

## **REGULATIONS FOR THE DEGREES OF MASTER OF SCIENCE (MSc) AND MASTER OF SCIENCE IN ENVIRONMENTAL MANAGEMENT (MSc[EnvMan])**

*For students admitted in 2012-2013 and thereafter*

*(See also General Regulations)*

Any publication based on work approved for a higher degree should contain a reference to the effect that the work was submitted to the University of Hong Kong for the award of the degree.

The degree of Master of Science is a postgraduate degree awarded for the satisfactory completion of a prescribed course of study in one of the following four fields: Applied Geosciences, Food Industry: Management and Marketing, Food Safety and Toxicology, and Material Science.

The degree of Master of Science in Environmental Management is a postgraduate degree awarded for the satisfactory completion of a prescribed course of study in Environmental Management.

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### **Admission requirements**

- (i) a Bachelor's degree with honours of this University; or
- (ii) another qualification of equivalent standard of this University or another University or comparable institution accepted for this purpose; and shall satisfy the examiners in a qualifying examination if required.

**Sc21** A candidate who does not hold a Bachelor's degree with honours of this University or another qualification of equivalent standard may in exceptional circumstances be permitted to register if the candidate can demonstrate adequate preparation for studies at this level and satisfies the examiners in a qualifying examination.

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### **Qualifying examination**

#### **Sc22**

A qualifying examination may be set to test the candidate's academic ability to follow the course of study prescribed. It shall consist of one or more written papers or equivalent and may include a project proposal.

A candidate who is required to satisfy the examiners in a qualifying examination shall not be permitted to register until he/she has satisfied the examiners in the examination.

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### **Award of degree**

#### **Sc23**

- (a) To be eligible for the award of the degree of Master of Science or Master of Science in Environmental Management, a candidate
  - (i) shall comply with the General Regulations; and
  - (ii) shall complete the curriculum and satisfy the examiners in accordance with these regulations and syllabuses.
- (b) A candidate (both full-time and part-time) who has not satisfied the examiners for the award of the Degree of Master of Science in the field of Applied Geosciences but has achieved good grades in 30 credits including 18 credits of core courses in the PGDES and satisfied the requirements for award of PGDES may be allowed to exit with PGDES, subject to the

approval of the Faculty Board. Those who are allowed to take this exit path will not be re-admitted to the Degree of Master of Science in the field of Applied Geosciences.

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### **Transfer of candidature into the Master of Science in the field of Applied Geosciences**

#### **Sc24**

- (a) Subject to the approval of the Faculty Board, a candidate who has registered for the PGDES may be allowed to transfer to read the Master of Science in the field of Applied Geosciences and advanced credits of up to 30 credits may be granted. Application for the transfer must be made prior to the BoE's recommendation for conferment of the PGDES, or before August 31 of the final year of PGDES, whichever is earlier.
  - (b) A candidate who has transferred his/her candidature to the Master of Science in the field of Applied Geosciences will not be awarded the PGDES. If a candidate after transferring to the Master of Science in the field of Applied Geosciences fails to complete the Master of Science, he/she may be awarded the PGDES provided that he/she has satisfied the requirements of the PGDES.
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### **Length of curriculum**

**Sc25** The part-time mode of the Master of Science and the Master of Science in Environmental Management shall extend over not less than two academic years of part-time study and the full-time mode of the Master of Science and the Master of Science in Environmental Management shall extend over not less than one academic year. Candidates in either degree shall not be permitted to complete the curriculum in more than 3 academic years, except with the approval of the Faculty Board.

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### **Completion of curriculum**

**Sc26** To complete the curriculum of the Master of Science or Master of Science in Environmental Management, a candidate shall follow courses of instruction and complete satisfactorily all prescribed written, practical and field work; shall complete and present a satisfactory dissertation or project on an approved subject or complete courses with equivalent credits as a replacement; and shall satisfy the examiners in all courses prescribed in the respective syllabuses.

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### **Dissertation or Project**

**Sc27** The title of the dissertation or project shall

- (a) for the full-time mode of Master of Science (except MSc in Environmental Management), be submitted for approval by October 15 and the dissertation or project report shall be submitted not later than August 15 in the subsequent year;
- (b) for the full-time curriculum of MSc in Environmental Management, be submitted by October 15 and the dissertation shall be submitted by a date specified by the Board of Studies;
- (c) for the part-time curriculum (except MSc in Environmental Management), be submitted for approval by March 15 of the first year of study in which the teaching curriculum ends and the dissertation or project report shall be submitted not later than April 15 of the second year of study;

- (d) for the part-time curriculum of MSc in Environmental Management, be submitted by June 1 of the first academic year and the dissertation shall be submitted by a date specified by the Board of Studies.

**Sc 28** A candidate shall submit a statement that the dissertation or project represents his/her own work (or in the case of co-joint work, a statement countersigned by his/her worker, which shows his/her share of the work) undertaken after registration as a candidate for either degree.

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### **Assessments**

**Sc29** The assessment in any course shall consist of elements prescribed by the course teachers, and will normally comprise either written coursework alone, or coursework combined with formal examinations; in either case participation in field work or practical work may form part of the assessment.

**Sc30** A candidate who has failed to satisfy the examiners

- (a) at his/her first attempt in any course in the examination held during any of the academic years of study may be permitted to present himself/herself for re-examination in the course or courses at a specified subsequent examination, with or without repeating any part of the curriculum;
- (b) at his/her first submission of dissertation or project report may be permitted to submit a new or revised dissertation or project report within a specified period;
- (c) in any prescribed fieldwork or practical work may be permitted to present himself/herself for re-examination in fieldwork or practical work within a specified period.

**Sc31** Failure to take the examination as scheduled, normally results in automatic course failure. A candidate who is unable because of illness to be present at any examination of a course, may apply for permission to be present at some other time. Any such application shall be made on the form prescribed within two weeks of the examination.

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### **Discontinuation**

**Sc32** A candidate who

- (a) has failed to satisfy the examiners in more than half the number of credits of courses during any of the academic years or in any course at a repeated attempt, or
  - (b) is not permitted or fails to submit a new or revised dissertation or project report, or
  - (c) has failed to satisfy the examiners in their dissertation or project report at a second attempt,
- may be recommended for discontinuation of studies.
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### **Examination results**

**Sc33** At the conclusion of the examination, a pass list shall be published. A candidate who has shown exceptional merit at the whole examination may be awarded a mark of distinction, and this mark shall be recorded in the candidate's degree diploma.

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# SYLLABUSES FOR THE DEGREE OF MASTER OF SCIENCE IN THE FIELD OF APPLIED GEOSCIENCES

(For students admitted in 2013-14)

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## A. COURSE STRUCTURE

To be eligible for the award of the MSc in the field of Applied Geosciences a student shall complete all core courses prescribed in a selected theme and elective courses totalling 66 credits.

### SIX THEME OPTIONS

#### ***CLIMATE AND EARTH SCIENCES STUDIES THEME***

Core Courses (51 credits)

GEOS7010/GEOS7023	* Geology Principles and Practice (6 credits)/Geology for Geotourism (6 credits)
GEOS7011	Advanced Geology of Hong Kong (6 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological Fieldwork I (3 credits)
GEOS8002	Professional Practice in Applied Geosciences (3 credits)
GEOS8003	Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)
GEOS8020	Project II (9 credits)
GEOS8207	Global Climate (6 credits)
GEOS8208	Climate Change and the Environment (6 credits)
GEOS8209	Climate Change and Society (6 credits)

\* Graduates in Earth Sciences cannot take this course. They must take course(s) worth 6 credits in its place.

#### ***ENGINEERING GEOLOGY THEME***

Core Courses (63 credits)

GEOS7010/GEOS7023	* Geology Principles and Practice (6 credits)/Geology for Geotourism (6 credits)
GEOS7011	Advanced Geology of Hong Kong (6 credits)
GEOS7012	Site Investigation and Engineering Geological Techniques (6 credits)
GEOS7015	Rock Mechanics (3 credits)
GEOS7016	+ Soil Mechanics (3 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological Fieldwork I (3 credits)
GEOS8001	Hydrogeology (3 credits)
GEOS8002	Professional Practice in Applied Geosciences (3 credits)
GEOS8003	Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)
GEOS8005	Field Testing and Instrumentation in Engineering Geology (3 credits)
GEOS8020	Project II (9 credits)
GEOS8101	Engineering Geology and Geotechnical Design (6 credits)
GEOS8102	Rock Engineering and Geomaterials (6 credits)

\* Graduates in Earth Sciences cannot take this course. They must take course(s) worth 6 credits in its place.

+ Graduates in Civil Engineering cannot take this course for credits. They must take another 3 credit course in its place.

#### ***ENGINEERING GEOLOGY WITH HKIE APPROVED COURSES THEME***

Core Courses (66 credits)

GEOS7012	Site Investigation and Engineering Geological Techniques (6 credits)
GEOS7015	Rock Mechanics (3 credits)
GEOS7016	Soil Mechanics (3 credits)
GEOS7020	Project I (3 credits)
GEOS7024	Management (3 credits)
GEOS8001	Hydrogeology (3 credits)
GEOS8002	Professional Practice in Applied Geosciences (3 credits)

GEOS8003	Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)
GEOS8005	Field Testing and Instrumentation in Engineering Geology (3 credits)
GEOS8020	Project II (9 credits)
GEOS8101	Engineering Geology and Geotechnical Design (6 credits)
GEOS8102	Rock Engineering and Geomaterials (6 credits)
GEOS8204	Basic Structural Mechanics and Behaviour (3 credits)
GEOS8205	Mathematics I (6 credits)
GEOS8206	Mathematics II (6 credits)

***ENVIRONMENTAL GEOLOGY THEME***

Core Courses (45 credits)

GEOS7004	Earth Science and Environmental Management (3 credits)
GEOS7010/GEOS7023	* Geology Principles and Practice (6 credits)/Geology for Geotourism (6 credits)
GEOS7011	Advanced Geology of Hong Kong (6 credits)
GEOS7012	Site Investigation and Engineering Geological Techniques (6 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological Fieldwork I (3 credits)
GEOS8002	Professional Practice in Applied Geosciences (3 credits)
GEOS8003	Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)
GEOS8020	Project II (9 credits)
GEOS8201	Applied Geochemistry (3 credits)

\* Graduates in Earth Sciences cannot take this course. They must take course(s) worth 6 credits in its place.

***GEOSCIENCES WITH SUSTAINABLE DEVELOPMENT THEME***

Core Courses (51 credits)

GEOS7004	Earth Science and Environmental Management (3 credits)
GEOS7010/GEOS7023	* Geology Principles and Practice (6 credits)/Geology for Geotourism (6 credits)
GEOS7011	Advanced Geology of Hong Kong (6 credits)
GEOS7012	Site Investigation and Engineering Geological Techniques (6 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological Fieldwork I (3 credits)
GEOS8002	Professional Practice in Applied Geosciences (3 credits)
GEOS8003	Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)
GEOS8020	Project II (9 credits)
ENVM7013	Sustainability, Society and Environmental Management (3 credits)
ENVM7016	Environmental Policy (3 credits)
ENVM7017	Environmental Law in Hong Kong (3 credits)

\* Graduates in Earth Sciences cannot take this course. They must take course(s) worth 6 credits in its place.

***GENERAL APPLIED GEOSCIENCES THEME***

Core Courses (33 credits)

GEOS7010/GEOS7023	* Geology Principles and Practice (6 credits)/Geology for Geotourism (6 credits)
GEOS7011	Advanced Geology of Hong Kong (6 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological Fieldwork I (3 credits)
GEOS8002	Professional Practice in Applied Geosciences (3 credits)
GEOS8003	Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)
GEOS8020	Project II (9 credits)

\* Graduates in Earth Sciences cannot take this course. They must take course(s) worth 6 credits in its place.

### Elective Courses

GEOS7027	Earth Systems (6 credits)
GEOS8021	Geological Fieldwork II (3 credits)
GEOS8202	Development and management of mineral resources (3 credits)
GEOS8213	Global Tectonics (6 credits)
GEOS8214	Structural Geology (6 credits)
GEOS8215	Sedimentology (6 credits)
GEOS8218	Meteorology (6 credits)
GEOS8219	Igneous and Metamorphic Petrology (6 credits)
GEOS8220	Mineralogy and Geochemistry (6 credits)
GEOS8221	Earth Resources (6 credits)
ENVM7012	Environmental Economics and Analysis (3 credits)
ENVM8006	Environmental Impact Assessment (3 credits)
ENVM8011	Environmental Auditing and Reporting (3 credits)
ENVM8012	Environmental Health and Risk Assessment (3 credits)
CIVL6079	Slope Engineering (6 credits)

**Certain courses not included in the list above may be accepted as alternative electives at the discretion of the programme director.** Timetabling of courses may limit availability of some elective courses. Certain courses have prerequisites and Grade bars, including those shown below.

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## B. COURSE CONTENTS (Provisional)

### **GEOS7004 Earth Science and Environmental Management (3 credits)**

The course examines major issues of earth science of relevance to environmental management. Case studies relevant to coastal cities will be presented. Topics include chemical composition of earth materials, geochemical surveys for pollution monitoring, geology and human health, environmental change in the Quaternary Period, fluvial and coastal processes and management, environmental impact of mining and dredging, geological aspects of land use planning, water resource management and waste disposal.

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### **GEOS7010 Geology Principles and Practice (6 credits)**

A review of fundamental concepts in geoscience, including earth and geological processes, surface processes, minerals and rocks, geological structures and geological map interpretation. The course also introduces the rocks and geological formations of Hong Kong.

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### **GEOS7011 Advanced Geology of Hong Kong (6 credits)**

This advanced course examines specialist aspects of the rocks and geological formations and structures of Hong Kong and their significance in the context of geotechnical engineering, environmental management and resource development. Topics include volcanic and granitic rocks, sedimentary and metamorphic rocks, weathering processes, superficial deposits, geology and geological aspects of landslides.

Pre-requisite course: Pass in GEOS7010 / GEOS7023

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### **GEOS7012 Site Investigation and Engineering Geological Techniques (6 credits)**

A professional course on the concepts and skills used in geotechnical site investigation. Topics include the design of site investigations, desk study and walkover survey, aerial photographic interpretation, soil and rock description and classification, ground investigation technology and soil and rock laboratory testing.

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**GEOS7015 Rock Mechanics (3 credits)**

The course introduces the basic concepts of rock mechanics used in geotechnical practice. Topics include index properties, strength and deformability of intact rock; distribution and measurement of in-situ stresses; and shear strength of discontinuities in rock masses.

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**GEOS7016 Soil Mechanics (3 credits)**

An examination of the basic soil mechanics theory used in geotechnical practice. The course reviews phase relationships, soil classification, compaction, fluid flow and effective stress concepts; and provides a more detailed analysis of elasticity, shear strength and consolidation.

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**GEOS7020 Project I (3 credits)**

The first phase of an independent study of a problem in applied geosciences. It involves literature review, data collection and data analysis. Students are required to write an inception report and give a presentation on their proposed study. Work is required on the project during the summer following the second semester. Professional geologists are expected to undertake a field mapping task as part of their project.

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**GEOS7021 Geological Fieldwork I (3 credits)**

Self-directed study in the field over a 6-month period leading to the production of maps, field sheets, narrative accounts and other geological records for assessment. The fieldwork may be undertaken in association with the excursions of the Department of Earth Sciences, the local learned societies or independently. (Marked on a pass/fail basis.)

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**GEOS7023 Geology for Geotourism (6 credits)**

This will be a joint course with GEOS7010 Geology Principles and Practice (6 credits).

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**GEOS7024 Management (3 credits)**

This subject will cover most of the following. Engineering processes, programming and procurement strategies: project framework, common methods for obtaining investigation, design and construction services and project programming. Contract management: Engineer's and contractor's site organisation, common forms of contract, specifications, methods of measurement, quantities and cost estimation, variations and claims, approaches to dispute resolution. Construction site safety, health and environmental aspects: Relevant regulations, environmental impacts of works and mitigation strategies. Quality control and quality assurance.

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**GEOS7027 Earth Systems (6 credits)**

To provide an appreciation of the Earth System and the interfaces between its component parts, in order that students might appreciate how informed decisions can be made on the future exploitation and preservation of the planet. To provide a forum for discussion of global issues facing earth scientists.

**GEOS8001 Hydrogeology (3 credits)**

To study the role of sub-surface water in engineering and environmental applications. Topics include the hydrologic cycle, properties of aquifers controlling the transmissivity storage and quality of groundwater, quantification of groundwater flow, the field investigation of groundwater and assessment of field parameters and applications of hydrogeology in engineering and environmental studies.

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**GEOS8002 Professional Practice in Applied Geosciences (3 credits)**

An examination of issues in professional practice in applied geoscience, including regulation of practice, professional ethics and law, contracts and risk management.

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**GEOS8003 Seminars on Unforeseen Ground Conditions, Geotechnical and Environmental Failures (3 credits)**

A series of student-led seminars on case histories of landslides, collapses of engineering structures, excessive ground settlement and environmental disasters. Presentations of facts and opinions are given by students based on suggested reading material.

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**GEOS8005 Field Testing and Instrumentation in Engineering Geology (3 credits)**

The course introduces several commonly used geophysical methods and in-situ testing techniques, including penetration tests, seismic cones, land geophysical surveys such as seismic refraction, microgravity, magnetic and conductivity surveys, ground penetrating radar, electrical imaging and downhole geophysical logging, and marine geophysics such as seismic and side-scan sonar surveys.

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**GEOS8020 Project II (9 credits)**

The second phase of an independent study of a problem in applied geosciences culminating in the preparation of a project report of about 8000 words. Students will be required to make a presentation of their preliminary results.

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**GEOS8021 Geological Fieldwork II (3 credits)**

Self-directed study in the field over a 6-month period leading to the production of maps, field sheets, narrative accounts and other geological records for assessment. The fieldwork may be undertaken in association with the excursions of the Department of Earth Sciences, the local learned societies or independently. (Marked on pass/fail basis.)

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**GEOS8101 Engineering Geology and Geotechnical Design (6 credits)**

An examination of civil engineering design methodology and the application of soil mechanics theory and empiricism in geotechnical design. Emphasis is given to soil slopes and embankments, earth pressure and retaining structures and shallow and deep foundations.

Pre-requisite course: Pass in GEOS7016



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**GEOS8102    Rock Engineering and Geomaterials (6 credits)**

This course starts with a brief introduction to the design methodology and the systems approach in rock engineering, and is mainly focused on the collection and analyses of engineering geological data for the design of rock structures. Uses of rock mechanics input and empirical classifications in analysis and design of rock slopes, tunnel excavation and support systems, and rock foundations are demonstrated through case histories.

Pre-requisite course: Pass in GEOS7015

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**GEOS8201    Applied Geochemistry (3 credits)**

Principles and hands-on experience of analytical techniques including nebulization ICP-MS, XRF and XRD; Basics of Environmental Geochemistry, Chemical Weathering, Clay Mineralogy, and Aqueous Geochemistry; Applications of Geochemistry to environmental problems; Case Studies, with an emphasis on Hong Kong

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**GEOS8202    Development and Management of Mineral Resources (3 credits)**

The course will give an overview of the life cycle of a mining project and insight into the making of investment decisions in mining projects. Environmental management systems will be introduced and economic issues in mining project development will be outlined.

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**GEOS8204    Basic Structural Mechanics and Behaviour (3 credits)**

The subject will cover most of the following:

Behaviour of structural members subjected to tension, compression, bending, shear and torsion. Buckling of compression members. Statically determinate and indeterminate structures; including the concept of redundancy of structural members. Load transfer mechanisms of structural systems including foundations and shoring systems. General behaviour and basic concepts in design of reinforced concrete members. Structural design of foundations and retaining walls.

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**GEOS8205    Mathematics I (6 credits)**

This course will cover the following topics: elementary and advanced calculus, matrix and vector algebra.

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**GEOS8206    Mathematics II (6 credits)**

This course will cover the following topics: ordinary and partial differential equations, introduction to probability and statistics.

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**GEOS8207    Global Climate (6 credits)**

Processes in the oceans and atmosphere. Heating the system, development of ocean currents, winds, clouds, and resources. Effects of coupling, climate change, pollution. Atmospheric structure and composition, global ocean and atmospheric circulation patterns, El Niño-La Niña and case studies of ocean-atmosphere feedbacks, formation of winds, storms and ocean currents.

**GEOS8208 Climate Change and the Environment (6 credits)**

The Quaternary Period comprises the last 2.6 million years of Earth history, an interval dominated by climate fluctuations and the waxing and waning of large northern hemisphere ice sheets. This course will cover the many types of evidence used to reconstruct ocean and atmospheric conditions through the Quaternary.

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**GEOS8209 Climate Change and Society (6 credits)**

This course will explore the role of humans in global change and the environmental responses to such changes. It will also take a look at human evolution and migration from a paleoenvironmental perspective.

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**GEOS8213 Global Tectonics (6 credits)**

This course is intended to provide students with an understanding of the driving forces of Earth processes and the global outcome of these processes through an examination of direct and indirect observations, the evolution of hypotheses, and critical thinking.

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**GEOS8214 Structural Geology (6 credits)**

The course covers the mechanical properties of rocks and how they are deformed, geological maps and their use in interpreting structure. Topics which may be covered include: Stress-strain relationships; use of Mohr Circles, earthquakes, big faults, fault rocks; thrusts; folds; textures, kinematic indicators and strain analysis; Shear zones; extensional faulting; basins; strike-slip faults; joints; deformation mechanisms. Practical classes will look at the use of stereonet; theoretical maps, real maps and an introduction to stereograms. These sessions will be both quantitative and descriptive.

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**GEOS8215 Sedimentology (6 credits)**

The course deals with sedimentary rocks and processes. Contents include some of the following: Physical properties of sediments; processes of weathering, transportation and deposition; sedimentary rocks, carbonates, siliclastic sediments, and sandstone petrography; diagenesis; sedimentary environments and facies; sedimentation and tectonics; geological record of environments through time.

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**GEOS8218 Meteorology (6 credits)**

The course is a survey of the earth's atmospheric structure and its behaviour, instrumental observation, application of remote sensing to meteorological studies, weather elements and weather systems.

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**GEOS8219 Igneous and Metamorphic Petrology (6 credits)**

The course provides a comprehensive treatment of the principles and techniques used in the study of igneous and metamorphic rocks and rock-forming processes. It covers petrogenesis, magmas and magmatic differentiation, igneous petrography, intrusive and extrusive rock suites, metamorphic processes & reactions and metamorphic facies and metamorphic petrography.

**GEOS8220 Mineralogy and Geochemistry (6 credits)**

The course provides students with an appreciation of mineralogical principles as a basis for understanding the petrography of igneous, sedimentary and metamorphic rocks. Its contents include the properties of minerals in hand specimen and thin section, the optical properties of minerals and the polarizing microscope and the characteristics of the major rock-forming minerals.

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**GEOS8221 Earth Resources (6 Credits)**

To provide students with knowledge about the classification of mineral deposits and their basic features, the processes that lead to their formation and mining procedures. Its contents include the concepts in mineral deposits and the mining industry; exploration and mining methods, classification of mineral deposits, mineral deposit models, magmatic oxide and sulfide deposits, skarn deposits, porphyre deposits, volcanogenic massive sulfide deposits, coal, oil and gas, resource evaluation.

Pre-requisite course: Pass in GEOS7010 / GEOS7023

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**CIVL6079 Slope Engineering (6 credits)**

Slope engineering in Hong Kong; geological models for slopes; slope stability analysis methods; landslip investigation; soil nailing; slope stabilization measures; surface drainage and protection; slope construction and monitoring; slope safety management and maintenance; natural terrain study.

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**ENVM7012 Environmental Economics and Analysis (3 credits)**

The aim of this course is to equip students with the ability to undertake an economic analysis of the environment. It examines the environment in the context of the market mechanism and policies for improving environmental performance. There is an emphasis on market failure and strategies for internalizing the external costs of environmental damage. A good deal of attention is paid to cost-benefit analysis and methodologies for the valuation of the environment. There is also a consideration of alternative policy instruments from an economic perspective. This course further examines means of managing resources in a way that is both economically and environmentally efficient.

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**ENVM7013 Sustainability, Society and Environmental Management (3 credits)**

This course begins with the intellectual debates on the definitions, conceptions and different schools of thought of the notion of sustainable development. The course then moves on to exploring ways of analyzing sustainable development at the macro- and the micro- levels, ranging from governance issues, frameworks, policies to projects. A number of tools for sustainable development are also explained including community engagement, sustainability assessment, life cycle assessment, etc. Each year there will be a special focus on a thematic area such as sustainable energy, low carbon living, or planning for sustainable cities, to illustrate the challenges of implementing both local and global sustainability.

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**ENVM7016 Environmental Policy (3 credits)**

This course focuses on processes of environmental policy making: how policy agendas emerge and

evolve, the drivers and barriers influencing policy development, institutional structures for environmental policy making, stakeholder engagement, and the implementation of environmental policy. Theories of policy making are explored in relation to the environment and sustainable development. Environmental policy making systems and outcomes are reviewed through local and international case studies.

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### **ENVM7017 Environmental Law in Hong Kong (3 credits)**

This course focuses on the statutory interpretation of the four principal Ordinances and subsidiary legislation dealing with pollution in Hong Kong; namely the Water Pollution Control Ordinance, the Air Pollution Control Ordinance, the Noise Control Ordinance and the Waste Disposal Ordinance. Some consideration will also be given to the Dumping at Sea Ordinance, the Radiation Ordinance, the Merchant Shipping (Prevention and Control of Pollution) Ordinance, the Environmental Impact Assessment Ordinance, the Ozone Layer Protection Ordinance and international conventions effecting the law. Students will study the nature of environmental offences, including the requirement for proving “mens rea” (intent) in order for certain offences to be successfully prosecuted. Students will also be introduced to the principles of judge made law (the Common Law) and will learn to read and interpret relevant case law in order to better understand the current sentencing policies towards environmental offenders, both locally and in other Common Law jurisdictions.

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### **ENVM8006 Environmental Impact Assessment (3 credits)**

Environmental impact assessment (EIA) is one of the most important contemporary instruments of environmental management. Used widely around the world to identify the impacts of development projects as well as strategic plans and policies, EIA plays a key role in many regulatory systems for the environment. This course reviews the development of different approaches to EIA, basic analytical principles, administrative and legal systems for EIA, assessments at the project and strategic levels (SIA), and case study applications in Hong Kong.

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### **ENVM8011 Environmental Auditing and Reporting (3 credits)**

This course is dedicated to the construction of an integrated environmental management system (EMS). The course considers the design of the EMS, its implementation and issues of continuous improvement. Environmental auditing is dealt with in the context of the systems-based approach. This course examines audit methodology, measurement and quality assurance. The approach is extended to the auditing of supply chains (particularly in China). Emphasis is placed on practical approaches to improving environmental performance over time. Methods and techniques of reporting on systems and auditing include both environmental reports as well as social and sustainable development reports.

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### **ENVM8012 Environmental Health and Risk Assessment (3 credits)**

Environmental Risk Assessments (ERAs) are a tool to determine the likelihood that contaminant releases, either past, current, or future, pose an unacceptable risk to human health or the environment. Currently, ERAs are required under various regulations in many developed countries so as to support decision-makers in risk characterization or the selection of cost-effective remedial cleanup. This course introduces the theory and practice of human and ecological risk assessments. Students completing the course will gain a sound knowledge of the concepts and principles of ERAs, management and communication as applied in practice; understand the basic risk assessment tools (i.e. prospective, retrospective and tiered approaches) to environmental risk management; be able to select and apply the simpler tools to tackle risk issues; and appreciate the interpretations of risk and its role in environmental

policy formulation and decision making.

# **SYLLABUSES FOR THE DEGREE OF MASTER OF SCIENCE IN THE FIELD OF FOOD INDUSTRY: MANAGEMENT AND MARKETING**

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## **A. COURSE STRUCTURE**

All courses in this programme are compulsory. A candidate shall be examined shortly after the completion of each course.

The list of courses, and their contents set out thereafter, may be changed from time to time.

### **First Year**

FOOD7001	Quality assurance and management (6 credits)
FOOD7002	GMP and environmental management (6 credits)
FOOD7003	Food quality preservation and evaluation (6 credits)
FOOD7004	HACCP and food laws (6 credits)
FOOD7005	R&D and export market strategies (9 credits)

### **Second Year**

FOOD8006	Marketing management (6 credits)
FOOD8007	Financial control (6 credits)
FOOD8008	Organisational behaviour (6 credits)
FOOD8009	Project (15 credits)

Total: 66 credits

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## **B. COURSE CONTENTS**

### **FOOD7001 Quality assurance and management (6 credits)**

An overview on quality management will be presented. Case studies will be used to generate in-depth discussion on relevant topics.

The management of food laboratories will also be described, with a review of the modes of infectious disease transmission followed by discussion on microbial and other contaminants of relevance to South East Asia. Standard assays as well as newer methods will be covered. Guidelines of the Department of Health on acceptable limits and routine inspection procedures will be discussed.

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### **FOOD7002 GMP and environmental management (6 credits)**

Good manufacturing practice has a significant impact on the daily operation of a food processing facility. Quality products and a safe work place are important components of a good company. This course will focus on issues arising from GMP and aspects of the physical design of a food processing facility which impact the safety of workers and products. There will be emphases on the sources of contamination, sanitation techniques for production site and personnel, pest control, and contingency plan for the production line. Quality assurance and HACCP will be discussed as well.

Proper handling of waste is closely related to the issue of food safety and in a broader context it has an eventual impact on the environment. This course will cover waste treatment and disposal, environmental impact assessment, operational procedures to implement ISO 14000, and laws and regulations on pollution control enforced by the Hong Kong Environmental Protection Department.

### **FOOD7003 Food quality preservation and evaluation (6 credits)**

The effects of processing and packaging on the physical and chemical characteristics of food products will be discussed. Emphasis will be placed on the freezing technology of marine products and frozen dim sums. Analytical methods for sensitive nutrients and techniques to preserve the characteristic aroma and taste of a product in processing modification will be reviewed. Issues related to nutrient enrichment and fortification will be discussed.

Sensory evaluation as an important component of food product development and marketing will be covered. Various evaluation methods and analytical techniques will be discussed in a case study setting.

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### **FOOD7004 HACCP and food laws (6 credits)**

As a core quality management tool in the food industry, the relevance, impact and use of HACCP in manufacturing and catering will be discussed. Topics covered will include the integration of HACCP and ISO 9000 as well as the practical implementation of HACCP using Asian case studies.

The course will provide student with a proper perspective on local, Chinese and international food laws and regulations. Familiarisation with international agencies such as the Codex Alimentarius Commission. Issues related to food inspection, food additives, and contaminants as well as the concept of and procedural details in attaining ISO registration will be discussed.

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### **FOOD7005 R&D and export market strategies (9 credits)**

The role of research from the management perspective, the R & D process and the impact of technological innovation on the development of new products will be discussed.

Cultural aspects will be emphasized as an important consideration in developing new market frontiers. The strengths and weaknesses of major “Chinese food” manufacturers will be analyzed. Areas of potentials will be identified and explored.

Basic concepts of intellectual property rights will also be described in this course: copyright, trademarks, trade secrets, patents. Patent strategy for research-intensive technology companies. Practical aspects and international considerations in filing for patent protection.

The application of information technology in food manufacturing and catering will be discussed.

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### **FOOD8006 Marketing management (6 credits)**

The course is designed to provide an understanding of the role of marketing in the business organization and its contribution to business success. Students will be taught in an applications oriented framework to become familiar with the various marketing concepts, marketing programs and planning and control of marketing strategies. On completion of the course students will be able to analyze customer requirements, the competitive environment and to formulate effective marketing program. Perspectives of local food manufacturers will be introduced through special seminars.

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### **FOOD8007 Financial control (6 credits)**

The course aims to equip non-accounting professionals with the skills required to analyse and interpret the major financial reports prepared by businesses. The focus of the course is on providing a user

perspective of the financial statements rather than on specific preparation concepts. In addition, the course addresses principles of basic financial management and explains the need for internal control procedures. Particular emphasis is given to developing an understanding of the balance sheet, profit and loss statement, and cash flow statement. The relationship between the statements will be explained and illustrated in detail. A framework for making business decisions by analysing a set of financial statements using simple techniques will also be developed.

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**FOOD8008    Organisational behaviour (6 credits)**

The course aims to equip students with a better understanding of the complex array of behaviours in organisational life. It will analyse the determinants of human behaviour in an organisation at the individual, group and organisational levels. Topics covered will include motivation, performance management, group dynamics, leadership, organisational culture, management of conflict, management ethics, and the management of change.

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**FOOD8009    Project (15 credits)**

This is an individual or group research project to be carried out under the supervision of one or more faculty members. Students may propose their own topics and approach potential supervisors, or they may consider those suggested by the faculty members. The proposed project title must be submitted for approval by June 30 of the first year of their study. The candidate shall make a formal presentation on the subject of his project during the final semester of the teaching programme. The deadline for submission of the project report is April 30.

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# SYLLABUSES FOR THE DEGREE OF MASTER OF SCIENCE IN THE FIELD OF FOOD SAFETY AND TOXICOLOGY

All courses in this programme are compulsory. A candidate shall be examined shortly after the completion of each course.

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## A. Course Structure

<b>Year 1 (39 credits)</b>		
FSTX7001	Principles of toxicology I	(9 credits)
FSTX7002	Principles of toxicology II	(9 credits)
FSTX7003	Toxicity tests and hazards evaluation methods	(9 credits)
FSTX7004	Regulatory toxicology: risk assessment, risk management and communication	(12 credits)
<b>Year 2 (30 credits)</b>		
FSTX8005	Chemical and microbial hazards in food	(9 credits)
FSTX8006	Food safety management	(9 credits)
FSTX8007	Project	(12 credits)

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## B. Course Content

### **FSTX7001 Principles of toxicology I (9 credits)**

This module introduces students to the general principles and practice of toxicology. The major focus of the course is on basic principles, mechanisms and common methods underpinning the science of toxicology. Selected target organ systems (e.g. respiratory, nervous and immune systems) are studied with respect to understanding how representative chemicals damage and impair their ability to function. Students will develop a fundamental understanding of how chemicals may exert toxic effects and gain insight into the importance of organ-specific toxicity.

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### **FSTX7002 Principles of toxicology II (9 credits)**

This module continues to introduce students to the general principles and practice of toxicology. The course continues to focus on basic principles, mechanisms and common methods underpinning the science of toxicology. Selected toxicants are studied with respect to their source of exposure and mechanisms of effects. Selected disease processes (e.g., mutagenesis, carcinogenesis, reproductive toxicity, teratogenesis and developmental toxicity) are studied with respect to understanding their basic pathways and common mechanisms. Selected fields are presented to give students insight into the applications of toxicology and its relationship with other fields.

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### **FSTX7003 Toxicity tests and hazards evaluation methods (9 credits)**

This module will provide students with the current state-of-the-art methodology employed to investigate the effect of chemical and microbial toxins and environmental pollutants on living systems. Topics include exposure estimate, animal tests for acute toxicity, short-term and long-term toxicity, for mutagenicity, genotoxicity and carcinogenicity, for reproductive toxicity, teratogenicity, developmental

toxicity and delayed neurotoxicity. Major focus is on the basic principles underpinning each test method including the test rationale, protocol design, limitations and data interpretation. Students will also be introduced to the basic concepts of toxicological evaluation and criteria for setting guidance values for dietary and non-dietary exposure to chemicals. The role of biochemical, metabolic and toxicokinetic studies in toxicological evaluation is also considered.

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#### **FSTX 7004 Regulatory toxicology: risk assessment, risk management and communication (12 credits)**

In order to fully appreciate risks that arise from human exposure to chemicals in our living environment, it is essential to quantify levels of chemical contamination in environmental media and foods, and estimate total chemical exposure from dietary and non-dietary sources. This module will provide students with intensive training to develop the necessary practical skills to measure and model the extent to which human populations come into contact with toxic agents in the environment and foods, to conduct qualitative and quantitative risk assessments, to set safe levels of chemical exposure in foods (based on local food consumption patterns), and to implement effective risk management in protecting human health and the environment. The roles of international food safety authorities such as WHO, FAO, Codex Alimentarius Commission, JECFA, IARC and OECD will be described. Introduction to local and international food laws will be provided.

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#### **FSTX 8005 Chemical and microbial hazards in food (9 credits)**

This module will introduce students to the chemical and microbial hazards in food and their effects on human health. Special reference is made to heavy metals, pesticides, food additives, persistent organic pollutants and natural food contaminants of current public concern. An emphasis will also be placed on developing the understanding of the actual impact of food and waterborne pathogens, their epidemiology and factors contributing to the increase in their incidence. Determination of exposure pathways and linking food hazards to human health is the primary focus. Topics include: contamination monitoring, quantification of exposure at the individual level, interactive effects of exposure to multiple risk factors, perceptions of risk and integration of laboratory science with population-based studies.

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#### **FSTX 8006 Food safety management (9 credits)**

Good manufacturing practice has a significant impact on the daily operation of a food processing facility. Quality products and a safe work place are important components of a good company. This course will focus on issues arising from GMP and aspects of the physical design of a food processing facility which impact the safety of workers and products. In food supply chain, traceability is the ability to follow the movement of a food product through the stages of production, processing, and distribution, and is an important component of the food safety management system. As a core quality management tool in the food industry, the relevance, impact and use of ISO 22000 and HACCP in manufacturing and catering will be discussed. Topics covered will include the international/national HACCP standards, and designing safety into food products and processes as well as the practical development and implementation of a HACCP Plan using local and Asian case studies.

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#### **FSTX 8007 Project (12 credits)**

All students are required to undertake to attend training (up to maximum 6 months) in one of the following areas:

- Academic institutions, to carry out basic research project using the most advanced techniques in molecular biology, analytical chemistry and biomedical sciences.
- Food, chemical and pharmaceutical industries, to overlook industry procedures on ensuring that the emerging/newly developed food and chemical products meet regulatory standards and

- requirements and are safe for consumers; their potential health implications, and
- Government agencies, to gain knowledge on the procedures implemented by the local/national authorities in formulating science-based policies, laws and regulations to ensure the safe production and use of food and chemicals.

The candidate shall make a formal presentation on the subject of his training during the final semester of the teaching programme.

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**SYLLABUSES FOR THE DEGREE OF  
MASTER OF SCIENCE IN ENVIRONMENTAL MANAGEMENT  
MSc(EnvMan)**

*For students admitted in 2012-2013 and thereafter*

A candidate shall follow and be examined in at least 54 credits of courses including ten core courses (39 credits) and five elective courses (15 credits). For Part-time candidates, they will normally take 27 credits in their first year of study and 27 credits in their second year of study. A 3-credit course will normally consist of 18-24 hours of lectures, seminars, workshops and/or field trips.

**A. COURSE STRUCTURE**

The list of courses, and their contents set out thereafter, will be changed from time to time.

<b>Programme Structure of the <u>Part-time</u> Mode (from 2012-2013 onwards):</b>	
The list of courses and their contents may be changed from time to time.	
<b><u>Year 1:</u></b>	
<b>Core courses (27 credits):</b>	
ENVM7003	Introduction to Ecology (3 credits)
<u>ENVM7012</u>	Environmental Economics and Analysis (3 credits)
<u>ENVM7013</u>	Sustainability, Society and Environmental Management (3 credits)
ENVM7014	Environmental Quality Management (6 credits)
ENVM7015	Research Methods and Report Writing in Environmental Management (3 credits)
ENVM7016	Environmental Policy (3 credits)
ENVM7017	Environmental Law in Hong Kong (3 credits)
<b>Select one course from the following list:</b>	
<u>ENVM7018</u>	Environmental Field Studies (3 credits)
ENVM7019	Intensive <u>Residential</u> Field Studies (3 credits)
<b><u>Year 2:</u></b>	
<b>Core Courses (12 credits)*:</b>	
<u>ENVM8004</u>	Dissertation (9 credits) <sup>#</sup>
<u>ENVM8006</u>	Environmental Impact Assessment (3 credits)
<b>Elective courses (select any five, 15 credits):</b> [Indicative only: courses' availability will vary from year to year]	
<u>ENVM8003</u>	Conservation Biology and Management (3 credits)
ENVM8010	Earth Science and Environmental Management (3 credits)
<u>ENVM8011</u>	Environmental Auditing and Reporting (3 credits)

<u>ENVM8012</u>	Environmental Health and Risk Assessment (3 credits)
ENVM8013	Air and Noise Pollution Control and Management (3 credits)
<u>ENVM8014</u>	Special Topics in Environmental Management (3 credits)
<u>ENVM8015</u>	Directed Studies in Environmental Management (3 credits)
<u>ENVM8016</u>	Conservation and Management of Freshwater Ecosystems (3 credits)
ENVM8017	Conservation and Management of Marine Resources (3 credits)
ENVM8018	Urban Planning and Environmental Management (3 credits)
<u>ENVM8019</u>	Corporate Social Responsibility (3 credits)

**Notes:** *Alternative courses from other taught Masters' programmes at HKU might be accepted at the discretion of the Programme Coordinator. By June 1, Part-time students must have submitted their dissertation titles and supervisor's names to the Board of Studies for approval. Part-time students are expected to commence work on their dissertation during the summer vacation between their first and second year of study.*

*#Students are also required to attend a research colloquium at which presentations are made by students based on their dissertation project. The presentations will be assessed and this will contribute to the final grade awarded for the dissertation. Part-time students must submit their dissertation to Faculty of Science on or before the last Friday in May in the second academic year of study. On the successful completion of the degree, a copy of the outstanding dissertation may be lodged in the University Library for public access.*

#### **Programme Structure of the Full-time Mode (from 2012-2013 onwards):**

The list of courses and their contents may be changed from time to time.

#### **Core Courses (39 credits):**

ENVM7003	Introduction to Ecology (3 credits)
<u>ENVM7012</u>	Environmental Economics and Analysis (3 credits)
<u>ENVM7013</u>	Sustainability, Society and Environmental Management (3 credits)
<u>ENVM7014</u>	Environmental Quality Management (6 credits)
ENVM7015	Research Methods and Report Writing in Environmental Management (3 credits)
<u>ENVM7016</u>	Environmental Policy (3 credits)
<u>ENVM7017</u>	Environmental Law in Hong Kong (3 credits)
ENVM8004	Dissertation (9 credits) #
<u>ENVM8006</u>	Environmental Impact Assessment (3 credits)

#### **Select one course from the following list:**

ENVM7018	Environmental Field Studies (3 credits)
<u>ENVM7019</u>	Intensive <u>Residential</u> Field Studies (3 credits)

<b>Elective courses (select any five, 15 credits):</b> [Indicative only: courses' availability will vary from year to year]	
<u>ENVM8003</u>	Conservation Biology and Management (3 credits)
<u>ENVM8010</u>	Earth Science and Environmental Management (3 credits)
<u>ENVM8011</u>	Environmental Auditing and Reporting (3 credits)
<u>ENVM8012</u>	Environmental Health and Risk Assessment (3 credits)
<u>ENVM8013</u>	Air and Noise Pollution Control and Management (3 credits)
<u>ENVM8014</u>	Special Topics in Environmental Management (3 credits)
<u>ENVM8015</u>	Directed Studies in Environmental Management (3 credits)
<u>ENVM8016</u>	Conservation and Management of Freshwater Ecosystems (3 credits)
<u>ENVM8017</u>	Conservation and Management of Marine Resources (3 credits)
<u>ENVM8018</u>	Urban Planning and Environmental Management (3 credits)
<u>ENVM8019</u>	Corporate Social Responsibility (3 credits)
<p><b>Notes:</b> Full-time students must have submitted their dissertation titles and supervisor's names to the Board of Studies by October 15.</p> <p># Students are also required to attend a research colloquium at which presentations are made by students based on their dissertation project. The presentations will be assessed and this will contribute to the final grade awarded for the dissertation. Full-time students must submit their dissertation to Faculty of Science on or before the last Friday in June in the first academic year of their study. On the successful completion of the degree, a copy of the outstanding dissertation may be lodged in the University Library for public access.</p>	

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## B. COURSE CONTENTS

### Core Courses

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#### **ENVM7003 Introduction to ecology (3 credits)**

This course deals with the ecological processes determining the distribution and abundance of organisms, and which in turn govern the structure and function of communities and ecosystems. The focus of the course is on how an understanding of ecology is important for environmental management. Together with lectures and student centered learning, this course also incorporates a practical fieldwork component based at the Swire Institute of Marine Science.

Assessment: Written examination (100%)

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#### **ENVM7012 Environmental economics and analysis (3 credits)**

The aim of this course is to equip students with the ability to undertake an economic analysis of the environment. It examines the environment in the context of the market mechanism and policies for improving environmental performance. There is an emphasis on market failure and strategies for internalizing the external costs of environmental damage. A good deal of attention is paid to cost-benefit analysis and methodologies for the valuation of the environment. There is also a consideration of

alternative policy instruments from an economic perspective. This course further examines means of managing resources in a way that is both economically and environmentally efficient.

Assessment: Course work (100%) (10% participation and performance at in-class discussion; 50% exercises; 40% take home examination)

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### **ENVM7013 Sustainability, society and environmental management (3 credits)**

This course begins with the intellectual debates on the definitions, conceptions and different schools of thought of the notion of sustainable development. The course then moves on to exploring ways of analyzing sustainable development at the macro- and the micro- levels, ranging from governance issues, frameworks, policies to projects. A number of tools for sustainable development are also explained including community engagement, sustainability assessment, life cycle assessment, etc. Each year there will be a special focus on a thematic area such as sustainable energy, low carbon living, or planning for sustainable cities, to illustrate the challenges of implementing both local and global sustainability.

Assessment: Course work (100%)

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### **ENVM7014 Environmental quality management (6 credits) (equivalent to 2 courses)**

This course introduces students to the types, sources and effects of environmental pollution and some of the key principles and strategies used in combating pollution and managing environmental quality. Topics include water and air quality management, solid waste management and noise pollution control, with an emphasis on the situation in Hong Kong. Aspects of pollution control legislation and its enforcement, adaptation and mitigation towards climate change and carbon auditing in practice may also be covered.

Assessment: Course work (40%) and written examination (60%)

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### **ENVM7015 Research methods and report writing in environmental management (3 credits)**

This course is intended both as preparation for the dissertation, which forms an important part of the study, and as a general introduction to writing reports on environmental issues. It is taught as a series of lectures, seminars and workshops. Subjects covered include: selecting a topic; the scientific method; asking questions; searching for information; surveys and interviews; the case study approach; formats, styles and presentation; avoiding plagiarism; citing sources; giving oral presentations; dealing with the media; basic data processing and data analysis.

Assessment: Course work (40%) and written examination (60%)

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### **ENVM7016 Environmental policy (3 credits)**

This course focuses on processes of environmental policy making: how policy agendas emerge and evolve, the drivers and barriers influencing policy development, institutional structures for environmental policy making, stakeholder engagement, and the implementation of environmental policy. Theories of policy making are explored in relation to the environment and sustainable development. Environmental policy making systems and outcomes are reviewed through local and international case studies.

Assessment: Written examination (50%) and term paper (50%)

### **ENVM7017 Environmental law in Hong Kong (3 credits)**

This course focuses on the statutory interpretation of the four principal Ordinances and subsidiary legislation dealing with pollution in Hong Kong; namely the Water Pollution Control Ordinance, the Air Pollution Control Ordinance, the Noise Control Ordinance and the Waste Disposal Ordinance. Some consideration will also be given to the Dumping at Sea Ordinance, the Radiation Ordinance, the Merchant Shipping (Prevention and Control of Pollution) Ordinance, the Environmental Impact Assessment Ordinance, the Ozone Layer Protection Ordinance and international conventions effecting the law. Students will study the nature of environmental offences, including the requirement for proving “mens rea” (intent) in order for certain offences to be successfully prosecuted. Students will also be introduced to the principles of judge made law (the Common Law) and will learn to read and interpret relevant case law in order to better understand the current sentencing policies towards environmental offenders, both locally and in other Common Law jurisdictions.

Assessment: Course work (100%)

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### **ENVM7018 Environmental field studies (3 credits)**

This is an experiential learning course. This course aims to broaden students' horizon and knowledge base on key aspects of environmental management and natural conservation through a series of field studies and visits to local and overseas organizations. Topics include conservation and biodiversity management, waste and wastewater treatment processes, water treatment processes, and corporate environmental management in practices. Field studies will be conducted in form of guided visits, field work, and invited lectures or forums according to the topics involved. Study trips outside Hong Kong such as Macau, Mainland China and Taiwan may be considered. Students are required to attend at least 50% of all field trips organized over the study period.

Assessment: Course work and participation and performance at in-class discussion (100%)

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### **ENVM7019 Intensive residential field studies (3 credits)**

This is an experiential learning course. This course aims to teach students with the field survey and study skills in biodiversity assessment through an intensive residential field course. Students taking this course have to conduct hands on field surveys of common plant and animal groups in Hong Kong such as vascular plants, mammals, birds, amphibians, reptiles and butterflies. Overseas field trip may be arranged for extra practices in field surveys.

Assessment: Course work and participation and performance at in-class discussion (100%)

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### **ENVM8004 Dissertation (9 credits) (equivalent to 3 courses)**

The dissertation is an individual, independent research project carried out under the supervision of one or more faculty members. Students may propose their own topics and approach possible supervisors, or they may consider those topics suggested by faculty members. Normally, the student develops the research outline in collaboration with his or her Faculty advisor(s) and then collects data, carries out analysis and writes the report prior to the research colloquium where the student will present his/her work. The candidate shall make a formal presentation on the subject of his/her dissertation as required by the programme organizers, during the final semester of the teaching programme.

Assessment: Individual presentation (10%), continuous assessment (10%) and a dissertation report of approximately 15,000-20,000 words (80%)



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**ENVM8006 Environmental impact assessment (3 credits)**

Environmental Impact Assessment (EIA) is one of the most important contemporary instruments of environmental management. Used widely around the world to identify the impacts of development projects as well as strategic plans and policies, EIA plays a key role in many regulatory systems for the environment. This course reviews the development of different approaches to EIA, basic analytical principles, administrative and legal systems for EIA, assessments at the project and strategic levels (SIA), and case study applications in Hong Kong.

Assessment: Written examination (60%) and a term paper (40%)

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**Elective Courses**

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**ENVM8003 Conservation biology and management (3 credits)**

Conservation biology is the essential scientific element in biodiversity conservation. The course will cover the basic principles and methods of conservation biology in a non-technical way. In reality, successful biodiversity conservation projects often require an integration of the welfare of local communities. As such, practical examples from Hong Kong and elsewhere will be used as case studies to illustrate the importance of different elements in conserving our biodiversity.

Assessment: Written examination (100%)

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**ENVM8010 Earth science and environmental management (3 credits)**

This course examines major issues of earth science of relevance to environmental management. Case studies based on past experiences with application to Hong Kong and other major coastal cities are emphasized. Topics include: chemical composition of earth materials; geochemical surveys; aspects of human health; quaternary record of environmental change; aspects of water resource management; natural and human-induced hazards; coastal management; aspects of waste disposals, etc.

Assessment: Course work (40%) and written examination (60%)

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**ENVM8011 Environmental auditing and reporting (3 credits)**

This course is dedicated to the construction of an integrated environmental management system (EMS). The course considers the design of the EMS, its implementation and issues of continuous improvement. Environmental auditing is dealt with in the context of the systems-based approach. This course examines audit methodology, measurement and quality assurance. The approach is extended to the auditing of supply chains (particularly in China). Emphasis is placed on practical approaches to improving environmental performance over time. Methods and techniques of reporting on systems and auditing include both environmental reports as well as social and sustainable development reports.

Assessment: Course work (100%) (12% participation and performance at in-class discussion; 54% projects and case studies; 34% take home exam)

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**ENVM8012 Environmental health and risk assessment (3 credits)**

Environmental Risk Assessments (ERAs) are a tool to determine the likelihood that contaminant releases, either past, current, or future, pose an unacceptable risk to human health or the environment. Currently, ERAs are required under various regulations in many developed countries so as to support decision-makers in risk characterization or the selection of cost-effective remedial cleanup. This course

introduces the theory and practice of human and ecological risk assessments. Students completing the course will gain a sound knowledge of the concepts and principles of ERAs, management and communication as applied in practice; understand the basic risk assessment tools (i.e. prospective, retrospective and tiered approaches) to environmental risk management; be able to select and apply the simpler tools to tackle risk issues; and appreciate the interpretations of risk and its role in environmental policy formulation and decision making.

Assessment: Course work (40%) and written examination (60%)

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### **ENVM8013 Air and noise pollution control and management (3 credits)**

This advanced course focuses on various technical aspects related to air and noise pollution control and their management issues. The topics include micrometeorology; air dispersion modelling; advanced air pollution control (e.g. process modification, energy audit and emission trading); case studies on control of emissions from stationary and mobile source; concept of sound propagation; basic principles of noise control; noise impact assessment and technical mitigation measures for construction, industrial, road traffic, railway and aircraft noise.

Assessment: Course work (10%) and written examination (90%)

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### **ENVM8014 Special topics in environmental management (3 credits)**

The contents of this course will vary from year to year, depending on the availability of teachers and topics, and will be announced before course selection each year. Hot topics in Hong Kong or overseas that are related to environmental management will be selected. Examples of such topics could include urban tree management; slope greening; nature conservation versus development in rural Hong Kong and China, sustainable development movements. With careful consideration of different needs of various stakeholders, various management options are reviewed and evaluated.

Assessment: Course work (100%)

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### **ENVM8015 Directed studies in environmental management (3 credits)**

This course provides an opportunity for students to study a topic of particular interest under the supervision of a specialist (i.e., a Faculty member) or undertake an internship (Full-time students only) under the supervision of an experienced Environmental Practitioner. The contents of this course will be agreed individually between the student and the supervisor, and may include research project, directed reading, written assignment, laboratory or field work, and/or other activities relevant to environmental management.

Assessment (Directed Studies): Reading exercise and report; or mini project and report; or mini review depending on the agreement between student and supervisor (100%)

Assessment (internship): Internship report (50%); Supervisor's assessment (20%); Presentation (30%)

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### **ENVM8016 Conservation and management of freshwater ecosystems (3 credits)**

Freshwater is an essential requirement of humans, plants and animals, but only a tiny fraction of the water on Earth (0.03%) is available for use. As water is used by humans in multiple ways and is subject to a variety of anthropogenic impacts, there is potential for conflict among different interest groups. Such conflicts will be exacerbated by ongoing changes in global climate that impact water availability. If global water use is to be sustainable, environmental requirements for water to maintain biodiversity as well as ecosystem goods and services need to be taken into consideration alongside human demands. This course offers an introduction to the problems associated with human use of water and current patterns of water resource management, and explains how the characteristics of natural systems

constrain sustainable use of water. Emphasis will be placed on examples of river and lake management that can indicate the reasons for success and failure of sustainable water resource use, with reference to regional examples. Students taking this course will gain an appreciation of the trade-offs inherent in water resource management, and the practices that can be adopted to conserve freshwater biodiversity in the complex context of maintaining human livelihoods.

Assessment: Written examination (100%)

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### **ENVM8017 Conservation and management of marine resources (3 credits)**

The marine environment has been an important source of its fortunes but today suffers from a range of perturbations, from pollution and habitat destruction, to communities loss and over-exploitation. This course primarily deals with pressing issues of marine resource conservation and management in Hong Kong. An overview of the current global situation of marine resources will be presented with an emphasis on the local situation. The past and present exploitation of marine resources and human impacts on the marine ecosystem are addressed with a view to identifying problems and providing practical solutions. Real cases are taken from Hong Kong as example to illustrate the crisis and its management options. Various management options are reviewed and evaluated with careful consideration of different needs of various stakeholders. The key topics of this course include marine pollution, habitat destruction, biological invasion, biodiversity conservation, fisheries, mariculture and harmful algal bloom.

Assessment: Course work (50%) and written examination (50%)

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### **ENVM8018 Urban planning and environmental management (3 credits)**

This course lays down the challenges of achieving environmental sustainability in cities. It highlights the important role of urban planning and its related tools and instruments in managing development pressure, mitigating environmental impacts and conserving the ecological sensitive areas. The course provides an introduction to the fundamental aspects of planning and focuses on essential concepts and methods in environmental planning and conservation policy where their application to resolving urban conflicts is discussed. These include land-use planning, planning law and enforcement, public-private partnership, management agreements, conservation trusts, etc. The course debates on the effectiveness of various planning approaches through real-life case studies in the local, regional and international contexts.

Assessment: Course work (100%)

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### **ENVM8019 Corporate social responsibility (3 credits)**

Corporate social responsibility (CSR) focuses on the business sector's reaction and contribution to achieving sustainability. In recent years, the scope has extended from contributing to the social welfare of the society to improving the environmental performance for cost reduction, brand building and environmental conservation. The course reviews business relationships with the environment and biodiversity expressed in the concepts of sustainable production and consumption. It examines the commonly used tools in CSR, including environmental management systems, life-cycle analysis and clean production. The course also emphasizes the importance of learning about current practice in the business sector, and thus guests from corporate sector will be invited to share their experience with students.

Assessment: To be determined

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