisms such as earthworm, cockroach, squid, dogfish, frog, and turtle. Corequisites: BIO3610 and 3620.

BIO3710

Marine Biology

3 U; 3 Lect.; 1st term

This course gives an introduction to the physical and chemical aspects of the marine environment, and to life in the oceans and coastal waters. The major groups of marine organisms will be treated, with a consideration of the factors influencing their distribution and abundance. Productivity of the marine environment and its present and future utilization by man will also be discussed.

BIO3712

Marine Biology Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

Laboratory and field work (including work on boats) designed to give practical experience in the use of sampling and measuring equipment, application of basic marine ecological field sampling and data analytical techniques with field and laboratory studies of the main marine habitats. Field trips to marine habitats are carried out during Saturdays. Corequisite: BIO3710.

BIO4010

Evolutionary Biology

3 U; 3 Lect.; 2nd term

This course introduces students to the pattern and processes of evolution. The course begins with an introduction of the history and philosophy of evolutionary ideas, followed by the genetics of adaptation, natural selection and speciation, and then on to the geological record and the fossil record of origination and extinction, and finishes with a discussion of the principle and practice of phylogenetic analysis and the molecular basis of evolution. Case studies on the use of molecular data in the study of evolutionary processes, biogeography and the history of life (including human evolution) will be included.

BIO4120

Developmental Biology

3 U; 3 Lect.; 1st term

This course deals with the principles and concepts of developmental biology. Topics include analysis of fundamental embryological process and consideration of major developmental biological problems such as cell fate determination, cell differentiation, pattern formation, morphogenesis, organogenesis, hormonal and environmental control of development in model organisms. Selected current topics and technology in developmental biology will also be discussed.

BIO4210

Environmental Pollution and Toxicology

3 U; 3 Lect.; 2nd term

This course covers 1) the causes, effects and solutions of water, land and air pollution, and 2) the basic principles and techniques in ecotoxicology, as well as the applications of these principles to environmental monitoring and toxicity testing.

BIO4212

Environmental Pollution and Toxicology Laboratory

2 U; 1 Tut. 3 Lab.; 2nd term

This course introduces the basic techniques and experimental procedures in ecotoxicology. Corequisite: BIO4210.

BIO4220

Environmental Biotechnology

3 U; 3 Lect.; 1st term

This course deals with biotechnological principles and techniques, and their applications to resolve environmental problems. Underlying principles of biodegradation and biotransformation and basic techniques such as culture collection and cell immobilization are introduced. Case studies emphasize on insect control, waste and wastewater treatment, energy production and cleanup of contaminated soils.

BIO4222

Environmental Biotechnology Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This course introduces biotechnological techniques and their applications to resolve environmental problems. Corequisite: BIO4220.

BIO4310

Human Genetics

3 U; 3 Lect.; 2nd term

This course considers the principles of genetics which concern with the most interesting organisms - the human being. Topics include Mendelian inheritance, human chromosomes, autosomal and sex-linked inheritance, chromosomal aberrations, human biochemical genetics, genetics of the immune system, behaviour genetics and genetic counselling. Progress in human genetics and practical application will also be discussed.

BIO4320

Molecular Biology and Genetic Engineering

3 U; 3 Lect.; 1st term

This course discusses how to make use of the knowledge in molecular biology to formulate different strategies in genetic engineering. Updated information on studying and manipulation of genes, gene products, and gene functions will be introduced. (Not for students who have taken BCH4010.)

BIO4322

Molecular Biology and Genetic Engineering Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This laboratory provides hands-on experience on modern technologies related to molecular biology and genetic engineering, including DNA fingerprinting, DNA analysis and two-dimensional gel electrophoresis. Demonstration sessions include technologies related to gene transfer and gene chip production. Corequisite: BIO4320.

BIO4330

Bioinformatics and Proteomics

3 U; 1 Tut. 2 Lect.; 2nd term

Bioinformatics and proteomics are complementary tools that provide a global view of living cells. In this course, we will introduce the principles and methods of bioinformatics and proteomics. First, web-based bioinformatics databases, DNA/protein sequence annotation tools, sequence alignments, protein structure prediction and analysis, and data mining strategies are covered. Second, the flow of information from genome to proteome, protein modification, and protein-protein interactions are discussed. This course also covers protein separation and characterization techniques including two-dimensional electrophoresis, HPLC and mass spectrometry. Prerequisite: BIO2120 or 2310 or 4320 or equivalent.

BIO4410

Microbial Biotechnology

3 U; 3 Lect.; 2nd term

This course examines the application of microbial biotechnology to agriculture, industry and medicine. Fundamental topics include applied microbial physiology, genetic manipulation through applied genetics and genetic engineering, industrial fermentation technology and enzyme technology. Examples of applications include microbial production of amino acids, enzymes, foods, chemicals, fuels, pharmaceuticals, biological control agents, etc.

BIO4510

Hong Kong Flora and Vegetation

3 U; 3 Lect.; 1st term

This course is aimed at familiarizing students with the plant biodiversity and representative components of various types of vegetation in Hong Kong, with emphasis on their ecological conditions and economic applications. This course consists of lectures and independent projects.

BIO4512

Hong Kong Flora and Vegetation Laboratory

2 U; 1 Tut. 3 Lab.; 1st term

This course aims to familiarize students, through both laboratory and field studies, with the common vascular plants and the major vegetation types in Hong Kong. Corequisite: BIO4510.

BIO4710

Fish Biology and Mariculture

3 U; 3 Lect.; 2nd term

This course deals with the application of biological principles to the culture of marine fishes, crustaceans, molluscs and algae. Emphasis will be placed on the environmental, nutritional, reproductive and endocrine aspects in relation to current maricultural practice. Prerequisite: BIO3710 or consent of instructor.

BIO4712

Fish Biology and Mariculture Laboratory

2 U; 1 Tut. 3 Lab.; 2nd term

The course encompasses a biological survey of the fishery and mariculture organisms in Hong Kong and neighbouring areas. Experimental work includes spawning and larval culture of fish and shrimp (including preparation of larval food items) and physiological studies on fish. Field work includes site visits to local fish cage and pond culture facilities, fish culture research station of the government and mariculture facilities at the Ocean Park. Students are required to present a group poster on a selected topic on mariculture. Corequisite: BIO4710.

Human Biology Stream

The Human Biology Stream is offered in cooperation with the Department of Anatomy and Department of Physiology in the Faculty of Medicine. Basically, the course requirement in the first half of this Stream is identical with that of the regular Biology Stream. In the latter half, students will specialize in other courses described therein.

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
BIO2110	Cellular Biochemistry	3
BIO2120	Cell Biology	3
BIO2152	Methods in Cell Biology and Biochemistry	2
BIO2210	Ecology	3
BIO2212	Ecology Laboratory	2
BIO2310	General and Molecular Genetics	3
BIO2312	General and Molecular Genetics Laboratory	2
BIO2910	Biological Research and Communication Skills	1
BIO3310	Human Biology	3

BIO3410	General Microbiology	3
BIO3412	General Microbiology Laboratory	2
BIO4120	Developmental Biology	3
BIO4210	Environmental Pollution and Toxicology	3
BIO4212	Environmental Pollution and Toxicology Laboratory	2
BIO4310	Human Genetics	3
BIO4320	Molecular Biology and Genetic Engineering	3
BIO4322	Molecular Biology and Genetic Engineering Laboratory	2
+MED3050/3060	Anatomy I/II	3/3
+MED3051/3061	Anatomy Laboratory I/II	1/1
ΔMED3070	Basic Principles of Physiology	3
ΔMED3071	Basic Principles of Physiology Laboratory	1
ΔMED3080	Physiology of Major Organ Systems in Man	3
ΔMED3081	Physiology of Major Organ Systems in Man Laboratory	1
ΔMED3090	Principles of Drug Action	3
+MED4550	Specialized Topics in Anatomy	3
ΔMED4560	Specialized Topics in Physiology	3
@BMJ0411	Research Project I	3
@BMJ0421	Research Project II	3

Course Description

(Please refer to Biology Stream for descriptions of the above courses coded BIO2110 to 4322.)

MED3050/3060

Anatomy I/II

3 U; 3 Lect.; 1st/2nd term

This course is designed to provide general information on the structure of the human body in relation to its function. The course or topics will include correlated studies in human topographical anatomy, neuroanatomy, microscopic and human developmental anatomy. Teaching will be by means of lectures, demonstrations and tutorials with emphasis on the functional aspects of anatomy.

MED3051/3061

Anatomy Laboratory I/II

1 U; 3 Lab.; 1st/2nd term

Practical classes in the relevant areas will include the use of prospecting specimens, histological slides and audio-visual aids. Exposure of techniques such as tissue preparation, light and electron microscopy, and tissue culture will also be included in order that students can acquire a broad knowledge of some of the techniques frequently employed in scientific research.

+ Courses offered by the Department of Anatomy, Faculty of Medicine.

Δ Courses offered by the Department of Physiology, Faculty of Medicine.

^ Course offered by the Department of Pharmacology, Faculty of Medicine.

@ Courses jointly offered by the Departments of Biology, Anatomy and Physiology.

MED3070

Basic Principles of Physiology

3 U; 3 Lect.; 1st term

This course introduces students to the basic principles in physiology and the concept of homeostasis. Topics on cellular basis of physiology, physiology of nerve and muscle cells, physiological control mechanisms, nature and organization of autonomic nervous system, body fluid compartments and blood, will be covered. The study of these fundamental principles is a prerequisite to the study of integrated physiology based on organ systems. Corequisite: MED3071.

MED3071

Basic Principles of Physiology Laboratory

1 U; 3 Lab.; 1st term

To accompany MED3070. Corequisite: MED3070.

MED3080

Physiology of Major Organ Systems in Man

3 U; 3 Lect.; 2nd term

This course involves the study of human body functions according to the major organ systems - cardiovascular system, respiratory system, urinary system, nervous system, endocrine and reproductive system. Pathophysiology related to some clinical disturbances will be discussed. Corequisite: MED3081. Prerequisites: MED3070 and 3071.

MED3081

Physiology of Major Organ Systems in Man Laboratory

1 U; 3 Lab.; 2nd term

To accompany MED3080. Corequisite: MED3080. Prerequisites: MED3070 and 3071.

MED3090

Principles of Drug Action

3 U; 3 Lect.; 1st term

The aim of this course is to introduce the basic principles of drug action and pharmacology as the basis of therapeutics. Topics include mechanisms of drug action, the body's response to and handling of drugs, effects of drugs on body function and treatment of common diseases. The course also deals with drug-drug interactions, drug toxicity and drug development to demonstrate the important role of pharmacology as a Life Science subject in therapeutics and in drug discovery.

MED4550

Specialized Topics in Anatomy

3 U; 3 Lect.; 1st term

This course is designed to introduce students to the current research areas undertaken in the Department of Anatomy. The areas include cancer research, embryology, molecular biology and neuroscience. Teaching will be by means of lectures and class discussions plus demonstrations where students will be exposed to advanced research techniques that are relevant to each area of research undertaken. Prerequisites: MED3050/3060 and 3051/3061.

MED4560

Specialized Topics in Physiology

3 U; 3 Lect.; 1st term

In this course, more advanced knowledge on research methodology is taught. During

the first term this course prepares students to conduct a research project later in the year. It will concentrate on research areas currently pursued in the Department and include membrane transport, sensory physiology, renal and gastrointestinal physiology and nutrition. This course comprises lectures, demonstrations and, where necessary, tutorials. Prerequisites: MED3070, 3080 and 3071, 3081.

BMJ0411**Research Project I**

3 U; 3 STOT; 1st term

This course is jointly offered by the Departments of Biology, Anatomy and Physiology. Students are required to undertake an in-depth research project under the supervision of a faculty member or members from the Department of Biology, Anatomy or Physiology. Research work should be started during the summer vacation preceding the final year of attendance. The literature review, design and preliminary results of the research project will be presented as a seminar in early January of the final year of attendance.

BMJ0421**Research Project II**

3 U; 3 STOT; 2nd term

This course is jointly offered by the Departments of Biology, Anatomy and Physiology. Based on the research project designed and developed in BMJ0411, students will carry out some further research work under their supervisors. The results of the project shall be formally written and submitted in the form of a thesis for assessment at the end of the second term. Prerequisite: BMJ0411.

Study Scheme

1. Major Programme

Biology Stream

A. Applicable to S7 entrants

Students are required to complete a minimum of 65 units of courses as follows:

- | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Required Courses (Notes): | 30 units |
| | BIO2110, 2120, 2152, 2210/2212, 2310/2312,
2910, 3410, 3550, 3610, 3620 | |
| (ii) | Elective Courses: | |
| (a) | Two laboratory courses from the following: | 4 units |
| | BIO3412, 3552, 3652 | |
| (b) | A combination of courses with a minimum
of two laboratory courses (including one
course not taken in (a) above) from the
following: | 31 units |
| | BIO0430/0440 (or 0431/0451), 3310,
3530, 3532, 3630, 3632, 3710, 3712, 4010,
4120, 4210, 4212, 4220, 4222, 4310, 4320,
4322, 4330, 4410, 4510, 4512, 4710, 4712,
STA2101 [#] , ENS4260 [#] , FNS4180 [#] , 4181 [#] ,
MBT4510 [#] | |

Total: 65 units

[#] To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	19 units
1st term : BIO2110, 2210/2212	
2nd term : BIO2120, 2152, 2310/2312, 2910	
<i>Second Year of Attendance</i>	24 units
(a) BIO3410, 3550, 3610, 3620	
(b) Two courses from: BIO3412, 3552, 3652: 4 units	
(c) Elective courses from (ii)(b) above: 9 units	
<i>Third Year of Attendance</i>	22 units
Elective courses from (ii)(b) above: 22 units	
	Total: 65 units

B. Applicable to S6 entrants

Students are required to complete a minimum of 74 units of courses as follows:

(i) Fundamental Courses:	9 units
BIO1010, CHM1070, 1870 and one course from the following:	
BCH1000, MAT1320, STA1310	
(ii) Required Courses (Notes):	30 units
BIO2110, 2120, 2152, 2210/2212, 2310/2312, 2910, 3410, 3550, 3610, 3620	
(iii) Elective Courses:	
(a) Two laboratory courses from the following:	4 units
BIO3412, 3552, 3652	
(b) A combination of courses with a minimum of two laboratory courses (including one course not taken in (a) above) from the following:	31 units
BIO0430/0440 (or 0431/0451), 3310, 3530, 3532, 3630, 3632, 3710, 3712, 4010, 4120, 4210, 4212, 4220, 4222, 4310, 4320, 4322, 4330, 4410, 4510, 4512, 4710, 4712, STA2101 [#] , ENS4260 [#] , FNS4180 [#] , 4181 [#] , MBT4510 [#]	
	Total: 74 units

[#] To be included in the Major GPA as well.

Recommended course pattern**(i) Four years**

<i>First Year of Attendance</i>	9 units
BIO1010, CHM1070, 1870 and one course from BCH1000, MAT1320, STA1310	
<i>Second Year of Attendance</i>	19 units
1st term : BIO2110, 2210/2212	
2nd term : BIO2120, 2152, 2310/2312, 2910	
<i>Third Year of Attendance</i>	24 units
(a) BIO3410, 3550, 3610, 3620	
(b) Two courses from BIO3412, 3552, 3652: 4 units	
(c) Elective course from (iii)(b) above: 9 units	

Fourth Year of Attendance 22 units
 Elective courses from (iii)(b) above: 22 units

Total: 74 units

(ii) Three years

First Year of Attendance 23 units

BIO1010, 2110, 2120, 2152, 2210/2212, 2910, CHM1070, 1870
 and one course from BCH1000, MAT1320, STA1310

Second Year of Attendance 26 units

(a) BIO2310/2312, 3410, 3550, 3610, 3620

(b) Two courses from BIO3412, 3552, 3652

(c) Elective courses from (iii)(b) above: 6 units

Third Year of Attendance 25 units

Elective courses from (iii)(b) above: 25 units

Total: 74 units

Notes: Applicable to students of biology stream

1. Students minoring in Biochemistry are exempted from BIO2110 and 2152, and should take 5 more units of Biology courses in place of the exempted courses.
2. Students should obtain Grade "D" or above in each of the courses of BIO2110, 2120, 2152, 2210/2212 and 2310/2312. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the fundamental courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
3. In general, students should complete courses at 2000 level before proceeding to courses at 3000 level, and so on. When selecting courses at 3000 and above level, students should pay attention to the prerequisite requirement.
4. Some elective courses in (ii)/(iii) above are offered in alternate years.

Human Biology Stream

Students are required to complete a minimum of 64 units of courses as follows:

(i) Required Courses (Notes): 56 units

BIO2110, 2120, 2152, 2210/2212, 2310/2312,
 2910, 3310, 3410, 4310, MED3050[#]/3051[#], 3060[#]/
 3061[#], 3070[#]/3071[#], 3080[#]/3081[#], 4550[#], 4560[#],
 BMJ0411[#]/0421[#]

(ii) Elective Courses: 8 units

A combination of courses with a minimum of one
 laboratory course from the following:
 BIO3412, 4120, 4210, 4212, 4320, 4322,
 ENS4250[#], 4252[#], MED3090[#], STA2101[#]

Total: 64 units

[#] To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	19 units
BIO2110, 2120, 2152, 2210/2212, 2310/2312, 2910	
<i>Second Year of Attendance</i>	19 units
BIO3310, MED3050/3051, 3060/3061, 3070/3071, 3080/3081	
<i>Third Year of Attendance</i>	26 units
BIO3410, 4310, BMJ0411/0421, MED4550, 4560 and two elective courses with at least one laboratory course	
<hr/>	
Total: 64 units	

Notes: Applicable to students of human biology stream

1. Students minoring in Biochemistry are exempted from BIO2110/2112 and should take 5 more units of Biology courses in place of the exempted courses.
2. Students should obtain Grade “D” or above in each of the courses of BIO2110, 2120, 2152, 2210/2212 and 2310/2312. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade “D” requirement in any one of the fundamental courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
3. In general, students should complete courses at 2000 level before proceeding to courses at 3000 level, and so on. When selecting courses at 3000 and above level, students should pay attention to the prerequisite requirement.
4. Some elective courses in (ii) above are offered in alternate years.

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

2. *Minor Programme*

Students are required to complete a minimum of 20 units of Biology courses which should include at least one course with laboratory (5 units) from the following fundamental courses: BIO2110/2112 (or 2110/2152); 2120/2122 (or 2120/2152); 2210/2212; 2310/2312.

- Notes:
1. Biochemistry Majors should not choose BIO2110/2112 or 2110/2152 to fulfil the Minor Programme requirement.
 2. Courses which Biochemistry, Environmental Science, Food and Nutritional Sciences, and Molecular Biotechnology Majors take to fulfil their Major requirement cannot be used to fulfil the Minor Programme requirement.
3. *Faculty Language Requirement*
 4. *Major/Faculty Requirement for S6 Entrants*

Chemistry

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
CHM0270	Student Oriented Teaching	1
©CHM0410/0420	Undergraduate Seminar I/II	0/2
CHM0430/0440	Problem-based Learning I/II	2/2
CHM1070	Principles of Modern Chemistry	2
CHM1870	General Chemistry Laboratory	1
CHM1280	Introduction to Organic Chemistry and Biomolecules	3
CHM2120	Main Group Chemistry	2
CHM2850	Inorganic Chemistry Laboratory I	2
CHM2200	Basic Principles and Hydrocarbons	3
CHM2820	Organic Chemistry Laboratory I	2
CHM2300	Thermodynamics and Chemical Equilibrium	2
CHM2830	Physical Chemistry Laboratory I	2
CHM2320	Fundamentals of Spectroscopic Analysis	2
CHM2330	Tools in Physical Chemistry	3
CHM2380	Chemical Safety and Practice	2
CHM2400	Analytical Chemistry	2
CHM2408	Analytical Chemistry Laboratory I	2
CHM2822	Introductory Organic Chemistry Laboratory	1
CHM3130	Transition Metal Chemistry	3
CHM3860	Inorganic Chemistry Laboratory II	2
CHM3220	Alcohols, Ethers, and Carbonyl Compounds	2
CHM3230	Amines, Arenes, and Heterocycles	2
CHM3810/3820	Organic Chemistry Laboratory II/III	2/2
CHM3310	Chemical Bonding	2
CHM3320	Chemical Kinetics	2
CHM3830	Physical Chemistry Laboratory II	2
CHM3410	Instrumental Analysis	3
CHM3870	Analytical Chemistry Laboratory II	2
CHM4100	Advanced Inorganic Chemistry	2
CHM4200	Pericyclic Reactions and Biomolecules	2
©CHM4830	Organic Chemistry Laboratory IV	1
CHM4330	Molecular Spectroscopy	2
©CHM4810	Advanced Inorganic Chemistry Laboratory	1
CHM4820	Physical Chemistry Laboratory III	2
©CHM4840	Physical Chemistry Laboratory IV	1
CHM4400	Advanced Analytical Chemistry	2
©CHM4870	Analytical Chemistry Laboratory III	1
CHM4480/4490	Undergraduate Special Project I/II	1/1
CHM4980/4990	Undergraduate Thesis I/II	2/2
CHM5080	Introduction to Macromolecules	2
CHM5710	Quantum Chemistry	2

The following elective courses are offered to graduate students in the Chemistry Division and undergraduates in the Chemistry programme in their final year of attendance. Topics offered each year are to be decided by the Department on selective basis.

CHM5040	Organic Polymer Chemistry	2
CHM5430	Practices in Testing Laboratory	2
CHM5510	Inorganic Reaction Mechanisms	2
CHM5520	Physical Methods in Inorganic Chemistry	2
CHM5530	Organometallic Chemistry	2
CHM5540	Bioinorganic Chemistry	2
CHM5550	Organolanthanide Chemistry	2
CHM5620	Synthetic Methods in Organic Chemistry	2
CHM5630	Synthesis of Natural Products	2
CHM5640	Pharmaceutical Chemistry	2
CHM5642	Supramolecular Chemistry	2
CHM5650	Bioorganic Chemistry	2
CHM5720	Molecular Modelling	2
CHM5730	Special Topics in Chemistry	2
CHM5740	Advanced Chemical Kinetics	2
CHM5750	Surface and Interface Analysis	2
CHM5760	X-ray Crystallography	2
CHM5780	Mass Spectrometry of Biomolecules	2
CHM5781	Advanced NMR Spectroscopy	2
CHM5782	Principles of Biomolecular NMR Spectroscopy	2
CHM5783	Introduction to Laser Spectroscopy	2
CHM5784	Instrumental Analysis of Biomolecules	2
CHM5785	Industrial Chemistry	2
CHM5910	Current Topics in Chemistry	2
CHM5930	Molecular Quantum Mechanics	2

Course Description

CHM0270

Student Oriented Teaching

1 U; STOT 1; 2nd term

The main objective of this course is to let students learn literature searching and practical skills for scientific presentation. They are required to deliver talks on different topics, as prescribed by the Department, after reading. Discussions in the class will follow after each oral presentation. (For students admitted in 2006-07 and thereafter.)

CHM0410/0420

Undergraduate Seminar I/II

0/2 U; 1 STOT; 2-term

Oral and written reports on important topics from the current chemical literature.

CHM0430/0440

Problem-based Learning I/II

2/2 U; 4 Tut. 4 Lab.; 2-term

This final year project will be of problem-based type. Students will be divided into groups to carry out hands-on experiments on projects prescribed, and to solve problems encountered during the process. At the end of the project, each group is required to give an oral presentation and to submit a written report on the outcomes obtained. (For students admitted in 2006-07 and thereafter.)

CHM1070

Principles of Modern Chemistry

2 U; 2 Lect.; 1st term

Basic concepts about matter. Atoms, molecules and ions. Bonding theory and molecular structure. States of matter and intermolecular forces. Stoichiometry: chemical calculations. Thermochemistry. Reaction rates and chemical equilibrium. Acids and bases. Oxidation and reduction. Electrochemistry. Chemistry and life: an introduction to organic and biological chemistry. Chemistry of materials. Environmental chemistry.

CHM1870

General Chemistry Laboratory

1 U; 4 Lab./fortnight; 1st term

To be taken in conjunction with CHM1070. Laboratory work covers basic techniques and training in analytical, inorganic, organic and physical chemistry.

CHM1280

Introduction to Organic Chemistry and Biomolecules

3 U; 3 Lect.; 2nd term

This course introduces basic principles of organic chemistry to non-chemistry major students in the faculty of science with emphasis on the structures and chemical properties of biomolecules. The structures and essential reactions of common organic functional groups will be covered and the fundamental concepts in chemical bonding, stereochemistry and reaction mechanism will be highlighted. Spectroscopic methods for structure analysis of organic compounds will also be briefly discussed.

CHM2120

Main Group Chemistry

2 U; 2 Lect.; 1st term

Acid-base chemistry. Chemistry in aqueous and non-aqueous solutions. Chemistry of non-transition elements. Periodicity.

CHM2850

Inorganic Chemistry Laboratory I

2 U; 4 Lab.; 1st term

To be taken in conjunction with CHM2120. Laboratory work covers inorganic synthesis, modern techniques of analysis and experiments designed to illustrate the theoretical principles.

CHM2200

Basic Principles and Hydrocarbons

3 U; 3 Lect. 1 Tut.; 2nd term

Fundamental concepts in structure, chemical bonding, stereochemistry and physical properties of carbon compounds. Preparations, physical properties and chemical reactions of aliphatic hydrocarbons, alkyl halides and aromatic compounds.

CHM2820

Organic Chemistry Laboratory I

2 U; 4 Lab.; 2nd term

To be taken in conjunction with CHM2200. Laboratory work covers basic techniques in organic chemistry.

CHM2300

Thermodynamics and Chemical Equilibrium

2 U; 2 Lect.; 2nd term

The laws of thermodynamics. Free energy. Equilibrium constant. Equilibrium constraints. Electrochemical equilibria. Ionic equilibria. Biochemical applications.

CHM2830

Physical Chemistry Laboratory I

2 U; 4 Lab.; 2nd term

To be taken in conjunction with CHM2300. This course attempts to acquaint the students with the basic principles of thermodynamics and their applications.

CHM2320

Fundamentals of Spectroscopic Analysis

2 U; 2 Lect. 1 Tut.; 2nd term

An introduction to the basic principles of various spectroscopic methods and their applications for the identification of chemical compounds.

CHM2330

Tools in Physical Chemistry

3 U; 3 Lect. 1 Tut.; 1st term

Mathematical functions frequently used in chemistry. The limiting process. Rates of change and differentiation. Location of maximum, minimum and saddle points, and their relation to stable and transition structures in chemical reactions. Power series and its application in spectroscopy. Integration techniques used in kinetics. Systems of linear equations and their applications in molecular orbital theory.

CHM2380

Chemical Safety and Practices

2 U; 2 Lect.; 1st term

Topics covered in this course: international chemical safety regulations and basic principles; local and PRC regulations related to chemical safety; MSDS, safety equipment, storage, transportation, disposal and emergency.

CHM2400

Analytical Chemistry

2 U; 2 Lect. 0.5 Exer.; 1st term

Treatment of analytical data. Gravimetric analysis. Titrimetric analysis. Electrochemistry and its analytical methods.

CHM2408

Analytical Chemistry Laboratory I

2 U; 4 Lab.; 1st term

To be taken in conjunction with CHM2400. It includes experiments in gravimetric, volumetric titration and some basic instrumental methods.

CHM2822

Introductory Organic Chemistry Laboratory

1 U; 4 Lab./fortnight; 2nd term

To be taken in conjunction with CHM2200. The laboratory work covers basic techniques in organic chemistry.

CHM3130

Transition Metal Chemistry

3 U; 3 Lect. 1 Tut.; 2nd term

Continuation of CHM2120. Co-ordination chemistry: bonding, structure, reaction kinetics and mechanisms. Chemistry of the transition elements, the lanthanides, actinides and the transactinide elements.

CHM3860

Inorganic Chemistry Laboratory II

2 U; 4 Lab.; 2nd term

To be taken in conjunction with CHM3130. Laboratory work covers inorganic synthesis, modern techniques of analysis and experiments designed to illustrate the theoretical principles.

CHM3220

Alcohols, Ethers, and Carbonyl Compounds

2 U; 2 Lect.; 1st term

Continuation of CHM2200. Chemistry of alcohols, phenols, ethers, epoxides, aldehydes and ketones. Enolate chemistry.

CHM3230

Amines, Arenes, and Heterocycles

2 U; 2 Lect.; 2nd term

Continuation of CHM3220. Chemistry of α,β -unsaturated carbonyl compounds. The chemistry of carboxylic acids and functional derivatives. Amines. Aryl halides. Polynuclear aromatic and heterocyclic compounds. Macromolecules.

CHM3810/3820

Organic Chemistry Laboratory II/III

2/2 U; 4 Lab.; 2-term

To be taken in conjunction with CHM3220, 3230 respectively. Laboratory work consists of experiments designed to illustrate the more important procedures and techniques in organic chemistry.

CHM3310

Chemical Bonding

2 U; 2 Lect. 1 Tut.; 1st term

Wave mechanics and electronic structure of atoms. The chemical bond. Molecular structure and symmetry.

CHM3320

Chemical Kinetics

2 U; 2 Lect.; 1st term

Statistical mechanics and kinetic theory of gases. Treatment of molecular speeds, Maxwell-Boltzmann distribution and simple hard-sphere collision. Transport phenomena and Fick's laws. Chemical dynamics and photochemistry. Experimental kinetics and gas reactions. Kinetics in the liquid phase.

CHM3830

Physical Chemistry Laboratory II

2 U; 4 Lab.; 1st term

To be taken in conjunction with CHM3320. The practical work deals with the application of principles covered in the lectures.

CHM3410

Instrumental Analysis

3 U; 3 Lect. 1 Tut.; 1st term

Spectrophotometric methods including atomic absorption and emission, x-ray fluorescence, infrared and ultraviolet visible spectroscopies. Chromatographic separation methods and mass spectrometry.

CHM3870

Analytical Chemistry Laboratory II

2 U; 4 Lab.; 1st term

To be taken in conjunction with CHM3410. Some illustrative experiments related to the lectures of CHM3410 to enable students to have some experience in using the modern analytical instruments for chemical analyses.

CHM4100

Advanced Inorganic Chemistry

2 U; 2 Lect.; 1st term

Molecular symmetry; point groups. Elements of group theory; irreducible representations; character tables and their use. Chemical bonding; molecular orbital theory and hybridization theory. Molecular vibrations; symmetry and activity of normal modes; CO stretching modes in metal carbonyls. Time permitting, the following topics may also be treated: crystal field model and molecular orbital theory for coordination compounds; cluster compounds and electron-counting rules.

CHM4810

Advanced Inorganic Chemistry Laboratory

1 U; 4 Lab./fortnight; 2nd term

To offer several advanced inorganic chemistry experiments including multi-step synthesis and structural characterization of coordination and organometallic complexes.

CHM4200

Pericyclic Reactions and Biomolecules

2 U; 2 Lect.; 1st term

Continuation of CHM3220, 3230. Discussion of conservation of orbital symmetry and two or more of the following topics: the chemistry of carbohydrates; physical organic chemistry; organometallic compounds in organic synthesis; general principles of organic synthesis; free-radical chemistry; biosynthesis.

CHM4830

Organic Chemistry Laboratory IV

1 U; 4 Lab./fortnight; 1st term

Laboratory work involving more advanced and/or project-oriented experiments in organic chemistry.

CHM4330

Molecular Spectroscopy

2 U; 2 Lect. 1 Tut. 1 Exer.; 2nd term

Introduction of molecular spectroscopy. Interactions and orders of magnitudes. Molecular structure and symmetry. Spectroscopy of molecules.

CHM4820

Physical Chemistry Laboratory III

2 U; 4 Lab.; 2nd term

To be taken in conjunction with CHM4330. The practical work deals with the application of principles covered in the lectures.

CHM4840

Physical Chemistry Laboratory IV

1 U; 4 Lab./fortnight; 1st term

Laboratory work involving more advanced and/or project-oriented experiments in physical chemistry.

CHM4400

Advanced Analytical Chemistry

2 U; 2 Lect. 1 Tut.; 2nd term

Hyphenated techniques including GC-IR, GC-MS, LC-MS for solving specific problems in chemical analysis. Sample treatment. Analysis of real samples.

CHM4870

Analytical Chemistry Laboratory III

1 U; 3 Lab.; 2nd term

To be taken in conjunction with CHM4400. To let students have the actual practice in performing more experiments by using some more advanced instruments.

CHM4480/4490

Undergraduate Special Project I/II

1/1 U; 4 Lab./fortnight or 2 Tut./week; 2-term

Research-oriented experimental work or non-experimental data collecting undertakings dealing with special chemical problems. Written approval from department to take the course is required.

CHM5080

Introduction to Macromolecules

2 U; 2 Lect.; 2nd term

Structure of macromolecules. Natural macromolecules. Synthesis of macromolecules. Macromolecules in solution. A brief introduction of bulk polymers.

CHM5710

Quantum Chemistry

2 U; 2 Lect.; 1st term

Elements of quantum mechanics. Exactly solvable problems. Approximation methods. The Hamiltonian operator and Born-Oppenheimer approximation. Pauli's Exclusion Principle and the Slater determinants, the calculation of one-center and two-center integrals with Slater determinants, and the Coulomb and exchange integrals. Averaged field for electron interactions and the self-consistent method. Linear combination of atomic orbitals, the variation principle and the Hartree-Fock equation. Gaussian orbitals. Density functional theory.

Study Scheme

I. Major Programme

A. Applicable to students admitted in 2006-07 and thereafter

Students are required to complete a minimum of 69 units of courses as follows:

- | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Required Courses (Notes): | 63 units |
| | CHM0270, 0430/0440, 2120, 2200, 2300, 2320, 2330,
2380, 2400, 2408, 2820, 2830, 2850, 3130, 3220,
3230, 3310, 3320, 3410, 3810/3820, 3830, 3860, 3870,
4330, 4820 plus at least **three courses from CHM
4100, 4200, 4400, 5080 or 5710 | |

** Excessive lecture courses may be counted as electives in the final year of studies if a student selects to take more than three from CHM4100, 4200, 4400, 5080 or 5710.

(ii) Elective Courses:	6 units
CHM5040, 5430, 5510, 5520, 5530, 5540, 5550, 5620, 5630, 5640, 5642, 5650, 5720, 5730, 5740, 5750, 5760, 5780, 5781, 5782, 5783, 5784, 5785, 5910, 5930	

 Total: 69 units

Recommended course pattern

<i>First Year of Attendance</i>	25 units
CHM0270, 2120/2850, 2200/2820, 2300/2830, 2320, 2330, 2380, 2400/2408	

<i>Second Year of Attendance</i>	24 units
CHM3130, 3860, 3410, 3870, 3220, 3230, 3810/3820, 3310, 3320, 3830	

<i>Third Year of Attendance</i>	20 units
CHM0430/0440, 4330, 4820, at least three from CHM4100, 4200, 4400, 5080 or 5710 AND 6 units from the elective courses	

 Total: 69 units

Notes: Applicable to students admitted in 2006-07 and thereafter

- Students should obtain Grade "D" or above in each of the courses of CHM 0270, 2120/2850, 2200/2820, 2300/2830, 2320, 2330, 2380, and 2400/2408. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
- A student in his final year of attendance may, subject to approval by the Department, select CHM4980/4990 and submit an undergraduate thesis in place of CHM0430/0440.
- A student in the final year of attendance may, under special circumstances and with written approval by the Department, select CHM4480 and/or 4490 to substitute up to two units of any lecture or laboratory courses in the Chemistry Major Programme.

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

B. Applicable to students admitted in 2005-06

Students are required to complete a minimum of 69 units of courses as follows:

(i) Required Courses (Notes):	63 units
CHM0410/0420, 2120, 2200, 2300, 2320, 2330, 2380, 2400, 2408, 2820, 2830, 2850, 3130, 3220, 3230, 3310, 3320, 3410, 3810/3820, 3830, 3860, 3870, 4330, 4820 plus at least ** three combinations from CHM4100/4810, 4200/4830, 5080 or 5710 with 4840, and 4400/4870	

** Excessive lecture courses may be counted as electives in the final year of studies (excluding corresponding laboratory courses) if a student selects to take more than three from CHM4100, 4200, 4400, 5080 or 5710.

(ii) Elective Courses:	6 units
CHM5040, 5430, 5510, 5520, 5530, 5540, 5550, 5620, 5630, 5640, 5642, 5650, 5720, 5730, 5740, 5750, 5760, 5780, 5781, 5782, 5783, 5784, 5785, 5910, 5930	

Total: 69 units

Recommended course pattern

<i>First Year of Attendance</i>	24 units
CHM2120/2850, 2200/2820, 2300/2830, 2320, 2330, 2380, 2400/2408	

<i>Second Year of Attendance</i>	24 units
CHM3130, 3860, 3410, 3870, 3220, 3230, 3810/3820, 3310, 3320, 3830	

<i>Third Year of Attendance</i>	21 units
CHM0410/0420, 4330, 4820, at least three combinations from CHM4100/4810, 4200/4830, 5080 (or 5710) with 4840, 4400/ 4870	

AND 6 units from the elective courses

Total: 69 units

Notes: Applicable to students admitted in 2005-06

- Students should obtain Grade "D" or above in each of the courses of CHM2120/2850, 2200/2820, 2300/2830, 2320, 2330, 2380 and 2400/2408. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
- A student may, subject to approval by the Department, select CHM4980/4990, and submit an undergraduate thesis in place of one elective and two units of third-year laboratory courses from CHM4810, 4820, 4830, 4840, 4870 in his final year of attendance.
- A student in the final year of attendance may, under special circumstances and with written approval by the Department, select CHM4480 and/or 4490 to substitute up to two units of any lecture or laboratory courses in Chemistry Major Programme.
- Minor Programme*
Students are required to complete a minimum of 21 units of courses including: CHM2120/2850, 2200, 2400/2408, 3220/3810, CHM2822 and at least five units from CHM2330, 3320, 3410, ENS4525, 4535
- Faculty Language Requirement*
- Major/Faculty Requirement for S6 Entrants*

Chinese Medicine

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
BCJ1201	Chinese Classics Related to Medicine	3
BCM1104	Pharmacognosy of Chinese Medicines	3
BCM1205	Basic Concepts in Chinese Medicine	5
BCM1600	Fundamental Physiology I	2
BCM1610	Fundamental Physiology II	2
BCM2001	Methodologies of Diagnosis in Chinese Medicine	5
BCM2101	Principles of Chinese Medicines Application	6
BCM2102	Selected Reading in Chinese Medicine Classics - Nei-Jing	3
BCM2105	Integrated Clinical Science	8
BCM2201	Principles of Prescription in Chinese Medicine	6
BCM2202	Selected Reading in Chinese Medicine Classics - Shang-Han-Lun	3
BCM2203	General History of Chinese Medicine	2
BCM2204	Introduction to the Meridian System	2
BCM2205	Principles of Therapeutics in Modern Medicine	8
BCM2207	Current Literature of Chinese Medicine and Management of Information	2
BCM2301	Medical Ethics in Chinese Medicine	2
BCM2302	Yi-Jing and Chinese Medicine	2
BCM2303	Medicinal Plants	2
BCM2304	Authentication of Medicinal Materials	2
BCM2305	Emergency Medicine in Chinese Medicine	2
BCM2306	Seminars in Chinese Medicines	1
BCM2307	An Introduction to Clinical Research in Chinese Medicine	2
BCM2308	Empirical Identification of Chinese Herbal Drugs	2
BCM2309	Fundamental Diagnostic Radiology	2
BCM2310	Five Movements and Six Qi	2
BCM2311	A Comparative Study of the Traditional Chinese and Western Medical System	2
BCM2401, 2402, 2403, 2404	Clinical Training I, II, III, IV	1 each
BCM2405	Clinical Training V	1
BCM3102	Internal Medicine I	4
BCM3103	Specialties in Chinese Medicine: Febrile Diseases	3
BCM3104	Selected Reading in Chinese Medicine Classics - Jin-Gui-Yao-Lue	3
BCM3105	Specialties in Chinese Medicine: Obstetrics and Gynaecology	4
BCM3106	Acupuncture	4
BCM3108	Massage Therapy in Chinese Medicine	2
BCM3110	Surgery and Topical Diseases	3
BCM3202	Internal Medicine II	4
BCM3204	Orthopaedics and Traumatology in Chinese Medicine	5
BCM3206	Promotion and Maintenance of Health by Chinese Medicine	2

BCM1610

Fundamental Physiology II

2 U; 1 Lect. 1 Prac.

This course is a continuation of BCM1600.

BCM2001

Methodologies of Diagnosis in Chinese Medicine

5 U; 4 Lect. 1 Tut.

This course teaches the traditional theories and practice of diagnosis. Students will learn the various approaches for diagnosis of common diseases, as well as the techniques of writing medical records.

BCM2101

Principles of Chinese Medicines Application

6 U; 3 Lect. 3 Tut.

This course deals with the applications of Chinese materia medica, emphasizing on topics such as the production of crude drugs, pretreatment, medicinal properties, uses and principles of combination in prescribing. This course sets the foundation for future studies of prescription and clinical specialties.

BCM2102

Selected Reading in Chinese Medicine Classics-Nei-Jing

3 U; 3 Lect.

Nei-Jing is the earliest Chinese medical writing. Through the study of selected passages of this medical classic, students will learn the basic concepts of Chinese medicine.

BCM2105

Integrated Clinical Science

8 U; 4 Lect. 4 Tut.

The overall aim of this course is to acquaint students with the clinical sciences necessary for a good understanding of the pathogenesis and modern management of common diseases. Topics include the following: the pathological, biochemical and physiological basis of common diseases; principles of modern management of common diseases in medicine and surgery; family medicine; epidemiology and preventive medicine; radiological and laboratory investigations.

BCM2201

Principles of Prescription in Chinese Medicine

6 U; 3 Lect. 3 Tut.

This is a foundation course to train students to become familiar with the principles and applications of multiple-item prescriptions. Traditional standing prescriptions and currently popular prescriptions will also be discussed in terms of their composition, uses, rationale and variability.

BCM2202

Selected Reading in Chinese Medicine Classics - Shang-Han-Lun

3 U; 3 Lect.

Shang-Han-Lun, or Treatise on Febrile Diseases, is one of the most important medical classics in Chinese medicine. Students will learn from this book the concepts and treatments of fevers and other infectious diseases.

BCM2203

General History of Chinese Medicine

2 U; 2 Lect.

This course discusses the origin, the theoretical background and the development of Chinese medicine. Emphasis will be put on the major events of Chinese medicine that occurred throughout history in relation to the social environment.

BCM2204

Introduction to the Meridian System

2 U; 2 Lect.

This course deals with the theory of meridian system in human body and its applications in disease diagnosis and acupuncture. This course sets the foundation for studies of acupuncture and massage therapy.

BCM2205

Principles of Therapeutics in Modern Medicine

8 U; 4 Lect. 4 Tut.

The overall aim of this course is to introduce students to the principles of drug treatment in modern medicine. Topics include the following: mechanisms of drug action; handling of drugs by the body; actions of drugs on various body systems and drug interactions and drug treatment of common diseases.

BCM2207

Current Literature of Chinese Medicine and Management of Information

2 U; 2 Lect.

Students will be taught to get access to the worldwide literature on Chinese medicines, including the use of indexing systems and computerized databases.

BCM2301

Medical Ethics in Chinese Medicine

2 U; 2 Lect.

This course emphasizes on the ethical standards of Chinese medicinal practitioners. It deals with the moral issues and practitioner-patient relationship.

BCM2302

Yi-Jing and Chinese Medicine

2 U; 2 Lect.

Chinese philosophy has a profound influence on the medical concepts. Through the study of Yi-Jing, students will learn the philosophical concepts behind many medical and medicinal theories.

BCM2303

Medicinal Plants

2 U; 2 Tut.

Through field trips and practical classes, students will study the morphology and medicinal applications of local plants. Botanical identification and authentication techniques will be taught.

BCM2304

Authentication of Medicinal Materials

2 U; 1 Lect. 1 Prac.

This course teaches the various approaches in authenticating Chinese medicinal materials, including macroscopic and microscopic examination, chemical analysis, as well as molecular studies.

BCM2305

Emergency Medicine in Chinese Medicine

2 U; 2 Lect.

Students are taught to deal with emergency situations in the setting of a Chinese medicine clinic. Basic knowledge of first aid is included in this course.

BCM2306

Seminars in Chinese Medicines

1 U; 1 Tut.

This course includes seminars in the area of Chinese medicine such as the cultural aspects, history, theories and practice, as well as modern research and recent development.

BCM2307

An Introduction to Clinical Research in Chinese Medicine

2 U; 2 Lect.

This introductory course provides students with basic knowledge in clinical research in Chinese Medicine. Topics include: experiment design, application of statistics, data analysis, report writing, research ethics and how to read medical literature with a critical mind.

BCM2308

Empirical Identification of Chinese Herbal Drugs

2 U; 2 Lect.

This course teaches the identification and quality assessment of Chinese herbal drugs basing on empirical knowledge. Various types of Chinese herbal drugs will be covered, including common Chinese herbal drugs, Chinese herbal drugs which are often confused as well as expensive Chinese herbal drugs.

BCM2309

Fundamental Diagnostic Radiology

2 U; 2 Lect.

This course introduces the x-ray images of the human body structure and organs and how the images facilitate the diagnosis of illnesses through better understanding of the anatomy, physiological functions and pathological changes of the human body. Topics include: diagnostic radiology, the theory of x-ray images, the concept of density and the applications on the respiratory system, the circulation system, the digestive system, the urological system and the bone system.

BCM2310

Five Movements and Six Qi

2 U; 2 Lect.

This course introduces the students to the theory of “Five Movement and Six Qi” in Chinese medicine. This theory deals with the relationship between human sickness and climatic variations. The emphasis of the course is placed on the climatic changes and their effects on the occurrence of diseases, in particular cardiovascular, neurological, respiratory and epidemic diseases.

BCM2311

A Comparative Study of the Traditional Chinese and Western Medical System

2 U; 2 Lect.

This course introduces to students the differences between traditional Chinese and Western Medical Systems by comparing their culture, history, scientific background, fundamental principles, treatment methods and present status. This course also looks into the differences between Chinese and Western drugs and their therapeutic applications.

BCM2401, 2402, 2403, 2404, 2405

Clinical Training I, II, III, IV, V

1 U each; 1 Prac.

This course provides teaching in the clinical settings of local clinics or wards in a Chinese medicine hospital. Clinical training will cover various specialties of Chinese medicine, including internal medicine, acupuncture and bone setting.

BCM3102

Internal Medicine I

4 U; 4 Lect.

Being the foundation of all other clinical courses, this course deals with the symptoms, etiology, mechanism, as well as the treatment of diseases of different internal systems. Students will learn how to diagnose, analyse and treat common diseases.

BCM3103

Specialties in Chinese Medicine: Febrile Diseases

3 U; 2 Lect. 1 Tut.

This course deals with the theories and treatment of ailments caused by exogenous factors (mostly infectious) by Chinese medicine in accordance with the principles of febrile diseases.

BCM3104

Selected Reading in Chinese Medicine Classics - Jin-Gui-Yao-Lue

3 U; 3 Lect.

This course deals with the medical classic Jin-Gui-Yao-Lue, or the Treatise of the Golden Chamber. Students will learn from it the traditional concepts and treatments of diseases.

BCM3105

Specialties in Chinese Medicine: Obstetrics and Gynaecology

4 U; 4 Lect.

This course teaches the traditional theories and practice of obstetrics and gynaecology. It will cover topics such as female reproductive physiology and pathology, as well as the diagnosis, treatment and prevention of female diseases, including those during pregnancy.

BCM3106

Acupuncture

4 U; 3 Lect. 1 Prac.

This course presents the basic principles and techniques of acupuncture and moxibustion. It also discusses the acupuncture points and the meridian system of the body, their physiological functions and clinical significance. Students will learn to use acupuncture needles for therapy.

BCM3108

Massage Therapy in Chinese Medicine

2 U; 1 Lect. 1 Prac.

The Chinese massage therapy, known as Tui-Na, is a common practice. Students will learn the theories as well as different massage techniques in this course.

BCM3110

Surgery and Topical Diseases

3 U; 3 Lect.

Based on the holistic theories of Chinese medicine, topical diseases are often caused by malfunctions of the internal systems. Management of topical diseases often requires a combination of surgical and internal treatments. This course will emphasize on the diagnosis, treatment and surgical techniques used in Chinese medicine for the management of topical diseases.

BCM3202

Internal Medicine II

4 U; 4 Lect.

This course is a continuation of BCM3102.

BCM3204

Orthopaedics and Traumatology in Chinese Medicine

5 U; 4 Lect. 1 Prac.

This course covers the Chinese medical theories and techniques in diagnosis and treatment of traumatic injuries such as muscular injury, bone fracture and joint dislocation.

BCM3206

Promotion and Maintenance of Health by Chinese Medicine

2 U; 2 Lect.

This course deals with the Chinese medical concepts and practice of Chinese Medicine for the promotion and maintenance of health.

BCM3208

Hong Kong Medical System

1 U; 1 Lect.

This course is an introduction to the medical system in Hong Kong, with special emphasis on the roles of Chinese medicine in the society and its regulation.

BCM4101

Clinical Study I

12 U

This course provides teaching in the clinical settings of clinics and wards in a Chinese medicine hospital. Clinical training will cover various specialties of Chinese medicine, including internal medicine, acupuncture and bone setting. Students will rotate among attachments to various clinical departments. They are required to write reports on case histories of selected topics.

BCM4103

Clinical Study II

12 U

This course is a continuation of BCM4101.

BCM4104

Clinical Study III

12 U

This course is a continuation of BCM4103.

BCM4105

History on Chinese Medicines and Theories of Chinese Medicine

4 U; 4 Lect.

This course discusses the origin, the theoretical background and the development of Chinese medicine. It will cover the major events of Chinese medicine that occurred throughout history in relation to the social environment. It also deals with the different important schools of thoughts in Chinese medicine and compares their viewpoints on the causes and treatments of diseases.

BCM4106

Tutorial in Chinese Medicine

3 U; 3 Tut.

This course provides an overall review of the theoretical and pre-clinical aspects of Chinese medicine, preparing students for clinical studies.

BCM4107

Ear, Nose, Throat and Ophthalmology

4 U; 4 Lect.

This course deals with the diseases associated with ENT and the eyes. It teaches the traditional theories, diagnosis and treatment of these ailments.

BCM4108

Paediatrics

3 U; 3 Lect.

This course teaches the traditional theories and practice of paediatrics. It will include topics such as growth and development of children, common childhood diseases and their treatment, as well as the preventive medicine for children.

Note: BCM1104 and 1205 are open to enrolment for all undergraduates/graduates.

Study Scheme

I. Major Programme

Pre-clinical Programme

The Pre-clinical Programme extends over three and a half academic years. Students are required to complete at least 123 units of required and elective courses including subjects in basic medical and life sciences, clinical disciplines of modern medicine, Chinese materia medica and prescription principles, Chinese classics in medicine, and cultural perspectives of Chinese Medicine, Chinese medical concepts and practices. Students are also required to complete 12 units of General Education courses and 2 units of Physical Education courses.

Clinical Programme

The second term of the fourth year of the study provides teaching in the clinical settings of clinics and wards in a Chinese medicine hospital. Clinical training will cover various specialties of Chinese medicine, including internal medicine, acupuncture and bone setting. Students will rotate among attachments to various clinical departments. They are required to write reports on case histories of selected topics.

The fifth year of the study consists of two courses (BCM4103 and 4104). Students will receive advanced clinical training in one or two selected specialties. Each student will attach to a Chinese medicine hospital and/or a specialty clinic in the Mainland or Hong Kong for advanced training. The courses also focus on the operation of Chinese medicine clinics in Hong Kong, and provide practical experience for students to diagnose and treat common medical problems in out-patient clinic settings. A professional examination will be given to students at the end of each term.

After satisfactory completion of the Clinical Programme, a Bachelor of Chinese Medicine degree will be conferred and graduates will be qualified to apply for registration as a registered Chinese medicine practitioner.

Recommended course pattern

Students are required to complete the following Major required courses:

A. Applicable to students admitted in 2005-06 and thereafter

First Year of Attendance

1st term :	BCM1104, 1205, 1600, NRS1400	12 units
2nd term :	BCJ1201, BCM1610, 2001, BCH1000, 1700, NRS1410	17 units

Second Year of Attendance

1st term : BCM2101, 2102, 2105, 2401	18 units
2nd term : BCM2201, 2202, 2204, 2205, 2402	20 units

Third Year of Attendance

1st term : BCM2403, 3102, 3104, 3106, 3108, 3110	17 units
2nd term : BCM2404, 3105, 3202, 3204, 3206, 3208	17 units

Fourth Year of Attendance

1st term : BCM2405, 3103, 4105, 4106, 4107, 4108	18 units
2nd term : BCM4101	12 units

Students should take 4-8 units from the following elective courses during Pre-clinical years: 4-8 units

BCM2203, 2207, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, BIO2010, PTH3051

Fifth Year of Attendance

1st term : BCM4103	12 units
2nd term : BCM4104	12 units

Total: 159-163 units

Students are required to take UGC282Z/GEE282Z (3 units) under Area C (Society and Culture) of the University General Education courses in the 1st term in the first year of attendance.

B. Applicable to students admitted in 2003-04 and 2004-05*First Year of Attendance*

1st term : BCM1104, 1205, 1600, NRS1400	12 units
2nd term : BCJ1201, BCM1610, 2001, BCH1000, 1700, NRS1410	17 units

Second Year of Attendance

1st term : BCM2101, 2102, 2105, 2401	18 units
2nd term : BCM2201, 2202, 2204, 2205, 2402	20 units

Third Year of Attendance

1st term : BCM2403, 3102, 3104, 3105, 3108, 3110	17 units
2nd term : BCM2404, 3106, 3202, 3204, 3206, 3208	17 units

Fourth Year of Attendance

1st term : BCM2405, 3103, 4105, 4106, 4107, 4108	18 units
2nd term : BCM4101	12 units

Students should take 4-8 units from the following elective courses during Pre-clinical years: 4-8 units

BCM2203, 2207, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, BIO2010, PTH3051

Fifth Year of Attendance

1st term : BCM4103	12 units
2nd term : BCM4104	12 units

Total: 159-163 units

Students are required to take UGC282Z/GEE282Z (3 units) under Area C (Society and Culture) of the University General Education courses in the 1st term in the first year of attendance.

Note: Applicable to all BCM Majors

Students should obtain Grade "D" or above in each Major course. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 5.2(e) of the Regulations Governing Undergraduate Studies in Chinese Medicine.

SUMMARY

	Units
General Education	12
Physical Education	2
Major Courses	118-122
Clinical Training	41
	<hr/>
	Total: 173-177

Note: BCJ1201, all BCM courses, as well as BCH1000, 1700, BIO2010, NRS1400 and 1410 will be included in the calculation of the Major GPA for honours classification.

2. *Faculty Language Requirement*
3. *Major/Faculty Requirement for S6 Entrants*

Environmental Science

The Environmental Science Programme is jointly offered by the Departments of Biology, Chemistry and Biochemistry.

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
ENS0200	Current Environmental Issues	2
ENS0420	Directed Research in Environmental Science I	2
ENS0421	Directed Research in Environmental Science II	3
ENS2100	Essentials of Environmental Science	3
ENS2270	Introduction to Environmental Science	3
ENS2272	Introduction to Environmental Science Laboratory	2
ENS2515	Environmental Chemistry I: General	3
ENS2517	Environmental Chemistry I Laboratory	2
ENS3230	Principles of Environmental Protection and Pollution Control	3
ENS3320	Biochemical Toxicology	3
ENS3920	Biochemical Toxicology Laboratory	2
ENS3415	Environmental Instrumentation Techniques	3
ENS3417	Environmental Instrumentation Techniques Laboratory	2
ENS4240	Environmental Impact Assessment	3
ENS4242	Environmental Impact Assessment Laboratory	2
ENS4250	Environmental Health	3
ENS4252	Environmental Health Laboratory	2
ENS4260	Conservation Biology	3
ENS4310	Methods in Toxicological Research	3
ENS4510	Methods in Toxicological Research Laboratory	2
ENS4525	Environmental Chemistry II: Industrial	3
ENS4535	The Chemical Treatment Processes	3

Course Description

ENS0200

Current Environmental Issues

2 U; 1 STOT 1 Sem.; 1st term

This course aims at increasing students' awareness of global environmental issues relevant to Hong Kong. Current issues of environmental policy and issues will be introduced. Active learning will be used to enhance students' knowledge on environmental issues and policy. Students will be provided with opportunities to express their opinions and to present information using evidence, data and sources pertaining to environmental issues. (For Environmental Science Majors only, other students should consult the Office of Environmental Science Programme for approval.)

ENS0420

Directed Research in Environmental Science I

2 U; 2 STOT; 1st term

In this course, students will undertake a research project under the supervision of a faculty member. Research work will commence during the summer vacation preceding the final year of attendance. Students are required to discuss their progress with their supervisors. These efforts will culminate in the production of a progress report on the research results obtained and relevant literature reviewed. The progress report will be submitted at the end of the first term. Also, students are required to attend seminars organized by the Programme. Corequisite: ENS0421.

ENS0421

Directed Research in Environmental Science II

3 U; 3 STOT; 2nd term

Students will complete the research project of ENS0420 and discuss their research data with supervisors. These efforts will culminate in delivery of a seminar and the production of a written report. Also, students are required to attend seminars organized by the Programme. Corequisite: ENS0420.

ENS2100

Essentials of Environmental Science

3 U

This is a survey course focused on a scientific understanding of the effects of human activities on the natural world. Basic biological and chemical concepts will be introduced to evaluate current environmental issues. A wide scope of topics including biodiversity, marine conservation, air quality, water pollution, remediation technologies, toxicology, waste management, alternative energy and sustainable development will be discussed. Besides attending lecture, students are expected to participate in discussion and field trips. The purpose of this course is to apply a multidisciplinary approach to examine complex environmental problems.

ENS2270

Introduction to Environmental Science

3 U; 3 Lect.; 2nd term

This course deals with the relationships between living organisms, resources and environment. The ecological viewpoint on resource processes such as agriculture, nature conservation, energy supply and utilization, and waste production will be discussed. Case studies are included to illustrate the importance of the biological components in waste treatment as well as food and energy production from waste utilization.

ENS2272

Introduction to Environmental Science Laboratory

2 U; 3 Lab.; 2nd term

To accompany ENS2270.

ENS2515

Environmental Chemistry I: General

3 U; 3 Lect.; 1st term

This is a foundation course designed to equip students with a proper understanding of the fundamental aspects of environmental chemistry. It introduces the basic concept of chemical equilibrium and kinetics, the nature and characteristics of various common types of air and water pollution arising from industrial, agricultural and domestic sources. It outlines

the principles of measurement for various parameters commonly used for air and water pollution studies, their significance and limitations. It also examines various types of aerial emission arising from combustion and industrial processes, and vehicles, and their chemical interaction leading to the formation of photochemical smog, depletion of ozone layer and global warming effects.

ENS2517

Environmental Chemistry I Laboratory

2 U; 3 Lab.; 1st term

To accompany ENS2515.

ENS3230

Principles of Environmental Protection and Pollution Control

3 U; 3 Lect.; 2nd term

This course discusses the anthropogenic causes of environmental degradation and the approaches to environmental protection and pollution control. Students are introduced the causes of environmental problems, the concept of sustainability in environmental protection, economic measures and voluntary approach in environmental management, energy issues and control and treatment technologies and their comparative effectiveness in the abatement of various types of pollution. Management programmes and control strategies in tackling local environmental problems are illustrated.

ENS3320

Biochemical Toxicology

3 U; 3 Lect.; 2nd term

This course presents the fundamental basis of toxic action of chemical substances including environmental toxicants on living systems. Students will get an understanding of biologic mechanisms and principles related to toxicology.

ENS3920

Biochemical Toxicology Laboratory

2 U; 3 Lab.; 2nd term

To accompany ENS3320.

ENS3415

Environmental Instrumentation Techniques

3 U; 3 Lect.; 1st term

This course aims to provide students with a basic understanding of the operational principles and application of various instrumental techniques commonly used for the studies of air and water pollution. It is designed to cover atomic absorption and emission spectrophotometry, plasma emission spectrometry, optical spectroscopy, x-ray spectroscopy, gas chromatography, high-performance liquid chromatography, mass spectrometry, and electrochemical methods. Emphasis will be placed on the application of such techniques for pollution monitoring and preventive detection systems, especially with reference to the identification and determination of trace levels of toxic heavy metals, organic and organometallic compounds. Prerequisite: ENS2515 or by permission of the instructor.

ENS3417

Environmental Instrumentation Techniques Laboratory

2 U; 3 Lab.; 1st term

To accompany ENS3415.

ENS4240

Environmental Impact Assessment

3 U; 3 Lect.; 1st term

This course discusses the rationale, techniques and procedures of evaluating environmental consequences arising from human activities such as urban development, landfill, waste disposal, sewerage discharge and resource utilization. Students will be introduced to the origin and development of environmental impact assessment in Hong Kong as well as in other countries, the design of assessment procedures, the identification and quantitative evaluation of key issues, and other special topics associated with EIA, including strategic environmental assessment, cumulative impact analysis and statistical and environmental data analysis. Prerequisite: ENS3230 or by permission of the instructor.

ENS4242

Environmental Impact Assessment Laboratory

2 U; 3 Lab.; 1st term

To accompany ENS4240.

ENS4250

Environmental Health

3 U; 3 Lect.; 2nd term

This course introduces the contemporary problems and issues in environmentally dependent aspects of health. Broad coverage of health effects of airborne and waterborne pollutants, pesticides, consumer product, and heavy metals are considered. Occupational exposure to chemical and physical hazards will also be discussed.

ENS4252

Environmental Health Laboratory

2 U; 3 Lab.; 2nd term

To accompany ENS4250.

ENS4260

Conservation Biology

3 U; 3 Lect.; 2nd term

This course aims to provide an in-depth discussion of conservation problems and solution. It requires students to have fundamental knowledge of biology and ecology. Major topics include conservation genetics, biodiversity, techniques in assessing biodiversity, problems of habitat fragmentation, design and role of reserves and protected areas, conservation of soil and water resources, wildlife and fisheries management, land use, conservation of non-renewable mineral resources, energy use and conservation, conservation policy and laws. Emphasis will be given to problems critically important to today's Hong Kong.

ENS4310

Methods in Toxicological Research

3 U; 3 Lect.; 1st term

This course introduces to students current methodologies commonly employed in toxicological studies. The following techniques, chromatographic and electrophoretic methods, sedimentation, use of radioisotope, ultraviolet and fluorescence spectrophotometry, will be included. The determination of toxic pollutants and their metabolic conversion in biological systems will be discussed. Animal models in toxicity evaluation and molecular toxicology concepts will also be covered.

ENS4510

Methods in Toxicological Research Laboratory

2 U; 3 Lab.; 1st term

To accompany ENS4310.

ENS4525

Environmental Chemistry II: Industrial

3 U; 3 Lect.; 1st term

This course is designed to extend students' understanding and develop their ability in the application of various aspects of environmental chemistry in relation to the major types of air and water pollution associated with industrial and vehicle emissions. It outlines the basic processes in bleaching and dyeing, electroplating and food processing that give rise to water pollution and applies physico-chemical techniques in controlling such pollution. It examines also combustion processes and the associated applications and limitations of the absorption, adsorption, oxidation-reduction and catalytic conversion techniques in relation to aerial emissions from furnaces and vehicles. Appropriate site visits will be arranged where possible to enhance students' ability in application.

ENS4535

The Chemical Treatment Processes

3 U; 3 Lect.; 2nd term

This course introduces the principles and applications of various chemical and physio-chemical processes applicable for treatment and control of air and water pollution. It studies the processes of neutralization, oxidation-reduction, chemical precipitation, coagulation, flocculation, physical separation, absorption, adsorption, filtration, chemical disinfection, solvent extraction, fractional distillation and incineration. It also examines the applicabilities and limitations of such processes with reference to the treatment and recovery of toxic and hazardous chemical wastes. Appropriate site visits will be arranged to enhance students' ability in application.

Study Scheme

1. Major Programme

A. Applicable to students admitted in 2007-08 and thereafter

Students are required to complete 64-70 units of courses as follows:

- | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Note): | 45 units |
| | BCH2030#/2730#, BIO2210#/2212#, 4210#/4212#, ENS0200, 2270/2272, 2515/2517, 3230, 3320/3920, 3415/3417, 4240/4242 | |
| (ii) | At least five of the following Elective Courses (Among the five courses, students should take at least two elective courses accompanied by laboratory courses, or ENS0420/0421 with one elective course accompanied by laboratory course.): | 19-25 units |
| | (a) ENS0420/0421, 4250, 4252, 4260, 4310/4510, 4525, 4535; and | |
| | (b) Approved electives offered by other Departments (Students should take no more than three courses from this category.): | |
| | BCH4010#/4610#, 4050#/4650#, BIO2010#/2012#, 2310#, 3410#/3412#, 3710#/3712#, 4220#/4222#, 4510#/4512#, CHM3130#/3860#, 4400#/4870#, GRM3202#, 3203#, 3223#, 3321# | |

Total: 64-70 units

To be included in the Major GPA as well.

B. Applicable to students admitted in 2005-06 and 2006-07

Students are required to complete 64-70 units of courses as follows:

- | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Note):
BCH2030#/2730#, BIO2210#/2212#, 4210#/4212#, ENS0200, 2270/2272, 2515/2517, 3230, 3320/3920, 3415/3417, 4240/4242 | 45 units |
| (ii) | At least five of the following Elective Courses (Among the five courses, students should take at least two elective courses accompanied by laboratory courses, or ENS0420/0421 with one elective course accompanied by laboratory course.):
(a) ENS0420/0421, 4250, 4252, 4260, 4310/4510, 4525, 4535; and
(b) Approved electives offered by other Departments (Students should take no more than three courses from this category.):
BCH4010#/4610#, 4050#/4650#, BIO2010#/2012#, 2310#, 3410#/3412#, 3710#/3712#, 4220#/4222#, 4510#/4512#, CHM3130#/3860#, 4400#/4870#, GRM3203#, 3223#, 3321# | 19-25 units |

Total: 64-70 units

To be included in the Major GPA as well.

Recommended course pattern**Applicable to students admitted in 2005-06 and thereafter**

<i>First Year of Attendance</i>	1st term : BIO2210/2212, ENS0200, 2515/2517 2nd term : BCH2030/2730, ENS2270/2272	22 units
<i>Second Year of Attendance</i>	1st term : ENS3415/3417, plus one to two elective courses from (ii) above 2nd term : ENS3230, 3320/3920, BIO4210/4212 and optionally one extra elective course from (ii) above	21-23 units
<i>Third Year of Attendance</i>	1st term : ENS4240/4242 plus three or four elective courses from (ii) above	16-25 units

Total: 64-70 units

Note: Applicable to all Major students

Students should obtain Grade "D" or above in each of the courses of BCH2030/2730, BIO2210/2212, ENS2270/2272 and 2515/2517. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.

2. Minor Programme

- | | | |
|-----|----------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Students are required to complete a minimum of 18 units of courses as follows: | |
| (a) | two courses from BIO2210, ENS2270, 2515 | 6 units |
| (b) | four courses from BCH4050 (or BIO4220), ENS3230, 3320, 3415 (or CHM3410/3870), ENS4240, 4250, 4260, 4310, 4525, 4535 | 12 units |

Total: 18 units

- (ii) Certain prerequisite conditions for registering for the courses may be waived; intending Minor students should consult the Office of Environmental Science Programme individually.
- 3. *Faculty Language Requirement*
- 4. *Major/Faculty Requirement for S6 Entrants*

Food and Nutritional Sciences

The Food and Nutritional Sciences Programme is jointly offered by the Departments of Biochemistry and Biology.

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
FNS0411	Directed Research in Food and Nutritional Sciences I	2
FNS0421	Directed Research in Food and Nutritional Sciences II	2
*FNS2000	Aspects of Food and Nutritional Sciences	2
FNS2001	Introduction to Food Science and Technology	2
FNS2002	Nutrition for Health	2
FNS2010	Fundamentals of Human Physiology	3
FNS2011	Fundamentals of Human Physiology Laboratory	1
FNS3010	Nutrition and Human Development	3
FNS3011	Nutrition and Human Development Laboratory	1
FNS3030	Nutritional Biochemistry	3
FNS3031	Nutritional Biochemistry Laboratory	1
FNS3110	Food Chemistry and Analysis	3
FNS3111	Food Chemistry and Analysis Laboratory	1
FNS4110	Food Technology	3
FNS4111	Food Technology Laboratory	1
FNS4120	Community Nutrition	3
FNS4121	Community Nutrition Laboratory	1
FNS4150	Introduction to Medical Nutrition Therapy	3
FNS4151	Introduction to Medical Nutrition Therapy Laboratory	1
FNS4160	Nutrition Planning and Food Policy	3
FNS4161	Nutrition Planning and Food Policy Laboratory	1
FNS4170	Food Product Development and Quality Control	3
FNS4171	Food Product Development and Quality Control Laboratory	2
FNS4180	Food Microbiology	3
FNS4181	Food Microbiology Laboratory	1
FNS4190	Food Safety and Toxicology	3

Course Description

FNS0411

Directed Research in Food and Nutritional Sciences I

2 U; 2 STOT; 1st term

In this course, students will undertake a small research project under the supervision of a faculty member. Research work will commence during the summer vacation immediately preceding the student's final year of attendance. The results of the research, as they relate to the recent relevant literature, will be presented as a seminar during the final year.

* *Course offered in 2005-06 and before.*

FNS0421

Directed Research in Food and Nutritional Sciences II

2 U; 2 STOT; 2nd term

Students will meet periodically with the supervisor to discuss and interpret their research data. These discussions will culminate in the production of a comprehensive written report which will be submitted for assessment near the end of the student's final term of attendance.

FNS2001

Introduction to Food Science and Technology

2 U; 2 Lect.; 1st term

This course will provide an overview of various topics in food science and technology. Lectures will include discussions of general areas of interest chosen to stimulate and foster students' interest in both food science and food technology. The course will cover topics that include basic food chemistry, food processing and preservation, food microbiology and fermentation, food safety and toxicology, food engineering, food biotechnology, food evaluation and product development, etc. Relevant examples will be cited to strengthen the basic understanding of the principles in each topic. Local issues related to food will also be discussed.

FNS2002

Nutrition for Health

2 U; 2 Lect.; 2nd term

This course provides an overview of the basic concepts and principles of nutrition science and how to apply the principles of good nutrition in everyday life to the planning of healthy eating for optimal health, performance and disease prevention. Students will also be able to identify some common Hong Kong nutrition problems and the role of nutrition in their origins, prevention and therapy. The course will also expose the students to some additional nutritional issues of current health or research significance.

FNS2010

Fundamentals of Human Physiology

3 U; 3 Lect.; 1st term

This course involves the study of the functions of the human body, including homeostasis and negative feedback in control of physiological parameters; transport mechanisms; body fluids and the cardiovascular system; the respiratory system: pulmonary function, mechanics of respiration, O₂ and CO₂ exchange and transport; the provision of nutrients and the gastrointestinal system; the renal system and elements of renal function; the nervous system; the endocrine system; sensory physiology; and immunology.

FNS2011

Fundamentals of Human Physiology Laboratory

1 U; 3 Lab.; 1st term

To accompany FNS2010.

FNS3010

Nutrition and Human Development

3 U; 3 Lect.; 2nd term

This course will introduce students to the study of human growth, development, nutrition and health. Particular reference will be made to dietary needs for growth and development and the importance of establishing healthy eating patterns. It includes coverage of pre-natal development, maternal nutrition, infant growth and feeding, growth and nutrition in childhood and adolescence, nutrition in the middle years, and ageing and nutrition.

FNS3011

Nutrition and Human Development Laboratory

1 U; 3 Lab.; 2nd term

To accompany FNS3010.

FNS3030

Nutritional Biochemistry

3 U; 3 Lect.; 1st term

This component will provide students with the background required to appreciate the biochemical aspects of nutrition and the impact of nutrition-related factors on normal human biochemistry. Areas covered include the digestion and absorption of nutrients, energy intake and expenditure, nutrition and metabolism of carbohydrate, cholesterol homeostasis, metabolism of dietary fats and their effect on lipoprotein cholesterol, nitrogen metabolism, and minerals and vitamins and their roles in biochemical processes.

FNS3031

Nutritional Biochemistry Laboratory

1 U; 3 Lab.; 1st term

To accompany FNS3030.

FNS3110

Food Chemistry and Analysis

3 U; 3 Lect.; 1st term

This course will cover the basic chemical and analytical aspects of major food components (water, carbohydrates, lipids and proteins) and minor food components (vitamins, minerals, pigments and food additives including flavors, colorants and preservatives). Emphasis will be made on the chemical reactions and changes in these food constituents during processing, handling and storage. The principles and applications of chemical and instrumental analysis of food will also be discussed.

FNS3111

Food Chemistry and Analysis Laboratory

1 U; 3 Lab.; 1st term

To accompany FNS3110.

FNS4110

Food Technology

3 U; 3 Lect.; 2nd term

In this course, students will examine the principles behind food processing technology, including various conventional equipment used and their effects on the sensory, microbiological and nutritional quality of a range of foods e.g., meats, vegetables, fruits. Topics may also include food processing, waste management, etc., and basic principles of food engineering.

FNS4111

Food Technology Laboratory

1 U; 3 Lab.; 2nd term

To accompany FNS4110.

FNS4120

Community Nutrition

3 U; 3 Lect.; 1st term

Community nutrition recognizes that the control and prevention of nutrition problems are not merely biomedical in nature, but are embedded in the community of the affected individuals. A community nutritionist assesses and monitors not only physiological and dietary, but also social, cultural, technological and psychological information from many sources to determine needs and identify opportunities for sound, appropriate interventions that improve nutritional health. Because well-conceived nutrition surveys are basic tools for prioritising problems and deciding program plans and evaluations to provide better nutrition services to the public, the course will first introduce community nutrition survey design to the students. Making healthier choices, however, requires lifelong change in thinking and action at both individual and community levels. The rest of the course examines applications of current individual and group nutritional behaviour change theories to promote healthier diets.

FNS4121

Community Nutrition Laboratory

1 U; 3 Lab.; 1st term

To accompany FNS4120.

FNS4150

Introduction to Medical Nutrition Therapy

3 U; 3 Lect.; 1st term

This course will introduce the aetiology and dietary management of selected diet-related diseases including obesity; anorexia and other eating disorders; diabetes mellitus; cardiovascular diseases including hyper-lipidaemias; diseases of the alimentary canal, liver, kidney and gall bladder; gout; cancer; pancreatitis and food allergies. It will also cover nutritional concern for AIDS patients and the interaction of drugs and nutrients. Medical nutrition therapy examines the theory behind the treatment of disease with the help of diet. The related applied aspects of dietetics, including the practical skills associated with the preparation, use and evaluation of special diets, and the development of interview and communication skills, will also be covered.

FNS4151

Introduction to Medical Nutrition Therapy Laboratory

1 U; 3 Lab.; 1st term

To accompany FNS4150.

FNS4160

Nutrition Planning and Food Policy

3 U; 3 Lect.; 2nd term

This course explores the emergence of food and nutrition policies from their multisectoral agricultural, population, health, environmental, economic, technological and political origins. The class will examine case studies from the international arena, focusing on Asian regional and local food and nutrition policy developments. Because nutrition promotion to the public is an integral component of these policies, a final portion of this course is devoted to the design of effective nutrition promotion and communication strategies for specific groups, including needs assessment, planning, implementation and evaluation.

FNS4161

Nutrition Planning and Food Policy Laboratory

1 U; 3 Lab.; 2nd term

To accompany FNS4160.

FNS4170

Food Product Development and Quality Control

3 U; 3 Lect.; 1st term

This course explores various stages of food product development, and the importance of quality assurance. Topics include idea development, taste-panelling, shelflife, packaging, production, costing procedures, market research and advertising, commercialization, food ingredient functionality, food product optimization, food regulations, the ISO 9000 series of standards, HACCP, etc.

FNS4171

Food Product Development and Quality Control Laboratory

2 U; 3 Lab.; 1st term

To accompany FNS4170.

FNS4180

Food Microbiology

3 U; 3 Lect.; 2nd term

This course considers the microorganisms in food safety, spoilage, and production. Topics discussed include food-borne disease agents and their control, food sanitation/hygiene, growth parameters of food spoilage agents, destruction of microbes in food, food fermentations, and the biotechnology of microbes as a resource for the food industry. The principles and practices of modern and rapid analytical methods for monitoring microbiological qualities of foods will also be discussed.

FNS4181

Food Microbiology Laboratory

1 U; 3 Lab.; 2nd term

To accompany FNS4180.

FNS4190

Food Safety and Toxicology

3 U; 3 Lect.; 2nd term

Food can be contaminated at any stage of its production and handling with naturally occurring toxicants and/or man-made chemicals that have adverse health effects to humans. The objective of this course is to gain knowledge on the key concepts and principles of food safety and toxicology. Students are expected to develop an understanding of the nature and properties of the toxic substances in foods as well as the nature and magnitude of the hazard they represent to humans, with the aim of preventing health risks due to food intake. Topics on food safety include food hygiene, food poisoning, food legislation and food safety control systems. Topics on food toxicology include its general principles, biochemical and physiological mechanisms of action of food toxicants, and methods for food safety assessment. Emphasis will be placed on the evaluation of current issues in food safety toxicology including risk assessment and management.

Study Scheme

I. Major Programme

A. Applicable to students admitted in 2006-07 and thereafter

Students are required to complete a minimum of 64 units of courses as follows:

- | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Required Courses (Note):
FNS2001, 2002, 2010/2011, 3010/3011, 3030/3031,
3110/3111, BCH2010#/2710#, 2030#/2730#,
BIO2310#/2312#, 3410#/3412# | 40 units |
| (ii) | One group of elective courses from: | 24 units |
| (a) | Six elective courses with laboratories from:
FNS4110/4111, 4120/4121, 4150/4151, 4160/
4161, 4170/4171, 4180/4181, 4190; or | |
| (b) | Five elective courses with laboratories from those
listed in (ii)(a) plus STOT courses FNS0411 and
0421; or | |
| (c) | Five elective courses with laboratories from those
listed in (ii)(a) plus one elective course with
laboratory from either BCH4050#/4650#, 4060#/
4660#, 4130#/4730#, BIO4320#/4322#, 4410# or
ENS3320#/3920#; or | |
| (d) | Four elective courses with laboratories from those
listed in (ii)(a) plus one elective course with
laboratory from either BCH4050#/4650#, 4060#/
4660#, 4130#/4730#, BIO4320#/4322#, 4410# or
ENS3320#/3920#, plus STOT courses FNS0411 and
0421. | |

Total: 64 units

To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	23 units
1st term : FNS2001, 2010/2011, BCH2030/2730	
2nd term : FNS2002, BCH2010/2710, BIO2310/2312	
<i>Second Year of Attendance</i>	21 units
1st term : FNS3030/3031, 3110/3111, BIO3410/3412	
2nd term : FNS3010/3011 plus one elective course with laboratory	
<i>Third Year of Attendance</i>	20 units
The rest of elective courses not yet taken from (ii)	

Total: 64 units

Note: *Applicable to students admitted in 2006-07 and thereafter*
Students should obtain Grade "D" or above in the courses of FNS2001, 2002, 2010/2011, BCH2010/2710, 2030/2730, and BIO2310/2312. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2 (e) of the General Regulations Governing Full-time Undergraduate Studies.

B. Applicable to students admitted in 2005-06

Students are required to complete a minimum of 62 units of courses as follows:

- | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Required Courses (Note):
FNS2000, 2010/2011, 3010/3011, 3030/3031, 3110/3111,
BCH2010#/2710#, 2030#/2730#, BIO2310#/2312#, 3410/
3412# | 38 units |
| (ii) | One group of elective courses from: | 24 units |
| (a) | Six elective courses with laboratories from:
FNS4110/4111, 4120/4121, 4150/4151, 4160/
4161, 4170/4171, 4180/4181, 4190; or | |
| (b) | Five elective courses with laboratories from those
listed in (ii)(a) plus STOT courses FNS0411 and
0421; or | |
| (c) | Five elective courses with laboratories from those
listed in (ii)(a) plus one elective course with
laboratory from either BCH4050#/4650#, 4060/
4660#, 4130#/4730#, BIO4320#/4322#, 4410# or
ENS3320#/3920#; or | |
| (d) | Four elective courses with laboratories from those
listed in (ii)(a) plus one elective course with
laboratory from either BCH4050#/4650#, 4060/
4660#, 4130#/4730#, BIO4320#/4322#, 4410# or
ENS3320#/3920#, plus STOT courses FNS0411 and
0421. | |

Total: 62 units

To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	21 units
1st term : FNS2000, 2010/2011, BCH2010/2710	
2nd term : BCH2030/2730, BIO2310/2312	
<i>Second Year of Attendance</i>	21 units
1st term : FNS3030/3031, 3110/3111, BIO3410/3412	
2nd term : FNS3010/3011 plus one elective course with laboratory	
<i>Third Year of Attendance</i>	20 units
The rest of elective courses not yet taken from (ii)	
	<hr/> Total: 62 units

Note: *Applicable to students admitted in 2005-06*

Students should obtain Grade "D" or above in the courses of FNS2000, 2010/2011, BCH2010/2710, 2030/2730, and BIO2310/2312. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.

2. *Faculty Language Requirement*
3. *Major/Faculty Requirement for S6 Entrants*

Mathematics

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
MAT0100	Guided Studies	1
*MAT0200	Tutorial Seminar	1
MAT0310	Seminar I	2
MAT0320	Seminar II	2
MAT1010	University Mathematics	3
MAT1020	University Mathematics II	3
MAT1110	University Mathematics for Engineering	3
MAT1320	University Mathematics for Applications	3
MAT2010	Advanced Calculus I	3
MAT2020	Advanced Calculus II	3
MAT2030	Linear Algebra I	3
MAT2040	Linear Algebra II	3
MAT2050	Elementary Analysis I	3
MAT2060	Elementary Analysis II	3
MAT2071	Mathematics Laboratory I	2
MAT2072	Mathematics Laboratory II	2
MAT2080	Essential Mathematical Methods I	3
MAT2090	Essential Mathematical Methods II	3
MAT2110	Mathematics and Culture	3
MAT2300	Applied Algebra	3
MAT2310	Linear Algebra and Applications	3
MAT3010	Higher Geometry	3
MAT3030	Algebra I	3
MAT3040	Algebra II	3
MAT3070	Introduction to Topology	3
MAT3080	Number Theory	3
MAT3090	Fourier Analysis	3
MAT3210	Linear Programming	3
MAT3220	Operations Research and Logistics	3
MAT3230	Numerical Analysis	3
MAT3240	Numerical Methods for Differential Equations	3
MAT3250	Complex Variables and Applications	3
MAT3260	Graph Theory	3
MAT3270	Ordinary Differential Equations	3
MAT3280	Introductory Probability	3
MAT3300	Mathematical Modeling	3
MAT3310	Computational and Applied Mathematics	3
MAT3330	IT for Mathematics Teaching	3
MAT4001, 4002	Project	3 each
MAT4010	Functional Analysis	3
MAT4020	Calculus of Variations	3
MAT4030	Differential Geometry I	3
MAT4040	Differential Geometry II	3
MAT4050	Real Analysis	3
MAT4210	Financial Mathematics	3
MAT4220	Partial Differential Equations	3

* Course offered in 2006-07 and before.

MAT4230	Optimization Theory	3
MAT4240	Stochastic Processes	3
MAT4250	Game Theory	3
MAT4260	Coding Theory and Cryptography	3
MAT4270	Discrete Dynamics and Fractals	3
MAT5011	Real Analysis I	3
MAT5012	Real Analysis II	3
MAT5031	Complex Analysis I	3
MAT5032	Complex Analysis II	3
MAT5051	Abstract Algebra I	3
MAT5052	Abstract Algebra II	3
MAT5070	Topology of Manifolds	3
MAT570S	Guided Studies I	3
MAT580S	Guided Studies II	3

Course Description

(Unless otherwise specified, all are 3-unit term courses of three hours of lecture and one hour of tutorial per week.)

MAT0100
Guided Studies
1 U; 1 STOT

This course is designed for Secondary 6 entering students with potential major in Mathematics. It consists of small group studies and discussions on calculus and related topics.

MAT0310
Seminar I
2 U; 2 STOT; 1st term

Small group discussion on topics in analysis, geometry, algebra and applied mathematics. (For Mathematics Majors only.)

MAT0320
Seminar II
2 U; 2 STOT; 2nd term

Small group discussion on topics in analysis, geometry, algebra and applied mathematics. (For Mathematics Majors only.)

MAT1010
University Mathematics

This course is designed for Secondary 6 entering students who have a good background in mathematics. Topics include: complex number system; basic geometry including conic sections, basic plane curves, polar coordinates, lines and planes in three-dimensional geometry; elementary functions including polynomials and rational functions, exponential and logarithmic functions; one variable differentiation including Mean Value theorem, L'Hopital's rule, chain rules, product rule, implicit differentiation; techniques of integration including integration by substitution, integration by parts, partial fractions, definite integrals and applications; methods of solving first and second order ordinary differential equations. Prerequisites: knowledge of basic calculus including limits of algebraic functions, derivatives and integrals of algebraic functions and trigonometric functions, derivatives of products and quotients, curve sketching techniques. Students are required to be familiar with the use of the language of sets.

MAT1020

University Mathematics II

This course is intended to be an introduction to the basic mathematical techniques frequently used in Science and Engineering. Topics include: complex number system, Euler's formula, elementary complex valued functions, basic vectors analysis, linear transformations associated to matrices, Hermitian, orthogonal and unitary matrices, the exponential map, determinants of $n \times n$ matrices with $n \geq 4$, and eigenvalues.

MAT1110

University Mathematics for Engineering

This course aims at providing students with fundamental knowledge and skills in engineering mathematics, and practical examples in solving problems in engineering situations. Topics include sequences and functions; differentiation, integration and various applications in engineering; transformations of vectors and matrices; complex numbers; probability and statistics, applications in simulations and modelings. (For Engineering Majors only.)

MAT1320

University Mathematics for Applications

This course is designed for local S6 entering students and non-local students coming from six-year high school who have a basic exposure to mathematics in secondary school. It is particularly suitable for students in business studies, social sciences and biological sciences. It aims to provide the students with a good preparation and intuition in mathematics and its applications. Topics include: graphical representations of data; logarithm and exponential function, coordinate geometry; rules of differentiation, maxima, minima, rate of changes; applications to demand, utility, and revenue; basic methods of integration and area; permutation, combination, and simple probabilities; mathematics problems in accountancy and actuary examinations. (Not for Mathematics Majors from seven-year high school system and students who have taken MAT1310.)

MAT2010

Advanced Calculus I

Functions of several variables, partial differentiation, differential and its geometric meaning, chain rule, maxima and minima, Lagrange multiplier, mean value theorem, Taylor series, and implicit function theorem.

MAT2020

Advanced Calculus II

This is a continuation of MAT2010. The following topics will be discussed: multiple integrals, change of variables formula, vector analysis, line and surface integral, Green's Theorem, divergence theorem, and Stokes' theorem.

MAT2030

Linear Algebra I

This course is intended to provide conceptual understandings and computational techniques of linear algebra. Topics include: Gaussian elimination, theory of simultaneous linear equations, matrices, determinants, vectors spaces, bases and linear independence.

MAT2040

Linear Algebra II

This is a continuation of MAT2030. Topics include: linear mapping and its matrix representation, eigenvalues and eigenvectors, inner product spaces, Gram-Schmidt process, dual space, and quadratic form.

MAT2050

Elementary Analysis I

This course is intended to provide conceptual understanding in the theory of functions of one variable. Topics include: real numbers, real valued functions, elementary set theory, limits of sequences and continuous functions.

MAT2060

Elementary Analysis II

This is a continuation of MAT2050. Topics include: differentiability, Riemann integrals, series, sequences and series of functions, and uniform convergence.

MAT2071

Mathematics Laboratory I

2 U; 1 Lect. 2 Lab.; 1st term

This course is intended to teach numerical computing, symbolic computing, and graphical visualization through the use of mathematical and computational software so as to familiarize the students with computing skills. (For Mathematics Majors or Mathematics Education Majors only.)

MAT2072

Mathematics Laboratory II

2 U; 1 Lect. 2 Lab.; 2nd term

This course is intended to use numerical methods and mathematical software to solve practical mathematical problems, so as to consolidate computational concepts and skills of using computers. Topics include data structure, computer organization, design and analysis of algorithms, computer programming, internet usage, and “C” programming language. (For Mathematics Majors or Mathematics Education Majors only.)

MAT2080

Essential Mathematical Methods I

This course emphasizes on computational techniques and geometrical visualization in higher mathematics. Topics include inequalities, elementary functions, elementary computational methods in calculus of one variable; complex plane and its geometry, complex functions; solutions of ordinary differential equations, power series method, Laplace transform.

MAT2090

Essential Mathematical Methods II

This course emphasizes on rigor and abstract thinking in mathematics and its applications. Topics include logic and axiomatic systems; sets, relations and functions; numbers and polynomials; groups, rings, fields; finite fields, Boolean algebras and applications. Pre-requisite: MAT2080.

MAT2110

Mathematics and Culture

In this course, we shall survey mathematics primarily in historical order to show how its ideas have helped to mould modern life and thought. Students will be expected to have knowledge about the history of Chinese mathematics from early to later development, have deeper understanding of the development of different fields of western mathematics at different stages, understand the influence of early western mathematics on later developments and appreciate masterpieces of prestigious mathematicians. Topics are selected from: development of Chinese mathematics, early western mathematics, later developments of European mathematics, mathematics and modern culture. (Not for students who have taken UGB250N.)

MAT2300

Applied Algebra

This course is designed for interested students with minimal mathematical experience. Topics will be selected from: logic, basic combinatorics, graphs, travelling and network problems, Boolean algebra and switching circuits, congruence and Chinese Remainder Theorem, applications to coding and cryptography.

MAT2310

Linear Algebra and Applications

This course is intended to introduce those methods and concepts in linear algebra which are often used in the studies of engineering and finance. Topics are usually selected from: system of linear equations, vector spaces, matrix, linear transformation, inner product, pseudoinverse, singular value decomposition, determinants, eigenvalues and eigenvectors. (Not for Mathematics Majors or Mathematics Education Majors.)

MAT3010

Higher Geometry

This course is to provide prospective high school teachers in mathematics a rigorous treatment of the foundations of Euclidean geometry and an introduction to non-Euclidean geometry. Topics include: Euclid's postulates, attempts to prove the parallel postulate, Hilbert's axioms-a reformulation of the foundations of Euclidean geometry, geometry without the parallel postulate, the discovery of non-Euclidean geometry, consistency of hyperbolic geometry and models of hyperbolic geometry of Beltrami-Klein and Poincaré.

MAT3030

Algebra I

Group theory: Lagrange theorem, normal subgroups, group homomorphism, isomorphism theorems, Cayley's theorem, Sylow's theorems, direct products, structure of finitely generated abelian groups.

Ring theory: ring, ideal, maximal ideal, prime ideal and integral domain.

Module theory: Fundamental theorem on finitely generated modules over principal ideal domain.

MAT3040

Algebra II

Ring theory: Polynomial rings, factorization in integral domain, principal ideal domain, unique factorization domain and Euclidean domain.

Field theory: field extension, algebraic extension, geometric construction, normal extension, finite fields, Galois theory and solvability by radicals.

MAT3070

Introduction to Topology

Topological Space: open set, closed set, compact set, limit point, Heine-Borel Theorem, continuous map, homeomorphism, connectedness, metric space, group action on a topological space and quotient topology. Fundamental Group: loop, space of loops, homotopy, calculation of fundamental groups of some spaces, path lifting lemma, homotopy lifting lemma, fundamental groups of quotient spaces of free discrete group actions.

MAT3080

Number Theory

This course is intended to introduce the students to the intriguing structure of integers. Topics are usually selected from: divisibility theory of the integers, primes, congruence, Fermat's little theorem, some arithmetic functions, primitive roots and indices.

MAT3090

Fourier Analysis

This course is an introduction to Fourier series and Fourier transform. Topics include: Orthogonal families of functions, mean-square convergence of Fourier series and completeness, pointwise convergence of Fourier series, Gibbs's phenomenon; Fourier transform and its inversion, Plancherel formula. Further topics will be selected from: The isoperimetric inequality, Poisson summation formula Heisenberg uncertainty principle, and the notion of a wavelet. Prerequisites: MAT2050 and 2060 or teacher's consent.

MAT3210

Linear Programming

Simplex method, dual problems, dual simplex method, duality theorems, complementary slackness, sensitivity analysis and transportation problem. Students taking this course are expected to have knowledge in linear algebra.

MAT3220

Operations Research and Logistics

Transshipment problem, the assignment problem, dynamic programming and applications, resource allocation problem, routing and scheduling problem, inventory and production problem, cargo loading problem, equipment replacement problem, reliability problem and integer programming. Students taking this course are expected to have knowledge in linear programming.

MAT3230

Numerical Analysis

Floating-point numbers and roundoff errors, absolute and relative errors, stable and unstable computations, solutions of nonlinear equations, linear systems, interpolation, numerical differentiation, and numerical integration. Students taking this course are expected to have knowledge in advanced calculus and linear algebra.

MAT3240

Numerical Methods for Differential Equations

Numerical solution of ordinary differential equations, numerical solution of partial differential equations. Students taking this course are expected to have knowledge in advanced calculus and linear algebra.

MAT3250

Complex Variables and Applications

This course is intended to provide computational techniques and a concise theory of functions of one complex variable. Topics are selected from: complex numbers and functions, analytic functions, Cauchy-Riemann equations, elementary functions, contour integration, Cauchy integral formula, series expansion, zeros, singularities, residue theorem and definite integrals, linear fractional transformation, harmonic functions and their applications. Students taking this course are expected to have knowledge in advanced calculus.

MAT3260

Graph Theory

Definitions and applications of graphs and digraphs, Eulerian graphs, Hamiltonian graphs, path algorithm, connectivity, trees, planarity and coloring graphs.

MAT3270**Ordinary Differential Equations**

Ordinary differential equations arise from quantitative description of natural and social phenomena. Topics are: method of explicit solution, linear equations and systems, series solutions, Sturm-Liouville boundary value problems, dynamical systems and stability, applications to mechanics, electrical networks and population of species.

MAT3280**Introductory Probability**

Axioms of probability, conditional probability, independence, discrete random variables, continuous random variables, mean, variance and covariance, moment generating function, Poisson distributions, normal distributions, central limit theorem, law of large numbers, random walks, transition probabilities and Markov chains. Students taking this course are expected to have knowledge in advanced calculus.

MAT3300**Mathematical Modeling**

This course introduces the concept of mathematical modeling. Topics include: different modeling techniques such as modeling with differential equations and modeling with linear programming, forecasting; economic models such as Markov models, network models and financial models such as input-output models and scheduling models.

MAT3310**Computational and Applied Mathematics**

This course introduces the general solution methods used in computational and applied mathematics. The central topics are differential equations and matrix equations. Methods include Fourier series, orthogonal expansion, conformal mapping, Fourier integrals, complex integration, LU decomposition, Newton method, semi-direct and iterative methods, the finite element methods and fast Fourier transform. Students taking this course are expected to have knowledge in advanced calculus and linear algebra.

MAT3330**IT for Mathematics Teaching**

3 U; 2 Lect. 2 Lab.

This course is designed for prospective teachers. Students will develop the skills of preparing mathematics documents, which typically includes formulas and graphics. Moreover, they will be trained to present and communicate mathematics through multimedia, which enhances their teaching skills in the future. Specifically, students will develop their skills in IT using a group of office-type commercial software. Upon the completion of the course, students are able to design and construct teaching aids, either as web pages or as computer documents, with market available software. Moreover, they are able to write simple programmes on using the software. Topics: internet communications, multimedia authoring, mathematics documentation, spreadsheets, databases, mathematics graphics and computing and multimedia presentation. (Not for students who have taken MAT3320.)

MAT4001, 4002**Project**

3 U each; 3 STOT

A project in pure or applied mathematics, either in research or in reviewing the literature of an advanced topic. Each section may be taken by an individual student or a team of two students. Prerequisite: permission of the instructor and satisfaction of at least one of the following conditions: 1) with Major GPA in the preceding academic term of at least 3.0; 2) with cumulative Major GPA of at least 3.0; and 3) any special case explicitly endorsed by the Board of the Department.

MAT4010

Functional Analysis

Metric spaces, fixed point theorems, Banach spaces, Hilbert spaces, continuous linear operator, the Hahn-Banach extension theorem, the uniform boundedness principle and the open mapping theorem, and applications of the above topics. Students taking this course are expected to have knowledge in elementary analysis and linear algebra.

MAT4020

Calculus of Variations

This course is intended to provide a basic theory of calculus of variations. Topics are usually selected from: necessary condition for extremum, Euler equation, fixed end point problem for unknown functions involving higher-order derivatives, natural boundary condition and transversality, Weierstrass-Erdman corner conditions, and sufficient conditions. Students taking this course are expected to have knowledge in advanced calculus.

MAT4030

Differential Geometry I

This course covers basic theory on curves, and surfaces in the Euclidean three space. Topics include: regular curves, Frenet formulas, local theory of curves, global properties of curves such as isoperimetric inequality and four-vertex theorem, regular surfaces, 1st and 2nd fundamental form, Gaussian curvature and mean curvature, Gauss map, special surfaces such as ruled surfaces, surfaces of revolution, parallel surfaces and minimal surfaces. Students taking this course are expected to have knowledge in advanced calculus and linear algebra.

MAT4040

Differential Geometry II

This course is an introduction to Riemannian geometry of surfaces. Topics include: Theorema Egregium, covariant differentiation, parallel vector fields, geodesics, Gauss-Bonnet theorem and applications, the Poincaré theorem on vector fields, exponential map, normal coordinates, Gauss lemma, completeness, Hopf-Rinow theorem, 1st and 2nd variation of the arc length, and Bonnet theorem. Students taking this course are expected to have knowledge in MAT4030.

MAT4050

Real Analysis

This is an introductory course on the Lebesgue integration theory on real line. Topics include: measurable sets, measurable functions, Lebesgue integral, Fatou's lemma, monotone convergence theorem, Lebesgue dominated convergence theorem and differentiation. Students taking this course are expected to have knowledge in elementary analysis.

MAT4210

Financial Mathematics

Topics of this course will include: Basic option theory, forward and futures contracts, model of asset price, Ito's Lemma, asset price random walk, Black-Scholes model, free boundary problems of options, constrained matrix problems and the projected SOR method, discrete random walk model and the binomial methods. Students taking this course are expected to have knowledge in probability and differential equations.

MAT4220

Partial Differential Equations

This is an introduction to the classical theory of partial differential equations. Topics are usually selected from: First-order equations, types of second-order equations, well-posedness of the wave and the heat equations, boundary value problems for the Laplace and Poisson equations, separation of variables. Students taking this course are expected to have knowledge in advanced calculus.

MAT4230

Optimization Theory

Unconstrained and equality optimization models, constrained problems, optimality conditions for constrained extrema, convex sets and functions, duality in nonlinear convex programming, descent methods, conjugate direction methods and quasi-Newton methods. Students taking this course are expected to have knowledge in advanced calculus.

MAT4240

Stochastic Processes

Bernoulli processes and sum of independent random variables, Poisson processes, times of arrivals, Markov chains, transient and recurrent states, stationary distribution of Markov chains, Markov pure jump processes, and birth and death processes. Students taking this course are expected to have knowledge in probability.

MAT4250

Game Theory

Principles and techniques of game theory, matrix games, minimax theorem and calculation of optimal strategies, cooperative and non-cooperative solutions of bimatrix games, coalitional games and applications. Students taking this course are expected to have knowledge in linear algebra.

MAT4260

Coding Theory and Cryptography

Coding theory: information theory, linear codes, cyclic codes and geometric codes. Cryptography: classical cryptosystems and public key cryptosystems. Students taking this course are expected to have some knowledge in algebra and number theory. (Not for students who have taken IEG4130.)

MAT4270

Discrete Dynamics and Fractals

This course is intended to introduce modern concepts in discrete dynamics. Topics include the following. One-dimensional discrete dynamical systems: chaos, symbolic dynamics, Period 3 theorem and Sarkovskii's theorem; higher-dimensional discrete dynamical systems: iterative functions system, fractals; introduction to complex analytic dynamics, Julia and Mandelbrot sets. Students taking this course are expected to have knowledge in advanced calculus.

MAT5011

Real Analysis I

3 U; 3 Lect.

This course provides a solid foundation in the Lebesgue integration theory and basic techniques in analysis. Topics include σ -algebra of sets, measure theory, Lebesgue integration theory, convergence theorems, L_p -spaces and differentiation. Students taking this course are expected to have knowledge in advanced calculus and elementary analysis.

MAT5012

Real Analysis II

3 U; 3 Lect.

This course provides more advanced topics in real analysis. Topics include signed measures, Hahn decomposition theorem, Lebesgue decomposition theorem, product measures, Fubini theorem, measure and topology, and Riesz representation theorem. Students taking this course are expected to have knowledge in MAT5011 or its equivalent.

MAT5031

Complex Analysis I

3 U; 3 Lect.

This course is intended to provide a solid and advanced training in the basic techniques and theorem of complex analysis. Topics include properties of holomorphic functions, complex integration, conformal mappings, singularities and residues. Students taking this course are expected to have knowledge in advanced calculus and elementary analysis.

MAT5032

Complex Analysis II

3 U; 3 Lect.

This is a continuation of MAT5031. Advanced topics will be selected from: Schwarz lemma, Riemann mapping theorem, Picard theorem, Weierstrass theorem and Mittag-Leffler theorem, analytic continuation and introduction to Riemann surfaces. Students taking this course are expected to have knowledge in advanced calculus and elementary analysis.

MAT5051

Abstract Algebra I

3 U; 3 Lect.

This course is intended to provide a solid background knowledge in Abstract Algebra. Topics include group theory, Sylow's theorems, structure of finitely generated abelian groups, rings and ideals, polynomial rings, principal ideal domain (PID), modules, fields and Galois theory. Students taking this course are expected to have knowledge in a first course in algebra.

MAT5052

Abstract Algebra II

3 U; 3 Lect.

This is a continuation of MAT5051. Topics include fields, cyclic extensions, separable extensions, integral ring extensions, integral Galois extensions, Noetherian rings and modules, localization, Hilbert basis theorem and primary decomposition. Students taking this course are expected to have knowledge in MAT5051 or equivalent.

MAT5070

Topology of Manifolds

3 U; 3 Lect.

This course is an introduction to several basic topological invariants for manifolds. Major topics are: differentiable manifolds and maps, Sard's Theorem, degree of maps, fundamental group, covering space and homology group. Students taking this course are expected to have knowledge in elementary analysis.

MAT570S

Guided Studies I

3 U; 3 STOT

Series of projects in pure or applied mathematics focusing on a central theme. Prerequisite: permission of the instructor.

MAT580S

Guided Studies II

3 U; 3 STOT

Series of projects in pure or applied mathematics focusing on a central theme. Prerequisite: permission of the instructor.

Study Scheme

1. Major Programme in Mathematics

A. Applicable to students admitted in 2006-07 and thereafter

There are three streams of specialization: *Mathematics Stream*, *Computational and Applied Mathematics Stream*, and *Enrichment Stream in Mathematics*. Students of Major Programme in Mathematics are under *Mathematics Stream* unless they apply to specialize in *Computational and Applied Mathematics Stream* or *Enrichment Stream in Mathematics* and select certain courses as prescribed below.

Students of all the streams are required to complete a minimum of 68 units of courses as follows:

Mathematics Stream

- | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Notes 1 and 2):
MAT0310, 0320, 2010, 2020, 2030, 2040, 2050,
2060, 2071, 2072, 2080, 2090 | 29-32 units |
| (ii) | 36-39 units of elective courses in Mathematics at
3000 and above level, (or IEG5124 [#] , SEG3540 [#] ,
4430 [#]) | 36-39 units |

Total: 68 units

Computational and Applied Mathematics Stream

- | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Notes 1 and 2):
MAT0310, 0320, 2010, 2020, 2030, 2040, 2050,
2060, 2071, 2072, 2080, 2090, 3230 | 32-35 units |
| (ii) | 33-36 units of elective courses from Group I, II or III
with at least 15 units from Group I
Group I : Mathematics courses coded MAT32xx,
33xx, 42xx or 43xx
Group II : Other Mathematics courses at 3000 and
above level
Group III : IEG5124 [#] , SEG3540 [#] , 4430 [#] | 33-36 units |

Total: 68 units

Enrichment Stream in Mathematics

Requirement for entering this Stream:

Applicable to students with GPA results: Accumulative Major GPA of at least 3.3, or the preceding two semesters' Major GPA of at least 3.3.

Applicable to students without GPA results: Grade "B" or above in the HKALE* "Pure Mathematics" (the condition for exemption of MAT2080).

- | | | |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Required Courses (Note 1):
MAT0310, 0320, 2010, 2020, 2030, 2040, 2050,
2060, 2071, 2072, 2090, 4001 | 32 units |
| (ii) | 35 units of elective courses in Mathematics at 3000
and above level (or IEG5124 [#] , SEG3540 [#] , 4430 [#]) with
at least 27 units from the following: MAT3030,
3040, 3070, 3230, 3240, 3250, 3270, 4002, 4010,
4030, 4040, 4050, 4220, 4230, 5011, 5012, 5031,
5032, 5051, 5052, 5070 | 36 units |

Total: 68 units

[#] To be included in the Major GPA as well.

- Notes: 1. All Major students should obtain Grade “D” or above in each of the courses of MAT2010, 2020, 2030 and 2040. Otherwise, they are required to repeat the course(s). Students who cannot meet the Grade “D” requirement in any one of the course mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
2. Students in Mathematics Stream or Computational and Applied Mathematics Stream who obtained Grade “B” or above in the HKALE* “Pure Mathematics” may apply for exemption from MAT2080. These students should take 3 more units of Major courses in place of the exempted course(s). Otherwise, they should take this course in their first year of attendance.
3. Applicable to Secondary 6 entrants:
They are automatically exempted from MAT2080 if they pass MAT1010. These students should take 3 more units of Major courses at 3000 and above level in place of MAT2080.
4. For students who have satisfied the requirements of both CAM and ESM streams, they will be allowed to graduate with double stream specialization, i.e. CAM and ESM.
The requirements for graduating with double stream specialization are:
(a) Students should satisfy the requirements of ESM; and
(b) Students should satisfy the requirements of CAM,
Total: 68 units.

* Only applicable to students admitted on the strength of HKALE results.

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

B. Applicable to students admitted in 2005-06

There are three streams of specialization: *Mathematics Stream*, *Computational and Applied Mathematics Stream*, and *Enrichment Stream in Mathematics*. Students of Major Programme in Mathematics are under *Mathematics Stream* unless they apply to specialize in *Computational and Applied Mathematics Stream* or *Enrichment Stream in Mathematics* and select certain courses as prescribed below.

Students of all the streams are required to complete a minimum of 68 units of courses as follows:

Mathematics Stream

- | | | |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Notes 1 and 2):
MAT0310, 0320, 2010, 2020, 2030, 2040, 2050,
2060, 2071, 2072, 2080, 2090 | 26-32 units |
| (ii) | 36-42 units of elective courses in Mathematics at
3000 and above level, (or IEG4130 [#] , 5124 [#] , SEG3540 [#] ,
4430 [#]) | 36-42 units |

Total: 68 units

Computational and Applied Mathematics Stream

- | | | |
|------|-------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Notes 1 and 2):
MAT0310, 0320, 2010, 2020, 2030, 2040, 2050,
2060, 2071, 2072, 2080, 2090, 3230 | 29-35 units |
| (ii) | 33-39 units of elective courses from Group I, II or III
with at least 15 units from Group I | 33-39 units |

- Group I : Mathematics courses coded MAT32xx,
33xx, 42xx or 43xx
- Group II : Other Mathematics courses at 3000 and
above level
- Group III: IEG4130#, 5124#, SEG3540#, 4430#

Total: 68 units

Enrichment Stream in Mathematics

Requirement for entering this Stream:

Applicable to students with GPA results: Accumulative Major GPA of at least 3.3, or the preceding two semesters' Major GPA of at least 3.3.

Applicable to students without GPA results: Grade "B" or above in the HKALE* "Pure Mathematics" (the condition for exemption of MAT2080/2090).

- (i) Required Courses (Note 1): 30 units
MAT0200, 0310, 0320, 2010, 2020, 2030, 2040,
2050, 2060, 2071, 2072, 4001
- (ii) 38 units of elective courses in Mathematics at 38 units
3000 and above level (or IEG4130#, 5124#, SEG3540#,
4430#) with at least 27 units from the following:
MAT3030, 3040, 3070, 3230, 3240, 3250, 3270, 4002,
4010, 4030, 4040, 4050, 4220, 4230, 5011, 5012,
5031, 5032, 5051, 5052, 5070

Total: 68 units

To be included in the Major GPA as well.

- Notes: 1. All Major students should obtain Grade "D" or above in each of the courses of MAT2010, 2020, 2030 and 2040. Otherwise, they are required to repeat the course(s). Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
2. Students in Mathematics Stream or Computational and Applied Mathematics Stream who obtained Grade "B" or above in the HKALE* "Pure Mathematics" may apply for exemption from MAT2080 and/or MAT2090. These students should take 3 or 6 more units of Major courses in place of the exempted course(s). Otherwise, they should take this(ese) course(s) in their first year of attendance.
3. For students who have satisfied the requirements of both CAM and ESM streams, they will be allowed to graduate with double stream specialization, i.e. CAM and ESM.
The requirements for graduating with double stream specialization are:
(a) Students should satisfy the requirements of ESM; and
(b) Students should satisfy the requirements of CAM,
Total: 68 units.
4. *Applicable to non-local students from six-year high school and students admitted through the Early Admissions Scheme (EAS)*
Non-local students from six-year high school and EAS students are exempted from MAT2080 provided they pass MAT1010. These students should take 3 more units of Major courses at 3000 and above level in place of MAT2080.

* *Only applicable to students on the strength of HKALE results.*

2. Double Degree Programme in Mathematics and Information Engineering

Students in the Double Degree Programme in Mathematics and Information Engineering are under the Information Science Stream (IFS)^Δ and are required to complete a minimum of 69 units of courses as follows:

- | | | |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| (i) | Required courses (Notes 1 and 2):
MAT0310 (or 0320), 2010, 2020, 2030, 2040,
2050, 2060, 2080, 2090, 3230, 3280 (or
ERG2040), CSC1110, 2100, ERG2020, IEG2051,
2810 | 42-45 units |
| (ii) | 24-27 units of elective courses from Group I or II
with at least 15 units from Group I and at least 9
units from Group II
Group I: MAT2300, 3030, 3040, 3070, 3080,
3210, 3220, 3240, 3250, 3260, 3270,
3300, 3310, 4001, 4010, 4030, 4040,
4050, 4210, 4220, 4230, 4240 (or
IEG4140), 4250, 4260 (or IEG4200)
Group II: IEG3010, 3050, 4020, 4060, 4100,
4130, 4160, 4190, 5124, 5154, 5240 | 24-27 units |
| | | Total: 69 units |

Notes: 1. All students should obtain Grade “D” or above in each of the courses of MAT2010, 2020, 2030 and 2040. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade “D” requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.

2. Students who are admitted on the strength of HKALE results and has obtained Grade “B” or above in the HKALE* “Pure Mathematics” may apply for exemption from MAT2080.

^Δ To continue with the second B.Eng. Programme in Information Engineering, students must first obtain their B.Sc. Degree in Mathematics under the IFS Stream within their normative period of study.

* Only applicable to students on the strength of HKALE results.

3. Minor Programme

Students are required to complete a minimum of 15 units of MAT courses at 2000 and above level with at least 9 units of courses at 3000 and above level. Students may also select the following:

- PHY2601 in place of MAT2020 (for Physics Majors only)
- STA3007 in place of MAT4240 (for Statistics and Risk Management Science Majors only)
- ERG2011, 2012, 2013, 2014, 2015, 2016 or 2017 in place of one of the courses: MAT2010 or 2310 (for Majors from Faculty of Engineering only)

to fulfil the Minor Programme requirements.

4. Faculty Language Requirement

5. Major/Faculty Requirement for S6 Entrants

Molecular Biotechnology

The Molecular Biotechnology Programme is jointly offered by the Departments of Biochemistry and Biology.

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
MBT0410/0420	Senior Experimental Project I/II	3/3
MBT2000	Introduction to Molecular Biotechnology	2
MBT3000	Business and Social Aspects of Biotechnology	3
MBT4030	Methods in Molecular Biotechnology	2
MBT4032	Methods in Molecular Biotechnology Laboratory	3
MBT4510	Plant Biotechnology	3
MBT4520	Animal Biotechnology	3

Course Description

MBT0410/0420

Senior Experimental Project I/II

3/3 U; 3 STOT; 1st/2nd term

Each senior student in the programme will undertake a biotechnology research project at the beginning of the final year under the supervision of a teaching staff member. In the first term, each student will prepare a project proposal and present a seminar (on literature review and methods/approaches). The experiment will run during the final year. The research project will be completed before graduation with a written report and a seminar presentation. (Students may take both courses in the same term upon approval of the programme.)

MBT2000

Introduction to Molecular Biotechnology

2 U; 2 Lect.; 1st term

The aim of this course is to introduce the basic principles and current topics in molecular biotechnology. The course will first cover major discoveries for the advancement of molecular biotechnology, basic principles of gene expression and recombinant DNA technology. Then, selected topics in molecular biotechnology such as human genome project, microbial, plant, animal and medical biotechnology will be introduced.

MBT3000

Business and Social Aspects of Biotechnology

3 U; 2 Lect.; 1st term

This course addresses the business and social issues related to the use of modern biotechnology. Topics include manufacturing practice of biotechnological products, biosafety, environmental impact, ethical and public concerns, regulation and policy, and issues of intellectual property.

MBT4030

Methods in Molecular Biotechnology

2 U; 2 Lect.; 2nd term

This course will cover the current methodology and techniques used in biotechnology.

MBT4032

Methods in Molecular Biotechnology Laboratory

3 U; 1 Tut. 4 Lab.; 2nd term

This laboratory course will provide hand-on experience to students in current techniques in biotechnology, including gene construction, transfer and expression analysis.

MBT4510

Plant Biotechnology

3 U; 3 Lect.; 1st term

This course will provide an overview on the basic principles and recent developments in plant molecular biology and biotechnology. Emphases will be on the molecular biology of unique plant biological processes and the molecular techniques including plant transformation. Development of transgenic plant species with new and improved traits, their release and utilization will be covered.

MBT4520

Animal Biotechnology

3 U; 3 Lect.; 2nd term

This course will cover the developments and applications of transgenic animals including mice, cattle, sheep, goats, pigs, birds and fish. Topics concerning human gene mapping and isolation and somatic cell gene therapy will also be covered.

Study Scheme

I. Major Programme

Students are required to complete a minimum of 68 units of courses as follows:

- | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|
| (i) | Required Courses (Note): | 52 units |
| | BCH2010#/2710#, 2020#/2720#, 3010#/3610#, 3020#/
3620#, 3030#, BIO2010#/2012#, 2310#/2312#, 4320#,
MBT0410/0420, 2000, 3000, 4030/4032 | |
| (ii) | Elective Courses: | |
| (a) | Two courses with laboratories from: | 10 units |
| | BIO3410#/3412#, 3530#/3532#, 3630#/3632# | |
| (b) | Two courses from: | 6 units |
| | BCH4050# (or BIO4410#), BCH3040#, BIO4330#,
MBT4510, 4520 | |

Total: 68 units

To be included in the Major GPA as well.

Recommended course pattern

First Year of Attendance 27 units

BCH2010/2710, 2020/2720, 3010/3610, BIO2010/2012, 2310/2312,
MBT2000

Second Year of Attendance 18 or 23 units

BCH3020/3620, BCH3030 or BIO4320, MBT4030/4032
and 5 or 10 units from (ii, a)

Third Year of Attendance 18 or 23 units

BCH3030 or BIO4320, MBT0410/0420, 3000
and 6 or 11 units from (ii, a) and (ii, b)

Total: 68 units

Note: Students should obtain Grade “D” or above in each of the courses of BCH2010/2710, 2020/2720, BIO2010/2012 and 2310/2312. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade “D” requirement in any one of the fundamental courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.

2. *Faculty Language Requirement*
3. *Major/Faculty Requirement for S6 Entrants*

Physics

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
PHY0211	Physics Problems I	1
PHY0222	Physics Problems II	1
PHY0241	Problems in Quantitative Methods for Basic Physics	1
PHY0411	Seminar	1
PHY1001	General Physics I	3
PHY2001	Introduction to Mechanics	4
PHY2002	Introduction to Thermal Physics	4
PHY2003	Introduction to Electricity and Magnetism	4
PHY2004	Quantitative Methods for Basic Physics	3
PHY2351	Basic Computational Physics	3
PHY2400	Topics in Contemporary Physics	3
PHY2601	Methods in Theoretical Physics I	3
PHY2811	Physics Laboratory I	2
PHY2822	Physics Laboratory II	1
PHY3011	Mechanics	3
PHY3022	Intermediate Mechanics	3
PHY3041	Electricity and Magnetism	3
*PHY3052	Thermal Physics	3
PHY3201	Quantum Physics I	4
PHY3202	Quantum Physics II	4
PHY3350	Introduction to Computer Simulations of Physical Systems	3
PHY3401	Contemporary Topics in Applied Physics	3
PHY3402	Applied Solid State Physics	3
PHY3412	Electronics	3
PHY371S, 372S	Special Experimental Project V, VI	1 each
PHY3751, 3752	Special Theoretical Projects I, II	1 each
PHY3811	Physics Laboratory III	1
PHY3822	Physics Laboratory IV	1
PHY4211	Electromagnetic Theory and Optics	3
PHY4221	Quantum Mechanics I	3
PHY4260	Statistical Mechanics	3
PHY4320	Photonics: Materials and Devices	3
PHY4330	Instrumentation I	3
PHY4350	Techniques in Materials Characterization	4
PHY4360	Electronic Packaging	3
PHY4370	Computational Physics	3
PHY4410	Modern Optics	3
PHY4420	Plasma Physics	3
PHY4440	Laser Principles and Applications	3
PHY4450	Solid State Physics	3
PHY4460	Relativity	3
PHY4510	Selected Topics (Thematic Melodies of 20th Century Theoretical Physics)	2

* Courses offered in 2006-07 and before.

PHY4520	Selected Topics (Physics in Meteorology)	3
PHY4530	Selected Topics (Astrophysics)	3
PHY4540, 4550	Selected Topics	3 each
PHY4560, 4570, 4580, 4590	Selected Topics in Applied Physics	3 each
PHY4610/4620	Physics Project I/II	3/3
PHY4700	Selected Topics in Nanoscience and Technology	3
PHY4711, 4721	Special Experimental Project I, II	1 each
PHY4712, 4722	Special Experimental Project III, IV	1 each
PHY4751, 4752	Special Theoretical Projects III, IV	1 each
PHY4910	Advanced Laboratory	3
PHY5410	Quantum Mechanics II	3
PHY5420	Classical Electrodynamics	3
PHY5430	Solid State Theory	3
PHY5440	Astrophysics	3
PHY5450	Introduction to Soft Matter Physics	3
PHY5460	Instrumentation II	3
PHY5510	Topics in Theoretical Physics (Advanced Statistical Mechanics)	3
PHY5520	Topics in Theoretical Physics (Introduction to Many-body Theory)	3
PHY5530	Topics in Theoretical Physics (Introduction to Particle Physics)	3
PHY5540	Topics in Theoretical Physics (Advanced Computational Physics)	3
PHY5550	Topics in Theoretical Physics (Quantum Optics)	3
PHY5560	Topics in the Frontiers of Physics	3
PHY5570	Methods in Theoretical Physics II	3
PHY5580	Physics of Quantum Information and Quantum Computation	3
PHY5620	Topics in Experimental Physics (Thin Film Physics and Technology)	3
PHY5630, 5640, 5650	Topics in Experimental Physics	3 each
PHY5660	Semiconductor Physics and Devices	3
MSE5080	Surface Science	3

Course Description

PHY0211

Physics Problems I

1 U; 1 STOT; 1st term

Tutorial problems primarily related to PHY2001. Prerequisite: permission of the instructor.

PHY0222

Physics Problems II

1 U; 1 STOT; 2nd term

Tutorial problems primarily related to PHY2002 and 2003. Prerequisite: permission of the instructor.

PHY0241

Problems in Quantitative Methods for Basic Physics

1 U; 1 STOT; 1st term

Tutorial problems primarily related to PHY2004. Prerequisite: permission of the instructor.

PHY0411

Seminar

1 U; 1 STOT; 1st term

Small group discussions on topics in modern or contemporary physics. Students are advised to take PHY3041, 3052 and 3202 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY1001

General Physics I

3 U; 3 Lect.; 1st/2nd term

This introductory course discusses the basic principles of mechanics and atomic physics. It is suitable for Secondary 6 entrants in science and engineering. Topics include: particle kinematics, force and motion, work and kinetic energy, potential energy, systems of particles and collisions, rotation, Newton's law of gravitation, fluid statics and dynamics, oscillations, waves, photons, electrons and atoms. (Not for Physics Majors in 3-year system.) Prerequisite: permission of the instructor.

PHY2001

Introduction to Mechanics

4 U; 4 Lect. 1 Tut.; 1st term

Particle kinematics and dynamics. Systems of particles and collisions. Rotational dynamics. Oscillations. Newton's law of gravitation. Fluid statics and dynamics. Wave motion. Prerequisite: permission of the instructor.

PHY2002

Introduction to Thermal Physics

4 U; 4 Lect. 1 Tut.; 2nd term

Temperature and the zeroth law of thermodynamics. Simple thermodynamic systems. Ideal gas. Work. Heat and the first law of thermodynamics. Second law of thermodynamics and entropy. Thermodynamic potentials. Phase diagrams of pure substances. First-order phase transitions, Clausius-Clapeyron equation and applications. Elementary kinetic theory of transport processes. Prerequisite: permission of the instructor.

PHY2003

Introduction to Electricity and Magnetism

4 U; 4 Lect. 1 Tut.; 2nd term

Electrostatics and magnetostatics in free space, conductors, electric current and DC circuits, electromagnetic induction and AC circuits, Maxwell's equations (integral and differential forms). Prerequisite: permission of the instructor.

PHY2004

Quantitative Methods for Basic Physics

3 U; 3 Lect. 1 Tut.; 1st term

Vectors, rates of change and kinematics. Methods for solving ordinary differential equations in mechanics and electric circuits. Line integral and multiple integrals in mechanics. Partial differentiation and its applications in mechanics and thermodynamics. Methods of vector calculus used in electromagnetism. Applications of series and systems of linear equations in physics. Prerequisite: permission of the instructor.

PHY2351

Basic Computational Physics

3 U; 2 Lect. 1 Tut. 3 Lab.; 1st term

Basic computer concepts. Programming languages and scientific applications. Algorithms. Optimization techniques. Computational laboratories for practice, demonstration and illustration of the subject matter. Prerequisite: permission of the instructor.

PHY2400

Topics in Contemporary Physics

3 U; 3 Lect.

Topics of contemporary interest will be selected both from fundamental physics (e.g., black holes, pulsars) and from physics with important applications to technology (e.g., laser, superconductivity). Each will be treated qualitatively and phenomenologically. The objectives are to introduce students to the frontiers of physics, and at the same time to develop skills in heuristic understanding and explanation. Students taking this course are expected to have knowledge in Physics at the level of PHY2001. Prerequisite: permission of the instructor.

PHY2601

Methods in Theoretical Physics I

3 U; 3 Lect. 1 Tut.; 1st term

This course provides a survey of various analytical techniques commonly used to solve problems in theoretical physics. The following physical problems are used as examples: the vibrating string, waves, electrostatics, heat conduction and coupled oscillators. Students are advised to take PHY2001, 2002, and 2003 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY2811

Physics Laboratory I

2 U; 3 Lab.; 1st term

Laboratory experiments to illustrate the principles taught in the courses at the 2000-level. Prerequisite: permission of the instructor.

PHY2822

Physics Laboratory II

1 U; 3 Lab.; 2nd term

Laboratory experiments to illustrate the principles taught in the courses at the 2000-level. Prerequisite: permission of the instructor.

PHY3011

Mechanics

3 U; 3 Lect. 1 Tut.; 1st term

Calculus of variation. Lagrangian and Hamiltonian mechanics. Central force motion. Motion of a system of particles. Coupled oscillations. Elementary dynamics of rigid bodies. Moving coordinate systems. Students are advised to take PHY2001 before taking this course. Prerequisite: permission of the instructor.

PHY3022

Intermediate Mechanics

3 U; 3 Lect. 1 Tut.; 2nd term

Special relativity. Mechanical waves. Fluids. Nonlinear mechanical systems. Students are advised to take PHY3011 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY3041

Electricity and Magnetism

3 U; 3 Lect. 1 Tut.; 1st term

Electrostatics. Magnetostatics. Multipoles and fields in matter. Boundary value problems. Electrodynamics. Maxwell's equations and electromagnetic waves. Students are advised to take PHY2003 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY3201

Quantum Physics I

4 U; 4 Lect. 1 Tut.; 1st term

Wave-particle duality. Atomic structure and Bohr's model. Basic quantum mechanics. Quantum theory of hydrogen atom. Many-electron atoms. Atomic spectra. Students are advised to take PHY2001, 2002 and 2003 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY3202

Quantum Physics II

4 U; 4 Lect. 1 Tut.; 2nd term

Atomic nucleus. Nuclear forces and models. Radioactivity and nuclear reactions. Elementary particles. Chemical bonds and molecular structure. Molecular spectra. Bonding in solids. Crystal structure. Band theory of solids. Superconductivity. Students are advised to take PHY3201 before taking this course. Prerequisite: permission of the instructor.

PHY3350

Introduction to Computer Simulations of Physical Systems

3 U; 2 Lect. 1 Tut. 3 Lab.; 2nd term

A project-oriented course on computer simulation, emphasizing the setting up of physical models, the development of algorithms for the models, data analysis and graphical techniques. Topics include the cooling problem, single and many particle dynamics, chaotic dynamics, wave phenomena, and electrostatic problems. Computational laboratories for practice, demonstration and illustration of the subject matter. Students are advised to take PHY3011 and 3041 or their equivalents before taking this course. Prerequisite: PHY2351 or permission of the instructor.

PHY3401

Contemporary Topics in Applied Physics

3 U; 3 Lect. 1 Tut.; 1st term

This course provides students with a broad view and basic understanding of some of the modern topics in applied physics. Topics include: laser applications and principles in fundamental and applied research; advanced ceramic and their applications; superconductivity and devices; magnetic materials, measurements and devices; current methods in non-destructive testing of materials; nanoscience, nanotechnologies and device applications. Students are expected to take PHY2001, 2002 and 2003 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY3402

Applied Solid State Physics

3 U; 3 Lect. 1 Tut.; 2nd term

This course provides an introduction to the physical properties of solids and their applications. Simple models will be used to discuss the solid state physics. Topics include: electrical and optical properties of conductors and insulators, mechanical properties of solids, magnetic materials, superconductors; bonds, free electron and nearly-free electron models of solids, energy bands and gaps, semiconductors, p-n junction, LED, photodetectors, solar cells and diode laser. Students are advised to take PHY3011, 3041 and 3201 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY3412

Electronics

3 U; 3 Lect. 1 Tut.; 2nd term

This course provides an introduction to electronic circuits commonly used in applied physics, with laboratory experiments for practice and illustration of the subject matter. Topics include: circuit analysis, diode circuits, transistor circuits, amplifiers, feedback theory, operational amplifiers, power supplies and logic circuits. Students are advised to take PHY2003 and 2004 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY371S, 372S

Special Experimental Project V, VI

1 U each; 3 Lab.

Student taking this course is required to finish a short experimental project, which illustrates modern physics and/or technique. Prerequisite: permission of the instructor.

PHY3751, 3752

Special Theoretical Projects I, II

1 U each; 3 Tut.; 1st/2nd term

Student taking this course are required to finish a short project or guided study in theoretical physics. Prerequisite: permission of the instructor.

PHY3811

Physics Laboratory III

1 U; 3 Lab.; 1st term

Several Laboratory experiments and one project to illustrate the principles taught in the courses at the 3000 level. Prerequisite: permission of the instructor.

PHY3822

Physics Laboratory IV

1 U; 3 Lab.

Several Laboratory experiments and one project to illustrate the principles taught in the courses at the 3000 level. Prerequisite: permission of the instructor.

PHY4211

Electromagnetic Theory and Optics

3 U; 3 Lect. 1 Tut.; 2nd term

This is an advanced undergraduate course on the theory of electromagnetism and optics, based on Maxwell's equations. Topics covered include: field energy and momentum, wave equations, macroscopic field equations and boundary conditions, electromagnetic waves in media, reflection and transmission, absorption and dispersion, radiation from accelerated charges and simple applications, Huygen's principle, and interference and diffraction. Student are advised to take PHY3041 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY4221

Quantum Mechanics I

3 U; 3 Lect. 1 Tut.; 1st term

This course provides an exposition of the central concepts and the theoretical framework of non-relativistic quantum mechanics. Topics covered include: experimental basis, wave mechanics, Schrödinger's equation, one-dimensional potentials, orbital angular momentum, central force problems, matrix representation, spin, and approximation methods. Students are advised to take PHY3201 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY4260

Statistical Mechanics

3 U; 3 Lect. 1 Tut.; 1st term

This course provides an introduction to the statistical mechanics of classical as well as quantum systems via the theory of ensembles. Topics covered include: microcanonical ensemble, canonical ensemble, open systems and grand canonical ensemble, Bose-Einstein and Fermi-Dirac statistics and their applications, properties of quantum ideal gases, and transport phenomena. Prerequisite: permission of the instructor.

PHY4320

Photonics: Materials and Devices

3 U; 3 Lect. 1 Tut.; 2nd term

A broad survey of the materials used and the generation, transmission, modulation and detection of light by optoelectronic devices. Emphases are placed on the operational principles and applications of both devices and materials in communications, data processing and as industrial transducers. Students are advised to take PHY3202 or 3402 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY4330

Instrumentation I

3 U; 2 Lect. 3 Lab.; 2nd term

This course provides an introduction to the working principles and operation techniques of instruments commonly used in experimental physics. Topics covered include: transducers and sensors; signal conditioning, propagation and conversion; noise, signal recovery techniques, computer interface, vacuum techniques, and integrated-circuit instrumentation. This course also includes laboratory experiments for practice and illustration of the subject matter. Prerequisite: permission of the instructor.

PHY4350

Techniques in Materials Characterization

4 U; 3 Lect. 1 Tut. 3 Lab.; 1st term

Principles and operation of materials characterization techniques with electron sources, atom and ion sources, X-ray diffractometry and other techniques. This course also provides experiments on microstructural analysis of materials for practice and illustration of selected subject matters. Prerequisite: permission of the instructor. (Not for students who have taken MSE4010 or 4811.)

PHY4360

Electronic Packaging

3 U; 3 Lect. 1 Tut.

This course provides an overview of concepts and applications of electronic packaging, soldering and materials. Topics include: thick and thin films technologies, polymeric materials in electronic packaging, testing of material properties and electrical performance. Prerequisite: permission of the instructor. (Not for students who have taken MSE4210.)

PHY4370

Computational Physics

3 U; 3 Lect. 1 Tut. 3 Lab.; 1st term

This course is intended to provide a solid training in the computational techniques for solving various physical problems. The following topics will be discussed: basic numerical methods, matrix problems in physics, numerical methods for partial differential equations in physics, modelling of continuous systems, and applications of Monte Carlo simulation in statistical physics. Students are advised to take PHY2351 before taking this course. Prerequisite: permission of the instructor.

PHY4410

Modern Optics

3 U; 3 Lect. 1 Tut.

This course provides an overview of the basic principles and applications of various branches of modern optics. Topics covered include: interference and diffraction, Fourier optics, holography, laser physics, polarization and waves in anisotropic media, and introduction to nonlinear optics. Students are advised to take PHY4211 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY4420

Plasma Physics

3 U; 3 Lect. 1 Tut.

This course is intended to introduce the students to the basic properties of plasma. Various important physical processes in plasmas will be discussed. Topics covered include: properties of plasmas, charged particle motions, fluid and kinetic descriptions of plasmas, waves in fluid plasmas, equilibrium and stability, collisions and transport phenomena, and Vlasov theory of electron plasma waves. Prerequisite: PHY3022, 3041 or their equivalents, and permission of the instructor.

PHY4440

Laser Principles and Applications

3 U; 3 Lect. 1 Tut.; 1st term

This course provides an exposition of the basic principles as well as the applied aspects of laser. Topics covered include: electromagnetic theory, ray tracing in optical systems, propagation of laser beams, resonant cavities, laser oscillators and amplifiers, quantum treatment of two-level system, and laser applications. Students are advised to take PHY 3041 and 3202 or 3402, or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY4450

Solid State Physics

3 U; 3 Lect. 1 Tut.; 2nd term

This course aims at providing students with the essential concepts of modern solid state physics. The thermal, electrical, and magnetic properties of solids will be discussed via microscopic models. Topics covered include: survey of crystal lattices, elastic scattering of waves, atomic vibrations, electrons in crystals, thermodynamics of phonons and electrons, electrical and thermal conduction, magnetic properties, and superconductivity. Students are advised to take PHY3202 or its equivalent before taking this course or permission of the instructor.

PHY4460

Relativity

3 U; 3 Lect. 1 Tut.

This course serves as an introduction to the central ideas of the theory of special relativity and general relativity. Topics in the theory of special relativity include: Lorentz transformation, relativistic kinematics and collisions, covariant formulation of electrodynamics. Elements of differential geometry such as metric, vectors, covariant differentiation and curvature will also be introduced. Topics in the general theory of relativity include: gravity as spacetime curvature, geodesic equation, Einstein's equations, Schwarzschild metric, black holes, Robertson-Walker metric, and cosmology. Students are advised to take PHY3022 and 3041 or their equivalents before taking this course. Prerequisite: permission of the instructor.

PHY4510

Selected Topics (Thematic Melodies of 20th Century Theoretical Physics)

2 U; 2 Lect.; 1st term

Different topics illustrating important ideas in 20th century theoretical physics will be discussed. Topics covered will include: quantization, phase factor, path integral, symmetry, symmetry and groups in physics, modern developments and gauge theory. Prerequisite: permission of the instructor.

PHY4520

Selected Topics (Physics in Meteorology)

3 U; 3 Lect. 1 Tut.

The course provides an introduction to the physical principles in meteorology and weather forecasting. Topics covered include: physics of fluids; dynamic meteorology; atmospheric thermodynamics; atmospheric physics (optics, electricity and cloud); weather systems and phenomena; weather observation, analysis and forecasting. Trips to Hong Kong Observatory headquarters/outstations will be arranged to help the students to familiarize themselves with the observational instruments and the real-life practice of weather analysis and forecasting. Students are advised to take PHY3011 and 3022 before taking this course. Prerequisite: Permission of the instructor.

PHY4530

Selected Topics (Astrophysics)

3 U; 3 Lect. 1 Tut.; 2nd term

This course provides an introduction to modern astronomy and cosmology. Topics covered include: star formation and pre-main sequence evolution, main sequence stars, post main sequence evolution: red giants, supernovae, white dwarfs, neutron stars and black holes. Prerequisite: students must have passed in PHY3022, 3201, 3202 or their equivalents or permission of the instructor.

PHY4540, 4550

Selected Topics

3 U each; 3 Lect. 1 Tut.

Different topics may be offered from year to year, depending on available expertise and current developments. Prerequisite: permission of the instructor.

PHY4560, 4570, 4580, 4590

Selected Topics in Applied Physics

3 U each; 3 Lect. 1 Tut.

Courses on selected topics in applied physics may be offered from year to year, depending on available expertise. Prerequisite: permission of the instructor.

PHY4610/4620

Project I/II

3/3 U; 3 Tut. 6 Lab.; 2-term

A project in experimental or theoretical physics, either in research or in reviewing the literature. These two courses should normally be taken as a sequence. Prerequisite: permission of the instructor.

PHY4700

Selected Topics in Nanoscience and Technology

3 U; 3 Lect. 1 Tut.; 2nd term

This course covers the theories and applications of materials with a length-scale of nanometers. The selected topics in nanoscience and technology, focusing on materials such as semiconductors, metals, polymers, etc., may differ from year to year, depending on available expertise. Growth and fabrication of nano-size materials and other related science and technology will also be discussed. Prerequisite: permission of the instructor.

PHY4711, 4721

Special Experimental Project I, II

1 U each; 3 Lab.; 1st term

Student taking this course is required to finish a short experimental project, which illustrates modern physics and/or technique. Prerequisite: permission of the instructor. (For undergraduates only.)

PHY4712, 4722

Special Experimental Project III, IV

1 U each; 3 Lab.; 2nd term

Student taking this course is required to finish a short experimental project, which illustrates modern physics and/or technique. Prerequisite: permission of the instructor. (For undergraduates only.)

PHY4751, 4752

Special Theoretical Projects III, IV

1 U each; 3 Tut.; 1st/2nd term

Students taking this course are required to finish a short project or guided study in theoretical physics. Prerequisite: permission of the instructor.

PHY4910

Advanced Laboratory

3 U; 6 Lab.

Experiments on physics and materials science. Prerequisite: permission of the instructor.

PHY5410

Quantum Mechanics II

3 U; 3 Lect. 1 Tut.; 2nd term

This course will discuss various theoretical topics of non-relativistic quantum mechanics at the graduate level. The quantum mechanics of many-body systems will also be introduced. Topics covered include: operator methods in quantum mechanics, addition of angular momenta, variational method, stationary perturbation theory, time-dependent perturbation theory, scattering theory, and introduction to the quantum theory of many-body systems. Prerequisite: permission of the instructor.

PHY5420

Classical Electrodynamics

3 U; 3 Lect. 1 Tut.; 2nd term

This course is intended to provide an introduction to the theory of classical electrodynamics at the graduate level. The emphasis is on the problems of electromagnetic radiation and the covariant formulation of electrodynamics. Selected topics of current research interest will also be discussed. Prerequisite: permission of the instructor.

PHY5430

Solid State Theory

3 U; 3 Lect. 1 Tut.; 1st term

This course serves as an introduction to the quantum theory of solid state physics at the graduate level. Topics covered include: band theory of electron in a periodic potential, semiclassical theory of electron dynamics, quantum theory of lattice dynamics, electron-phonon interaction, transport properties of solids, superconductivity, and selected topics of current research interest. Prerequisite: PHY4221 or their equivalents, and permission of the instructor.

PHY5440

Astrophysics

3 U; 3 Lect. 1 Tut.

This course is intended to provide an introduction to contemporary theoretical astrophysics. Topics covered include: tools for probing astrophysical phenomena, structure and evolution of stars, introduction to the general theory of relativity and cosmology, and relativistic astrophysics. Prerequisite: permission of the instructor.

PHY5450

Introduction to Soft Matter Physics

3 U; 3 Lect. 1 Tut.; 2nd term

The aim of this course is to provide students the basic concepts and research methods in soft matter physics. Topics covered include: structural, thermodynamic and dynamical properties of macromolecules, gels, colloids, amphiphilic molecules, membranes and liquid crystals. Principles for some of the major experimental techniques used in soft matter research will also be discussed. Students who take this course are expected to have a good knowledge of thermodynamics and statistical mechanics. Prerequisite: permission of the instructor.

PHY5460

Instrumentation II

3 U; 2 Lect. 4 Lab.; 1st term

Principles, instrumentation, experiments and data interpretation of spectroscopy, thermal analysis, microscopy and other instrumentation. Laboratory experiments for practice and illustration of the subject matter. Prerequisite: PHY4330 or its equivalent or special permission of the instructor.

PHY5510

Topics in Theoretical Physics (Advanced Statistical Mechanics)

3 U; 3 Lect. 1 Tut.

This course provides an introduction to the major ideas and methods in equilibrium statistical mechanics as well as in nonequilibrium statistical physics. Topics will be selected from: the statistical mechanics of magnetic systems, interacting fluids and soft matter, theory of critical phenomena and the renormalization group, stochastic dynamics and nonequilibrium processes, introduction to quantum statistical mechanics, and other topics of current interest in statistical physics. Prerequisite: PHY4260 or its equivalent or permission of the instructor.

PHY5520

Topics in Theoretical Physics (Introduction to Many-body Theory)

3 U; 3 Lect. 1 Tut.

This course provides an introduction to the basic concepts and theoretical techniques of the quantum theory of many-body systems at zero-temperature as well as at finite temperature. Topics covered include: second quantization, Green's functions at zero-temperature, Green's functions at finite temperature, perturbation theory and Feynman diagram, equations of motion of the Green's functions, linear response theory, and applications of many-body theory in condensed matter physics. Prerequisite: permission of the instructor.

PHY5530

Topics in Theoretical Physics (Introduction to Particle Physics)

3 U; 3 Lect. 1 Tut.

An introductory survey of major ideas and important results in particle physics. Topics include symmetries, relativistic quantum mechanics, perturbation theory, quantum electrodynamics, the Standard Model, and the relationship between particle physics and cosmology. Prerequisite: PHY5410 or its equivalent or permission of the instructor.

PHY5540

Topics in Theoretical Physics (Advanced Computational Physics)

3 U; 3 Lect. 1 Tut.

This course is intended to provide a solid training in the advanced techniques of contemporary computational physics. Topics covered include: classical Monte Carlo method and applications, quantum Monte Carlo techniques and applications, exact diagonalization technique for quantum many-body systems, random systems, molecular dynamics and classical fluids, and selected topics of current interest in computational physics. Prerequisite: permission of the instructor.

PHY5550

Topics in Theoretical Physics (Quantum Optics)

3 U; 3 Lect. 1 Tut.

Concept of photons, properties and applications of nonclassical light, photo-detection of optical coherence, photon-atom interaction models, quantum theory of damping, laser theory, atom coherence effects and an introduction to quantum communication. Students are advised to take PHY4221 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY5560

Topics in the Frontiers of Physics

3 U; 3 Lect. 1 Tut.

Topics of contemporary interest will be selected both from fundamental physics and from physics with important applications to technology. The objective is to introduce students to the frontiers of physics. The level of presentation assumes basic understanding of undergraduate physics. Prerequisite: permission of the instructor.

PHY5570

Methods in Theoretical Physics II

3 U; 3 Lect. 1 Tut.; 1st term

The aim of the course is to provide students with the essential mathematical physics background needed for carrying out postgraduate studies in physics. Topics will be selected from complex analysis including analytic functions, Laurent series, Cauchy-Riemann conditions, residue theorem and its applications; ordinary differential equations including the Frobenius method, Green's functions, special functions and their applications; partial differential equations including Green's functions, eigenfunction expansions and boundary-value problems; perturbation theory and its application in physics; probability and statistics with applications in physics; and other topics of relevance to physics. Students are expected to have taken PHY2601 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY5580

Physics of Quantum Information and Quantum Computation

3 U; 3 Lect. 1 Tut.

This course provides an introduction to the basic concepts and applications of quantum information and quantum computation. Topics covered include: key concepts of quantum mechanics, single qubit transformations, quantum circuits, quantum algorithms, quantum communication, and quantum information theory. Students are advised to take PHY4221 or its equivalent before taking this course. Prerequisite: permission of the instructor.

PHY5620

Topics in Experimental Physics (Thin Film Physics and Technology)

3 U; 3 Lect.; 1st term

This course provides an introduction to the physical properties as well as the methods of preparation of thin films. Topics covered include: vacuum science and technology, thin film deposition techniques, growth processes and modes, characterization, epitaxy, lattice engineering, metastable phases, artificial structures, novel properties in thin films: superconductivity, giant-magnetoresistance and colossal magnetoresistance effects, modulation doping and quantum wells, superhard coatings, and transparent conducting coatings. Prerequisite: permission of the instructor.

PHY5630, 5640, 5650

Topics in Experimental Physics

3 U each; 3 Lect. 1 Tut.

Topics of current interest in experimental physics, depending on available expertise and current developments. Prerequisite: permission of the instructor.

PHY5660

Semiconductor Physics and Devices

3 U; 3 Lect. 1 Tut.; 1st term

This is an introductory course at the postgraduate level in semiconductor physics and devices. Based on quantum theory, it describes the electronic band structures, band gaps, and phonon dispersion relations for the technologically important semiconductors such as Si, Ge, GaAs, etc. The electric transport properties and the optical properties of these bulk materials will then be treated. The principles of a number of common devices will also be introduced. Finally, the modern heterostructures at low dimensions, including quantum wells, quantum wires, and quantum dots, together with their applications will be discussed. From this course, the students will appreciate how the fundamental courses of Quantum Mechanics and Solid State Physics are applied to the technologically important semiconductor materials, which leads to today's information revolution. Prerequisite: permission of the instructor.

MSE5080

Surface Science

3 U; 2 Lect. 3 Lab; 1st term

This course serves as an introduction to surface science. Major topics are: vacuum technology, electron-surface interactions, photon-surface interactions, ion-surface interactions, scanning probe microscopy and case studies in surface science. Prerequisite: permission of the instructor.

Study Scheme

1. Major Programme

A. Applicable to students admitted in 2007-08 and thereafter

There are two streams of specialization: *Physics Stream*, and *Enrichment Stream in Theoretical Physics*. All students are initially under Physics Stream. Students with cumulative Major GPA of at least 3.0, or with the permission of the Department, may apply at their second term of the second year of attendance or thereafter (for Secondary 6 entrants, at their second term of the third year of attendance or thereafter) to specialize in the *Enrichment Stream in Theoretical Physics* and select certain courses as prescribed below.

Courses Required of All. (Note):

PHY0211, 0222, 0411, 2001, 2002, 2003, 2004, 2351, 2811, 2822,
3011, 3041, 3201

34 units

Total: 34 units

Physics Stream

(i)	Required Courses: PHY3202, 3811	5 units
(ii)	24 units of Elective Courses from Group A and B with at least 15 units from Group A:	24 units
	<u>Group A</u> PHY3022, 3350, 4211, 4221, 4260, 4320, 4330, 4700	
	<u>Group B</u> PHY2400, 2601, 371S, 372S, 3401, 3402, 3412, 3822, 4350, 4360, 4370, 4410, 4420, 4440, 4450, 4460, 4520, 4530, 4540, 4550, 4560, 4570, 4580, 4590, 4610, 4620, 4711, 4712, 4721, 4722, 5410, 5420, 5430, 5440, SCI2400 [#]	
		Total: 63 units

[#] To be included in the Major GPA as well.

Recommended course pattern*First Year of Attendance*

1st term :	PHY0211, 2001, 2004, 2351, 2811	13 units
2nd term:	PHY0222, 2002, 2003, 2822, elective course	13 units

Second Year of Attendance

1st term :	PHY3011, 3041, 3201, 3811	11 units
2nd term :	PHY3202, elective course(s)	7-10 units

Third Year of Attendance

1st term :	PHY0411, elective courses	10 units
2nd term:	elective courses	9 units

Total: 63 units

Enrichment Stream in Theoretical Physics

(i)	Required Courses: PHY2601, 3022, 3202, 4211, 4221, 4260	19 units
(ii)	At least 12 units of Elective Courses: PHY3350, 4420, 4450, 4460, 4520, 4530, 4610 (or 4620), 5410, 5420, 5570	12 units

Total: 65 units

[#] To be included in the Major GPA as well.

Recommended course pattern*First Year of Attendance*

1st term :	PHY0211, 2001, 2004, 2351, 2811	13 units
2nd term :	PHY0222, 2002, 2003, 2822	10 units

Second Year of Attendance

1st term :	PHY2601, 3011, 3041, 3201	13 units
2nd term :	PHY3022, 3202, elective course(s)	10-13 units

Third Year of Attendance

1st term :	PHY0411, 4221, 4260, elective course	10 units
2nd term :	PHY4211, elective courses	9 units

Total: 65 units

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

B. Applicable to students admitted in 2006-07

There are three streams of specialization: *Physics Stream*, *Enrichment Stream in Applied Physics*, and *Enrichment Stream in Theoretical Physics*. All students are initially under Physics Stream. Students with cumulative Major GPA of at least 3.0, or with the permission of the Department, may apply at their second term of the second year of attendance or thereafter (for Secondary 6 entrants, at their second term of the third year of attendance or thereafter) to specialize in the *Enrichment Stream in Applied Physics* or the *Enrichment Stream in Theoretical Physics* and select certain courses as prescribed below.

Courses Required of All. (Note): 34 units
PHY0211, 0222, 0411, 2001, 2002, 2003, 2004, 2351, 2811, 2822, 3011, 3041, 3201

Total: 34 units

Physics Stream

- (i) Required Courses: 5 units
PHY3202, 3811
- (ii) 24 units of Elective Courses from Group A and B with at least 15 units from Group A: 24 units

Group A

PHY3022, 3350, 4211, 4221, 4260, 4320, 4330, 4700

Group B

PHY2400, 2601, 371S, 372S, 3401, 3402, 3412, 3822, 4350, 4360, 4370, 4410, 4420, 4440, 4450, 4460, 4520, 4530, 4540, 4550, 4560, 4570, 4580, 4590, 4610, 4620, 4711, 4712, 4721, 4722, 5410, 5420, 5430, 5440, SCI2400#

Total: 63 units

To be included in the Major GPA as well.

Recommended course pattern

First Year of Attendance

1st term : PHY0211, 2001, 2004, 2351, 2811 13 units

2nd term: PHY0222, 2002, 2003, 2822, elective course 13 units

Second Year of Attendance

1st term : PHY3011, 3041, 3201, 3811 11 units

2nd term : PHY3202, elective course(s) 7-10 units

Third Year of Attendance

1st term : PHY0411, elective courses 10 units

2nd term: elective courses 9 units

Total: 63 units

Enrichment Stream in Applied Physics

- (i) Required Courses: 17 units
PHY3401, 3402, 3412, 3811, 4330, 4350
- (ii) At least 14 units of Elective Courses (at most 8 units from Group B): 14 units

Group A:

PHY3022, 3202, 371S, 372S, 4320, 4420, 4440, 4520,
4560, 4570, 4580, 4590, 4610 or 4620, 4700, 4711,
4712, 4721, 4722, 5620, MSE5080[#]

Group B:

ACE3200^{**}, ELE3010^Δ, 3240^{#*}, 3520^{#*}, 4310[#], 4320[#],
4430[#], PHY4360

Total: 65 units

[#] To be included in the Major GPA as well.

^{*} Students are advised to take PHY4330 before taking ACE3200 or ELE3240.

^Δ Students who have taken (or intend to take) PHY4320 or 4440 are not allowed to take ELE3010.

[⊙] Students are advised to take PHY3412 before taking ELE3520.

Recommended course pattern*First Year of Attendance*

1st term : PHY0211, 2001, 2004, 2351, 2811 13 units

2nd term : PHY0222, 2002, 2003, 2822 10 units

Second Year of Attendance

1st term : PHY3011, 3041, 3201, 3401, 3811 14 units

2nd term : PHY3402, 3412, elective course(s) 9-10 units

Third Year of Attendance

1st term : PHY0411, 4350, elective course(s) 8-12 units

2nd term : PHY4330, elective courses 6-10 units

Total: 65 units

Enrichment Stream in Theoretical Physics

(i) Required Courses: 19 units
PHY2601, 3022, 3202, 4211, 4221, 4260

(ii) At least 12 units of Elective Courses: 12 units
PHY3350, 4420, 4450, 4460, 4520, 4530, 4610 (or
4620), 5410, 5420, 5570

Total: 65 units

[#] To be included in the Major GPA as well.

Recommended course pattern*First Year of Attendance*

1st term : PHY0211, 2001, 2004, 2351, 2811 13 units

2nd term : PHY0222, 2002, 2003, 2822 10 units

Second Year of Attendance

1st term : PHY2601, 3011, 3041, 3201 13 units

2nd term : PHY3022, 3202, elective course(s) 10-13 units

Third Year of Attendance

1st term : PHY0411, 4221, 4260, elective course 10 units

2nd term : PHY4211, elective courses 9 units

Total: 65 units

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

C. Applicable to students admitted in 2005-06

There are three streams of specialization: *Physics Stream*, *Enrichment Stream in Applied Physics*, and *Enrichment Stream in Theoretical Physics*. All students are initially under Physics Stream. Students with cumulative Major GPA of at least 3.0, or with the permission of the Department, may apply at their second term of the second year of attendance or thereafter (for Secondary 6 entrants, at their second term of the third year of attendance or thereafter) to specialize in the *Enrichment Stream in Applied Physics* or the *Enrichment Stream in Theoretical Physics* and select certain courses as prescribed below.

Courses Required of All. (Note): 37 units
 PHY0211, 0222, 0411, 2001, 2002, 2003, 2004, 2351, 2811, 2822,
 3011, 3041, 3052, 3201

Total: 37 units

Physics Stream

- (i) Required Courses: 5 units
 PHY3202, 3811
- (ii) 24 units of Elective Courses from Group A and B with 24 units
 at least 15 units from Group A:

Group A

PHY3022, 3350, 4211, 4221, 4260, 4320, 4330, 4700

Group B

PHY2400, 2601, 371S, 372S, 3401, 3402, 3412,
 3822, 4350, 4360, 4370, 4410, 4420, 4440, 4450,
 4460, 4520, 4530, 4540, 4550, 4560, 4570, 4580,
 4590, 4610, 4620, 4711, 4712, 4721, 4722, 5410,
 5420, 5430, 5440, SCI2400[#]

Total: 66 units

[#] To be included in the Major GPA as well.

Recommended course pattern

First Year of Attendance

1st term : PHY0211, 2001, 2004, 2351, 2811 13 units
 2nd term: PHY0222, 2002, 2003, 2822, elective course 13 units

Second Year of Attendance

1st term : PHY3011, 3041, 3201, 3811 11 units
 2nd term : PHY3052, 3202, elective course 10 units

Third Year of Attendance

1st term : PHY0411, elective courses 10 units
 2nd term: elective courses 9 units

Total: 66 units

Enrichment Stream in Applied Physics

- (i) Required Courses: 17 units
 PHY3401, 3402, 3412, 3811, 4330, 4350
- (ii) At least 14 units of Elective Courses (at most 8 units from 14 units
 Group B):

Group A:

PHY3022, 3202, 371S, 372S, 4320, 4420, 4440, 4520,
4560, 4570, 4580, 4590, 4610 or 4620, 4700, 4711,
4712, 4721, 4722, 5620, MSE5080[#]

Group B:

ACE3200^{#*}, ELE3010^{#Δ}, 3240^{#*}, 3520^{#*}, 4310[#], 4320[#],
4430[#], PHY4360

Total: 68 units

[#] To be included in the Major GPA as well.

^{*} Students are advised to take PHY4330 before taking ACE3200 or ELE3240.

^Δ Students who have taken (or intend to take) PHY4320 or 4440 are not allowed to take ELE3010.

[⊙] Students are advised to take PHY3412 before taking ELE3520.

Recommended course pattern*First Year of Attendance*

1st term : PHY0211, 2001, 2004, 2351, 2811 13 units

2nd term : PHY0222, 2002, 2003, 2822 10 units

Second Year of Attendance

1st term : PHY3011, 3041, 3201, 3401, 3811 14 units

2nd term : PHY3052, 3402, 3412, elective course 12-13 units

Third Year of Attendance

1st term : PHY0411, 4350 elective course(s) 8-12 units

2nd term : PHY4330, elective courses 6-10 units

Total: 68 units

Enrichment Stream in Theoretical Physics

(i) Required Courses: 19 units
PHY2601, 3022, 3202, 4211, 4221, 4260

(ii) At least 12 units of Elective Courses: 12 units
PHY3350, 4420, 4450, 4460, 4520, 4530, 4610 (or
4620), 5410, 5420, 5570

Total: 68 units

[#] To be included in the Major GPA as well.

Recommended course pattern*First Year of Attendance*

1st term : PHY0211, 2001, 2004, 2351, 2811 13 units

2nd term : PHY0222, 2002, 2003, 2822 10 units

Second Year of Attendance

1st term : PHY2601, 3011, 3041, 3201 13 units

2nd term : PHY3022, 3052, 3202, elective course 13 units

Third Year of Attendance

1st term : PHY0411, 4221, 4260, elective course 10 units

2nd term : PHY4211, elective courses 9 units

Total: 68 units

Note: Students should obtain Grade "D" or above in each of the courses of PHY2001, 2002 and 2003. Otherwise, they are required to repeat the course(s). Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.

2. *Minor Programme*

Students are required to complete a minimum of 18 units from the following courses and other elective courses as approved by the Department. The completed courses must include at least 6 units of PHY courses at 3000 or above level. (Notes 1-3):

PHY2001, 2002, 2003, 2351, 2400, 2601, 3011, 3022, 3041, 3052, 3201, 3202, 3350, 3402, 3412, 4211, 4221, 4260, 4320, 4330, 4350, 4360, 4370, 4410, 4420, 4440, 4450, 4460, 4520, 4530, 4540, 4550, 4700

- Notes:
1. Electronics Engineering Majors are not allowed to select PHY3412 to fulfil the Minor Programme requirements.
 2. Mathematics Majors are not allowed to select PHY2601 to fulfil the Minor Programme requirements.
 3. Computer Science and Computer Engineering Majors are not allowed to select PHY2351 to fulfil the Minor Programme requirements.

3. *Course Exemptions*

Physics Majors

Substitute Courses

Students who fail no more than one required course may be allowed to substitute it by another elective course at PHY3000 or above level as approved by the Department, provided that: 1) the course is failed in the final two terms of attendance before graduation, and 2) the students concerned satisfy all other graduation requirements.

Physics Minors

Certain prerequisite/co-requisite conditions for registering for the courses may be waived; intending Minor students should consult the Department of Physics individually.

4. *Faculty Language Requirement*
5. *Major/Faculty Requirement for S6 Entrants*

Risk Management Science

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
*RMS0401	Special Topics in Risk Management	1
RMS2001	Introduction to Risk Management	3
RMS2101	Special Topics in Risk Management I	1
RMS3101	Special Topics in Risk Management II	1
RMS4001	Simulation Methods for Risk Management Science and Finance	3
RMS4002	Data Analysis in Finance and Risk Management Science	3
RMS4003	Statistical Modelling in Financial Markets	3
RMS4004	Theory of Risk and Insurance	3
RMS4005	Stochastic Calculus for Finance and Risk	3
RMS4007	Risk Management with Derivatives Concepts	3
RMS4101	Special Topics in Risk Management III	1

Course Description

(Unless otherwise specified, all are 3-unit term courses of three hours of lecture and one hour of tutorial per week.)

RMS2001

Introduction to Risk Management

This course aims at providing a focused introduction to various concepts of risk and risk measures from a scientific perspective. The course will discuss the various roles that risk plays in insurance and financial applications. Current risk measures such as value at risk and shortfall risk will be introduced. These measures will be calculated for recent financial losses to illustrate their usefulness in risk management.

RMS2101

Special Topics in Risk Management I

1 U

This is an elementary course aiming at introducing current issues and special topics in risk management. Students are required to read books and articles in the related topics assigned by the instructor. (For Risk Management Science Majors only or consent of instructor.)

RMS3101

Special Topics in Risk Management II

1 U

This is an intermediate course aiming at introducing current issues and special topics in risk management. Students are required to read books and articles in the related topics assigned by the instructor. (For Risk Management Science Majors only or consent of instructor.)

* *Course offered in 2005-06 and before.*

RMS4001

Simulation Methods for Risk Management Science and Finance

This course starts with presenting standard topics in simulation including random variable generations, variance reduction methods and statistical analysis of simulation outputs. The course then reviews the applications of these methods to derivative security pricing. Topics addressed include: importance sampling, martingale control variables, stratification and the estimation of derivatives. Additional topics include the use of low discrepancy sequence (quasi-random numbers), pricing American options and scenario simulation for risk management. Prerequisite: RMS2001 or consent of instructor.

RMS4002

Data Analysis in Finance and Risk Management Science

This course covers modern data analysis techniques that are commonly used in financial and risk management. Topics include applications of multivariate techniques such as principal component and canonical correlation to asset management, Value-at-Risks, GARCH model in estimating volatility, time series methods in term-structure analysis, and data mining methods such as logistic regression, k-mean clustering and classification tree, and neural network. Prerequisite: RMS2001 or consent of instructor.

RMS4003

Statistical Modelling in Financial Markets

This course is designed to introduce the current developments in risk management in the financial markets. Risk management ideas associated with three general important areas in finance will be discussed: asset management, derivative pricing and fixed income models. Emphasis will be placed on the statistical modelling aspects on some of the commonly used models in these areas. Prerequisite: RMS2001 or consent of instructor.

RMS4004

Theory of Risk and Insurance

This course covers the theory of risk and its applications to insurance. Topics include: classical and stochastic risk models, ruin theory, claims modelling and evaluations, risk premium pricing, loss distributions and creditability theory. Prerequisite: STA3007 or consent of instructor.

RMS4005

Stochastic Calculus for Finance and Risk

This course starts with the introduction of the concepts of arbitrage and risk-neutral pricing. It then proceeds to discuss the stochastic calculus foundations for continuous-time finance models. Topics include: Brownian motion, stochastic integral, Itô's formula, Girsanov's change of measure, and the relationship between stochastic calculus and partial differential equations. Examples will be taken from equity options, including the Black-Scholes formula for foreign exchange and term-structure models. Prerequisites: RMS2001 and STA3007 or consent of instructor.

RMS4007

Risk Management with Derivatives Concepts

This course aims at understanding the application of derivatives theories for the practical risk management. It starts by reviewing basic concepts of pricing and hedging derivatives, like risk-neutral valuation, arbitrage strategies, hedging strategies, implied volatilities and the Greeks. The Value-at-Risk framework for derivatives positions is discussed. Student will also learn how to apply option theoretic approach to credit risk management. Specifically, the capital structure model will be applied to measure the default probability. The Moody's KMV methodology and CreditRisk⁺ are introduced. Prerequisites: RMS2001 and 4003. (For Risk Management Science Majors only or consent of instructor.)

RMS4101

Special Topics in Risk Management III

1 U

This is an advanced course aiming at introducing current issues and special topics in risk management. Students are required to read books and articles in the related topics assigned by the instructor. (For Risk Management Science Majors only or consent of instructor.)

Study Scheme

I. Major Programme

A. Applicable to students admitted in 2006-07 and thereafter

Students are required to complete 72 units of courses as follows:

- (i) Required Courses (Note): 45 units
 ACY1111, DSE1030, FIN2010[#], 3080[#], MAT2010[#],
 2310[#], RMS2001, 2101, 3101, 4001, 4003, 4101,
 STA2001[#], 2006[#], 3007[#], 3008[#]
- (ii) Elective Courses: 27 units
 - (a) One course from CSC1110, 1500
 - (b) At least eight courses from CSC2520[#],
 ECO3420[#], FIN3010[#], 3210[#], MAT3210[#],
 3220[#], 3230[#], 3240[#], 4210[#], RMS4002, 4004,
 4005, 4007, STA3006[#], 4002[#], 4003[#], 4004[#],
 4005[#], 4006[#], 4008[#]

Total: 72 units

[#] To be included in the Major GPA as well.

Recommended course pattern

First Year of Attendance 30 units

ACY1111, DSE1030, FIN2010, MAT2010, 2310, RMS2001,
 2101, STA2001, 2006, and one elective course from CSC1110,
 1500

Second Year of Attendance 20-23 units

FIN3080, RMS3101, 4003, STA3007, 3008, and two or three
 elective courses from CSC2520, ECO3420, FIN3010, 3210,
 MAT3210, 3220, 3230, 3240, 4210, STA3006, 4004

Third Year of Attendance 19-22 units

RMS4001, 4101 and five or six elective courses from CSC2520,
 ECO3420, FIN3010, 3210, MAT3210, 3220, 3230, 3240, 4210,
 RMS4002, 4004, 4005, 4007, STA3006, 4002, 4003, 4004,
 4005, 4006, 4008

Total: 72 units

B. Applicable to students admitted in 2005-06

Students are required to complete a minimum of 69 units of courses as follows:

- | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Note):
ACY1111, DSE1030, FIN2010 [#] , 3080 [#] , MAT2010 [#] ,
2310 [#] , RMS2001, 4001, 4003, STA2001 [#] , 2006 [#] ,
3007 [#] , 3008 [#] | 42 units |
| (ii) | Elective Courses: | 27-28 units |
| (a) | One course from CSC1110, 1500, STA2009 | |
| (b) | At least eight courses from CSC2520 [#] ,
ECO3420 [#] , FIN3010 [#] , 3210 [#] , MAT3210 [#] ,
3220 [#] , 3230 [#] , 3240 [#] , 4210 [#] , RMS0401, 4002,
4004, 4005, 4007, STA3006 [#] , 4002 [#] , 4003 [#] ,
4004 [#] , 4005 [#] , 4006 [#] , 4008 [#] | |

Total: 69-70 units

[#] To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	29 units
ACY1111, DSE1030, FIN2010, MAT2010, 2310, RMS2001, STA2001, 2006, and one elective course from STA2009, CSC1110, 1500	
<i>Second Year of Attendance</i>	19-22 units
FIN3080, RMS4003, STA3007, 3008, and two or three elective courses from CSC2520, ECO3420, FIN3010, 3210, MAT3210, 3220, 3230, 3240, 4210, STA3006, 4004	
<i>Third Year of Attendance</i>	18-21 units
RMS4001 and five or six elective courses from CSC2520, ECO3420, FIN3010, 3210, MAT3210, 3220, 3230, 3240, 4210, RMS0401, 4002, 4004, 4005, 4007, STA3006, 4002, 4003, 4004, 4005, 4006, 4008	

Total: 69-70 units

Note : All Risk Management Science Major students should obtain Grade "D" or above in each of the courses of RMS2001, STA2001, 2006, 3007 and 3008. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.

2. Minor Programme

Students are required to complete 21-23 units of courses as follows:

- | | | |
|------|-------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses:
RMS2001, STA2101 (or 2001), 2102 (or 2006), and
either STA2009 (or CSC1110 or 1500) | 12-14 units |
| (ii) | Elective Courses (Note):
Three courses from RMS4001, 4002, 4003, 4004,
4005, 4007, STA4004 | 9 units |

Total: 21-23 units

Note : The elective courses in (ii) that are counted towards the fulfilment of the student's RMS Minor Programme requirement cannot be counted towards the fulfilment of his/her other Major/Minor Programme requirement. Students are required to declare which course(s) will be counted towards requirements of the Minor Programme in RMS at their final term of attendance.

3. *Faculty Language Requirement*
4. *Major/Faculty Requirement for S6 Entrants*

Statistics

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
RMS2001	Introduction to Risk Management	3
RMS4001	Simulation Methods for Risk Management Science and Finance	3
RMS4002	Data Analysis in Finance and Risk Management Science	3
RMS4003	Statistical Modelling in Financial Markets	3
RMS4004	Theory of Risk and Insurance	3
RMS4005	Stochastic Calculus for Finance and Risk	3
STA0201	Workshop on Data Exploration and Technical Writing	3
STA0301	Workshop on Data Analysis and Statistical Computing	3
STA0303	Case Studies for Business Applications	3
STA0401	Statistics Projects	3
STA1310	Computer Interactive Statistics	3
STA2001	Basic Concepts in Statistics and Probability I	4
STA2003	Computer-aided Statistical Reasoning	3
STA2004	SAS for Data Management	3
STA2006	Basic Concepts in Statistics and Probability II	4
STA2007	Mathematics with Applications in Statistics I	3
STA2008	Mathematics with Applications in Statistics II	3
STA2009	Introduction to Programming Language for Statistics	3
STA2101	Basic Statistical Concepts and Methods I	3
STA2102	Basic Statistical Concepts and Methods II	3
STA2103	Statistics in Modern Society	3
STA2104	Statistical Reasoning: A Web-based Experience	3
STA3001	Foundation of Financial and Managerial Statistics	3
STA3002	Experimental Design	3
STA3003	Survey Methods	3
STA3004	Basic Methods in Biomedical Statistics	3
STA3005	Applied Nonparametric Statistics	3
STA3006	Statistical Computing	3
STA3007	Applied Probability	3
STA3008	Applied Regression Analysis	4
STA4002	Multivariate Techniques with Business Applications	3
STA4003	Statistical Inference	3
STA4004	Actuarial Science	3
STA4005	Time Series	3
STA4006	Categorical Data Analysis	3
STA4007	Statistical Quality Control	3
STA4008	Survival Modelling	3
STA4009	Workshop on Marketing Survey	3

Course Description

(For the course descriptions of all RMS courses, please refer to the Chapter of Risk Management Science. Unless otherwise specified, all are 3-unit term courses of three hours of lecture and one hour of tutorial per week.)

STA0201

Workshop on Data Exploration and Technical Writing

3 U; 3 STOT

This course is designed to build students' intuition upon data and fundamental principles of statistics, and to develop skills in technical writing. Students are required to take part in several term projects with emphasis on techniques of data exploration. (Prerequisite: STA2003 or consent of instructor.)

STA0301

Workshop on Data Analysis and Statistical Computing

3 U; 3 STOT; 1st term

This course is designed to strengthen students' ability in statistical computing as well as in processing and analysing data. Students are required to participate in several term projects with emphasis on techniques of data management and analysis. (Prerequisite: STA0201 or consent of instructor.)

STA0303

Case Studies for Business Applications

3 U; 3 STOT; 2nd term

This course is designed to enlighten students with a more comprehensive and in-depth understanding of business statistics through studying example cases. Students are required to carry out several term projects with emphasis on statistical applications in business. (Prerequisite: STA0301 or consent of instructor.)

STA0401

Statistics Projects

3 U; 3 STOT; 1st term

This course is designed to enhance students' competence in integrating and applying statistical techniques in a practical manner. Students are required to conduct several term projects with emphasis on applications. (Prerequisite: STA0301 or consent of instructor.)

STA1310

Computer Interactive Statistics

This course is specially designed for students with a six-year secondary school education background or students who are not trained under Hong Kong high school education system, such as students who have completed their secondary school in mainland China. Students will learn the basic concepts of statistics, so that they will be equipped to read statistical reports and recognize when the quantitative information being presented is accurate or misleading. They will also learn about organizing and displaying graphical and numerical summaries of data, and drawing conclusions from them. The course uses computer interactive techniques, instead of tedious arithmetic calculations, to introduce simple but powerful statistical concepts. Topics include exploratory data analysis, statistical graphics, sampling variability, point and confidence interval estimation, hypothesis testing, as well as other selected topics. The course does not require background on calculus.

STA2001**Basic Concepts in Statistics and Probability I**

4 U; 4 Lect. 1 Tut.; 1st term

This course is designed to study the basic concepts of probability and statistics. Topics include elementary probability, Bayes theorem, random variables, distribution and density functions, mathematical expectation, conditional distribution, stochastic independence, correlation, special univariate and multivariate distributions, transformation of random variables, sampling distributions, law of large number, moment generating function and central limit theorem.

STA2003**Computer-aided Statistical Reasoning**

1st term

The objective of this course is to help students develop their abilities to judge correctly under uncertainty. The focus of the course is on statistical reasoning. Statistical packages such as Minitab will be used throughout the course for computation and demonstration purposes. Descriptive statistics and statistical graphics will be covered. Important concepts underlying statistical estimation and hypothesis testing will be elucidated and demonstrated using simulation techniques. (For Statistics Majors only or consent of instructor.)

STA2004**SAS for Data Management**

2nd term

This course aims at familiarizing students with the capabilities of the Base SAS software for data management. Students will learn SAS programming with emphasis on data storage, data retrieval, data manipulation, data transformation, descriptive analysis, sorting, files merging, file updating, random sampling and data reporting. (For Statistics Majors only or consent of instructor.)

STA2006**Basic Concepts in Statistics and Probability II**

4 U; 4 Lect. 1 Tut.; 2nd term

This course covers basic theories in estimation and testing. Topics include point estimation, interval estimation, unbiasedness, maximum likelihood estimation, hypothesis testing and likelihood ratio test. (Prerequisite: STA2001 or consent of instructor.)

STA2007**Mathematics with Applications in Statistics I**

1st term

This course introduces the mathematical background knowledge for statistics. Topics include vector spaces, basic operations on matrices, simultaneous linear equations, functions, limits, differentiation, integration, Cauchy-Schwarz inequality and infinite series. (For Statistics Majors only or consent of instructor.)

STA2008**Mathematics with Applications in Statistics II**

2nd term

This course provides mathematical tools useful in statistics. Topics include eigenvalues, special matrices (partitioned matrices, idempotent matrices, nonnegative definite matrices, etc.), singular value decomposition, multidimensional calculus, Lagrange multipliers, elementary differential and difference equations, parabolic partial differential equations, and Laplace transform. (For Statistics Majors only or consent of instructor.)

STA2009

Introduction to Programming Language for Statistics

This course aims at providing students with basic knowledge of high level programming languages such as C and S-plus. A problem-solving approach will be employed. Algorithm development and implementation with emphasis on examples and applications in statistics will be discussed.

STA2101

Basic Statistical Concepts and Methods I

1st term

This course introduces basic statistical methods with applications in experimental sciences. Topics include descriptive statistics, the concepts of population and sample, random sampling, basic distributions, point and confidence interval estimations, hypothesis testing and analysis of variance for designed experiments. Topics and examples in relation to correlation, regression, curve-fitting, Hardy-Weinberg equilibrium and Linkage equilibrium will be selected and discussed. The use of related statistical packages will be demonstrated. (Not for Statistics Majors.)

STA2102

Basic Statistical Concepts and Methods II

2nd term

This course offers basic concepts of statistics. Topics include elementary probability, Bayes theorem, random variables, distribution and density functions, discrete and continuous distributions, sampling distributions, and elementary concepts of estimation and hypothesis testing. (Not for Statistics Majors.)

STA2103

Statistics in Modern Society

3 U; 3 Lect.

This course is designed for students who are interested in the applications of statistical methods to real life situations such as opinion polls, clinical trials, gambling and public policy. The objective of the course is to help students become statistically literate and discover the power of statistics and its growing importance in modern society. (Not for Statistics Majors or students who have taken UGB247N.)

STA2104

Statistical Reasoning: A Web-based Experience

3 U; 3 Lect.

Statistics, especially survey data, are frequently misused and misinterpreted. The aim of this course is to equip students with critical perspectives to scrutinize statistical works. The main objectives are as follows: 1) to investigate the role of common sense in understanding statistics; 2) to discuss important features in survey sampling, including sampling schemes and questionnaire design; 3) to introduce the art of data presentation, including popular graphical techniques and statistical report writing; and 4) to examine interesting case studies from typical classes of surveys such as opinion polls and marketing surveys. The pros and cons of using Internet as a means for survey will also be explored. (Not for Statistics Majors or students who have taken UGB252N.)

STA3001**Foundation of Financial and Managerial Statistics**

This course presents an overview of statistical techniques that lay the foundation for effective applications of statistics in the context of business administration. It covers financial management techniques including investment appraisal, portfolio management and models for assessing stock prices; as well as management techniques including decision analysis under uncertainty, project management, construction and usage of indices, and official statistics in Hong Kong. Selected topics in relation to the applications of multivariate techniques in marketing management will be discussed.

STA3002**Experimental Design**

This course is designed to study various statistical aspects of models in the analysis of variance. Topics include randomization, replication and blocking, randomized blocks, Latin squares and related designs, missing values, incomplete block designs, factorial designs, nested designs and nested-factorial designs, and 2k factorial designs. The use of related statistical packages will be demonstrated.

STA3003**Survey Methods**

This course focuses on the sample design, data analysis and interpretation of survey data. The basic sampling methods covered include simple random sampling, stratified random sampling, clustering sampling, subsampling and double sampling. The underlying method of parameter estimation will be fully discussed for simple random sampling and stratified random sampling. Special estimation techniques including ratio and regression estimations will be introduced in the context of simple random sampling. Analytic treatment of sample size determination, questionnaire design, problem of nonresponse and nonsampling errors will be discussed.

STA3004**Basic Methods in Biomedical Statistics**

This course explores some statistical methods in epidemiological research. Topics are selected from case-control studies, cross-sectional studies, relative risk and odds ratio, attributable risk, matched samples, logistic regression, life-table data analysis, Kaplan-Meier estimates, diagnostic tests, combining evidence from fourfold tables, effects of misclassification errors and agreement among observers.

STA3005**Applied Nonparametric Statistics**

Nonparametric testing and estimation procedures are introduced. Topics include one sample location problem, two sample location problem, two sample dispersion problem, one-way layout, two-way layout, independence problem and regression problems.

STA3006**Statistical Computing**

This course is concerned with the computational aspects of various statistical techniques. Topics include matrix computations, computational methods in multiple linear regression and ANOVA, nonlinear regression and optimization. Prerequisite: CSC1110 or 1500 or STA2009.

STA3007

Applied Probability

This course deals with applied probability and stochastic models with application in industry, engineering and management science. Topics include discrete and continuous time Markov chain, Poisson process, queueing theory, renewal process, replacement problem and elementary reliability theory.

STA3008

Applied Regression Analysis

4 U; 3 Lect. 1 Lab. 1 Tut.

This course introduces the general methodology in regression analysis. Topics include least squares method in simple and multiple regression, weighted least squares, diagnostic checkings, variables selection, dummy variables and multicollinearity. A laboratory section will be held to demonstrate the use of related statistical packages and provide students opportunities for hands-on practices.

STA4002

Multivariate Techniques with Business Applications

This course deals with multivariate statistical techniques and their applications in business. Topics are selected from multivariate normal distribution, analysis of means, profile analysis, MANOVA, partial correlation, multiple and canonical correlations, discriminant analysis, and principal components. The integrated use of these techniques in analysing business problems will be emphasized throughout the course.

STA4003

Statistical Inference

This course provides an introduction to statistical inference. Topics include statistical models, sampling distributions, asymptotic distributions, sufficiency, maximum likelihood estimation, Bayesian estimation, Rao-Blackwell theorem, Cramér-Rao theorem and the best unbiased estimator, Neyman-Pearson lemma, uniformly most powerful test and general likelihood ratio test.

STA4004

Actuarial Science

This course covers the basic principles of life contingencies, which is a science for life insurance. Topics include life tables, annuities, assurances, net and gross premiums, reserve, and multiple life theory.

STA4005

Time Series

This course deals with time series with applications. Fundamental concepts of time series such as trends, stationary process, ARIMA process, model building (including parameter estimation, order determination and diagnostic checking), forecasting and seasonal models, ARCH and GARCH models will be covered. The use of related statistical packages will be demonstrated.

STA4006

Categorical Data Analysis

This course deals with major statistical techniques in analysing categorical data. Topics include measures of association, inference for two-way contingency tables, loglinear models, logit models and models for ordinal variables. The use of related statistical packages will be demonstrated.

STA4007

Statistical Quality Control

This course deals with the application of statistical techniques to problems associated with the quality of a product which is produced in large numbers. It covers acceptance sampling plans by attributes, acceptance sampling plans by variables, rectifying inspection, control charts for attributes and control charts for variables.

STA4008

Survival Modelling

This course focuses on the modelling of survival data and its applications in actuarial and medical sciences. It covers basic concepts of lifetime distribution, various types of censoring, and methods to analyse censored data using non-parametric, parametric and semi-parametric models. Emphases are on the construction of the likelihood functions, parameter estimation and hypothesis testing.

STA4009

Workshop on Marketing Survey

This course adopts a workshop approach that scrutinizes the process of marketing surveys. Group projects will be the major ingredients of the course that familiarize students with the entire survey process from problem formulation to report writing. Internet surveys will also be included. Interesting case studies will be presented and discussed.

Study Scheme

1. Major Programme

There are two streams of specialization: the stream of *Applied Statistics* and the stream of *Data Science and Business Statistics*. A student's selected stream will be printed on his/her transcript. All students are under the stream of *Applied Statistics* unless they apply at their second year of attendance to specialize in the stream of *Data Science and Business Statistics* and select certain courses as prescribed below.

Applied Statistics Stream

Students are required to complete 66-69 units of courses as follows:

- | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses (Notes 1-3):
STA0201, 0301, 0303, 0401, 2001, 2003, 2004, 2006,
2007, 2008, 2009, 3008 | 36-39 units |
| (ii) | Elective Courses (Note 4):
Ten courses from the following (with at least five from
Statistics at 4000 and above level or RMS4003, 4004,
4005): STA3001, 3002, 3003, 3004, 3005, 3006,
3007, 4002, 4003, 4004, 4005, 4006, 4007, 4008,
4009, RMS4001 [#] , 4002 [#] , 4003 [#] , 4004 [#] , 4005 [#] | 30 units |

Total: 66-69 units

[#] To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	23-26 units
STA0201, 2001, 2003, 2004, 2006, 2007, 2008, 2009	
<i>Second Year of Attendance</i>	22 units
STA0301, 0303, 3008 and four elective courses	
<i>Third Year of Attendance</i>	21 units
STA0401 and six elective courses	
	Total: 66-69 units

Data Science and Business Statistics Stream

Students are required to complete 66-69 units of courses as follows:

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| (i) Required Courses (Notes 1-3): | 36-39 units |
| STA0201, 0301, 0303, 0401, 2001, 2003, 2004,
2006, 2007, 2008, 2009, 3008 | |
| (ii) Elective Courses (Note 4): | 30 units |
| Ten courses from the following (with at least four
from STA3001, 4004, 4005, 4008, 4009, and at
least other two from Statistics at 4000 and above
level or RMS4004): STA3001, 3002, 3003,
3004, 3005, 3006, 3007, 4002, 4003, 4004,
4005, 4006, 4007, 4008, 4009, RMS4004 [#] | |
| | Total: 66-69 units |

[#] To be included in the Major GPA as well.

Recommended course pattern

<i>First Year of Attendance</i>	23-26 units
STA0201, 2001, 2003, 2004, 2006, 2007, 2008, 2009	
<i>Second Year of Attendance</i>	25-28 units
STA0301, 0303, 3008 and five to six elective courses from STA3001, 3002, 3003, 3004, 3005, 3006, 3007, 4002, 4003, 4006, 4007, RMS4004	
<i>Third Year of Attendance</i>	15-18 units
STA0401, and four to five elective courses from STA3001, 3002, 3003, 3004, 3005, 3006, 3007, 4002, 4003, 4004, 4005, 4006, 4007, 4008, 4009, RMS4004	
	Total: 66-69 units

- Notes: 1. All Major students should obtain Grade "D" or above in each of the courses of STA2001, 2003, 2004, 2006, 2007, 2008, 2009 and 3008. Otherwise, they are required to repeat the course(s). Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(e) of the General Regulations Governing Full-time Undergraduate Studies.
2. Statistics Majors who have obtained Grade "B" or above in "Pure Mathematics" in the HKALE* will be exempted from STA2007. For those students, the minimum requirement is 66 units of Major courses.
3. S6 entrants will be exempted from STA2007.
4. Major students minoring in Risk Management Science are required to declare which Risk Management Science courses will be counted towards the fulfilment of the requirements of the Minor Programme in Risk Management Science at their final term of attendance.

* Only applicable to students admitted on the strength of HKALE results.

The Major Programme requirement for second-year entrants can be viewed on the homepage of the Academic and Quality Section, <<http://www.cuhk.edu.hk/aqs/>>.

2. *Minor Programme*

Students are required to complete a minimum of 18 units of courses as follows:

- | | | |
|------|---------------------------------------------------------------------------------------------------------|-------------|
| (i) | Required Courses:
STA2101, 2102 | 6 units |
| (ii) | Elective Courses: | 12-13 units |
| | (a) Two courses from STA3001, 3002, 3003,
3004, 3005, 3006, 3007, 3008, RMS4001,
4002 | |
| | (b) Two courses from STA4001, 4002, 4003,
4004, 4005, 4006, 4007, 4008, 4009,
RMS4003, 4004, 4005 | |

Total: 18-19 units

- Notes:
1. Students may take DSE2020, ECO2121, GRM2102, SOC2042 or any other course approved by the Department of Statistics as a substitute for STA2101 to fulfil the Minor Programme requirement.
 2. Students may take DSE2010 or another course approved by the Department of Statistics as a substitute for STA2102 to fulfil the Minor Programme requirement.
 3. Mathematics Majors may take MAT4240 as a substitute for STA3007 to fulfil the Minor Programme requirement.
 4. Students may take STA2001 as a substitute for STA2101 and STA2006 as a substitute for STA2102 to fulfil the Minor Programme requirement specified in (i). A maximum of two courses which count towards the fulfilment of these students' respective Major Programme requirements can also be counted towards the fulfilment of the Minor Programme requirement specified in (ii).
 5. Courses which count towards the fulfilment of a student's Risk Management Science Minor Programme requirement cannot be counted towards the fulfilment of the Minor Programme requirement specified in (ii).

3. *Faculty Language Requirement*

4. *Major/Faculty Requirement for S6 Entrants*