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

For students admitted in 2020-2021 and thereafter.

(See also General Regulations and Regulations for Taught Postgraduate Curricula)

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 Space 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.

Admission requirements

Sc21

(a) To be eligible for admission to the courses leading to the degree of Master of Science or Master of Science in Environmental Management, a candidate

(i) shall comply with the General Regulations and the Regulations for Taught Postgraduate Curricula;

(ii) shall hold a Bachelor's degree with honours of this University; or another qualification of equivalent standard of this University or another University or comparable institution accepted for this purpose;

(iii) in respect of the courses of study leading to the degree of Master of Science in the field of Space Science, a Bachelor's degree in a relevant science (e.g. physics, astronomy, earth sciences) or engineering discipline, and prior knowledge expected in basic college physics (mechanics, electricity & magnetism), college-level mathematics (e.g. calculus, linear algebra), basic statistics, and some computer programming (e.g. python, C);

(iv) shall satisfy the examiners in a qualifying examination if required.

(b) 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 demonstrates adequate preparation for studies at this level and satisfies the examiners in a qualifying examination.

Qualifying examination

Sc22

(a) 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.

(b) 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.

Award of degree

Sc23 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 the Regulations for Taught Postgraduate Curricula; and
(ii) shall complete the curriculum and satisfy the examiners in accordance with these regulations and syllabuses.

Advanced standing

Sc24 In recognition of studies completed successfully before admission to the Master of Science in Environmental Management, Master of Science in the field of Applied Geosciences and Master of Science in the field of Space Science, advanced standing of up to 12 credits may be granted to a candidate with appropriate qualification and professional experiences, on production of appropriate certification, subject to the approval of the Board of the Faculty. Credits gained for advanced standing shall not be included in the calculation of the GPA but will be recorded on the transcript of the candidate. The candidate should apply before commencement of first year of study via the Department and provide all the supporting documents.

Period of study

Sc25 The curriculum of the Master of Science or the Master of Science in Environmental Management shall normally extend over one academic year of full-time study or two academic years of part-time study. Candidates in either degree shall not be permitted to extend their studies beyond the maximum period of registration of two academic years of full-time study or three academic years of part-time study, unless otherwise permitted or required by the Board of the Faculty.

Completion of curriculum

Sc26 To complete the curriculum of the Master of Science or Master of Science in Environmental Management, a candidate

(a) shall satisfy the requirements prescribed in TPG 6 of the Regulations for Taught Postgraduate Curricula;
(b) shall follow courses of instruction and complete satisfactorily all prescribed written, practical and field work;
(c) shall complete and present a satisfactory dissertation or project on an approved subject or complete courses with equivalent credits as a replacement; and
(d) shall satisfy the examiners in all courses prescribed in the respective syllabuses.

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 30 and the dissertation or project report shall be submitted not later than the last

Friday in June of the first year of study, unless otherwise permitted or required by the course coordinator(s);

(c) for the part-time curriculum (except Master of Science in the field of Applied Geosciences and MSc in Environmental Management), be submitted for approval by March 15 of the first year of study and the dissertation or project report shall be submitted not later than July 1 of the second year of study;

(d) for the part-time curriculum of MSc in Environmental Management, be submitted by June 30 of the first academic year, unless otherwise permitted or required by the course coordinator(s). The dissertation shall be submitted not later than the last Friday in May of the second year of study and the project report shall be submitted not later than the last Friday in June of the second year of study, unless otherwise permitted or required by the course coordinator(s).

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.

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.

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.

Assessment results

Sc33 On successful completion of the curriculum, candidates who have shown exceptional merit may be awarded a mark of distinction, and this mark shall be recorded in the candidates' degree diploma.

Grading systems

Sc34 Individual courses shall be graded according to one of the following grading systems as determined by the Board of Examiners:

(a) Letter grades, their standard and the grade points for assessments as follows:

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

or

*(b) 'Pass' or 'Fail'

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

*Only applies to certain courses in MSc in the field of Applied Geosciences

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

For students admitted in 2020-21and thereafter.

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 and total credits prescribed in a selected theme and elective courses, if any, totalling 66 or 69 credits.

ENGINEERING GEOLOGY THEME (66 credits)

Core Courses	
GEOS7010	^Geology principles and practice (6 credits)
GEOS7011 OR GEOS7033	*Advanced geology of Hong Kong (6 credits) OR ^ 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 Part I (6 credits)
GEOS7021 OR GEOS8021	^ Geological fieldwork I (3 credits) OR *Geological fieldwork II (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)
GEOS8020	Project Part II (12 credits)
GEOS8101	Engineering geology and geotechnical design (6 credits)
GEOS8102	Rock engineering and geomaterials (6 credits)
GEOS8104	*Natural hillside landslide and hazard studies (3 credits)
GEOS8204	+△Basic structural mechanics and behaviour (3 credits)
Other courses	
GEOS7022	#Course of directed studies (3 credits)

* For students with a first degree in Geology or a related subject
^ For students whose first degree is not in Geology or a related subject
△Not a core course for students taking course GEOS7022 and students whose first degree is not in Geology or a related subject
+ Students with a first degree in Civil Engineering cannot take this course for credits
# As directed by the programme director

Core courses for students with a first degree in Geology or a related subject:
GEOS7011, 7012, 7015, 7016, 7020, 8001, 8002, 8003, 8020, 8021, 8101, 8102, 8104, 8204 – 66 credits.
Course GEOS7022 may be substituted for course GEOS8204.

Core courses for students with a first degree in Civil Engineering:
GEOS7010, 7012, 7015, 7020, 7021, 7033, 8001, 8002, 8003, 8020, 8101, 8102 – 63 credits.

Core courses for students whose first degree is not in Geology or a related subject, or Civil Engineering:
GEOS7010, 7012, 7015, 7016, 7020, 7021, 7033, 8001, 8002, 8003, 8020, 8101, 8102 – 66 credits.

ENGINEERING GEOLOGY WITH HKIE APPROVED COURSES THEME (69 credits)

Core Courses

GEOS7012	Site investigation and engineering geological techniques (6 credits)
GEOS7015	Rock mechanics (3 credits)
GEOS7016	Soil mechanics (3 credits)
GEOS7020	Project Part I (6 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)
GEOS8020	Project Part II (12 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)

Elective Courses	
ENVM7013	Sustainability, Society and Environmental Management (3 credits)
ENVM7016	Environmental Policy (3 credits)
ENVM7017	Environmental Law in Hong Kong (3 credits)

Certain courses not included above may be accepted as electives at the discretion of the programme director.

Teaching will take place mainly on weekday evenings but students are expected to undertake field and laboratory work during weekends. Normally there are two evening classes each week but in some semesters there are three. Full-time students attend the same evening classes as part-time students, most of whom have day-time employment. Concentrated teaching may be held at weekends.

B. COURSE CONTENTS

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.

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

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.

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

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.

Assessment: Course work (30%) and written examination (70%)

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.

Assessment: Course work (30%) and written examination (70%)

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.

Assessment: Course work (30%) and written examination (70%)

GEOS7020 Project Part I (6 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. This course provides a capstone experience.

Assessment: Course work (100%)

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.)

Assessment: Course work (100%)

GEOS7022 Course of directed studies (3 credits)

Studies to assist learning in the core courses, involving some of the following activities: professional activities, field work, laboratory work, internship, class exercises, tutorials and reading.

Assessment: course work (80%) and oral examination (20%)

GEOS7024 Management (3 credits)

This subject provides the graduate with basic knowledge of project management practice. It will cover most of the following: engineering processes, programming and procurement strategies: contact management; construction site safety, health and environmental aspects; quality control and quality assurance.

Assessment: Course work (30%) and written examination (70%)

GEOS7033 Geology of Hong Kong (6 credits)

To provide an understanding of the principal components of the geology of Hong Kong and its regional setting, including the distribution and interpretation of the main rock types, age relationships; and superficial deposits; and the locations and orientations of the main regional and local structures.

Pre-requisite course: Pass in GEOS7010
Assessment: Course work (50%) and written examination (50%)

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.

Assessment: Course work (30%) and written examination (70%)

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.

Assessment: Course work (30%) and written examination (70%)

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. This course provides a capstone experience.

Pre-requisite course: Pass in GEOS8002
Assessment: Course work (100%)

GEOS8020 Project Part II (12 credits)

The second phase of an independent study of a problem in applied geosciences culminating in the preparation of a project report of about 10,000 words. Students will be required to make a presentation of their preliminary results. This course provides a capstone experience.

Assessment: Course work (100%)

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.)

Assessment: Course work (100%)

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 except for students with a first degree in Civil Engineering
Assessment: Course work (30%) and written examination (70%)

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
Assessment: Course work (30%) and written examination (70%)

GEOS8104 Natural hillside landslide and hazard studies (3 credits)

The contents of this course will include most of the following topics: classification of landslides; Hong Kong terminology, examples of natural terrain landslides and documentary sources of information; hillslope evolution, geomorphological principles (including the evolutionary landform models of Dalrymple and Hansen) and Quaternary geology of Hong Kong; hillslope hydrology, modes of groundwater flow, runoff and infiltration, piping; hydrological and morphological conditions for initiation of shallow landslides in regolith; engineering geological and geomorphological mapping; landform processes; regolith mapping, boulder identification; landslide hazard assessment; landslide susceptibility assessment for risk quantification; design event approach; landslide mobility modelling.

Assessment: Course work (30%) and written examination (70%)

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.

Assessment: Course work (30%) and written examination (70%)

GEOS8205 Mathematics I (6 credits)

This course (together with GEOS8206 Mathematics II) strives to provide a comprehensive introduction to the fundamental mathematics that all earth scientists need. Topics include the language of sets, the concept of matrices and its applications, functions, limits, first order differentiation, applications of derivatives, first order Taylor's expansion, properties of exponential and logarithmic functions, the notation of integration, integration techniques, volume of revolution, higher order differentiation and Taylor's expansion, Hessian test for functions of two variables, the concept of multiple integration, and volume using triple integration.

Assessment: Course work (30%) and written examination (70%)

GEOS8206 Mathematics II (6 credits)

This course is a continuation of GEOS8205 (Mathematics I). The first part of the course aims to teach students different solution methods to first order differential equations (separable, linear, Bernoulli, exact/non-exact types), second order linear differential equations with constant coefficients using characteristic equation, method of variation of parameters, method of educated guess. The second part introduces the concept of probability and statistics, topics include counting, probability (using the language of sets), random variables (including Binomial, Poisson, Exponential, Normal), probability density/distribution functions, cumulative distribution functions, joint distributions, independence, mean, variance, covariance, moment generating functions, sampling and confidence intervals (using Normal/t- distributions).

Assessment: Course work (30%) and written examination (70%)

ENVM7013 Sustainability, society and environmental management (3 credits)

This course begins with intellectual debates on the definitions, conceptions and different interpretations of the notion of sustainable development. The course then moves on to explore and analyse the implementation of the sustainability concept at the macro- and the micro- levels, covering a wide range of issues from international agreements and campaigns to local projects and practice. This will be followed by a number of implementation tools and techniques including community engagement and sustainability assessment. The course concludes with a series of real-life case investigations on innovative models to achieve sustainability in different contexts.

Assessment: Course work (100%)

ENVM7016 Environmental policy (3 credits)

This course focuses on key aspects of environmental policy-making and policy-implementation processes, such as how policy agendas emerge and evolve, how environmental discourse shapes policy outputs; and how institutions affect the trajectories and outcomes of environmental policy measures. Making references to local, national and international cases of successful and not-so-successful policies that pertain to the sustainable development agenda, the course also examines the theories and praxis of policy transfer and policy convergence, as well as the perennial problematics of policy integration, policy learning and policy failure.

Assessment: Course work (100%)

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%)

C. PROGRAMME LEARNING OUTCOMES

1. Can apply geological knowledge and skills in the solution of problems in the student's discipline.
2. Can explain, use and critically assess the use of science related to the student's discipline.
3. Insists on knowing the facts before making a judgement; exhibits judicial habits of mind.
4. Effective in defining and solving problems from first principles, without reliance on solutions from memory; can satisfactorily complete a self-directed study.
5. Effective in oral, written and graphical communication.
6. Works well in a team.
7. Knows the standards of conduct required by law, by the student's professional qualifying body

and by the university and why it is important to uphold a high standard of professional ethics. Knows the specific malpractices that may be encountered in the student's profession and how to guard against malpractice.

8. Able to recognise, articulate and advocate the societal benefits of the application of best practice in engineering geology in the construction industry, in the use of earth resources and in the mitigation of geological risk.[1.]

[1.] for those taking the Engineering Geology Theme or the Engineering Geology with HKIE Approved Courses Theme of the MSc in Applied Geosciences

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D. ACADEMIC ASSESSMENT

The following Grade Descriptors will be used in academic assessment:

Grade A	Is very good or excellent in using basic principles and essential skills in practice. Requires very limited supervision. Is creative, work is virtually error free and writes well. Can apply learning in unfamiliar situations.
Grade B	Is good in using the basic principles and the essential skills in practice but requires some supervision.
Grade C	Is able to state most of the basic principles but is poor at using them, and the essential skills, in practice without direction.
Grade D	Marginal Pass and any Pass in a supplementary examination.
Fail	Does not know most of the basic principles and has not mastered the essential skills used in practice.

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

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) *[Capstone experience]*

Total: 66 credits

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.

Assessment: Course work (30%); Examination (70%)

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.

Assessment: Course work (20%); Examination (80%)

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.

Assessment: Course work (30%); Examination (70%)

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.

Assessment: Course work (20%); Examination (80%)

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.

Assessment: Course work (30%); Examination (70%)

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.

Assessment: Course work (20%); Examination (80%)

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.

Assessment: Course work (30%); Examination (70%)

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.

Assessment: Course work (60%); Examination (40%)

FOOD8009 Project (15 credits) *[Capstone experience]*

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 before December 31 of the second 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.

Assessment: Project (100%)

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.

A. Course Structure

Programme Structure of the Full-time Mode:		
Year 1 (69 credits)		
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)
FSTX8005	Chemical and microbial hazards in food	(9 credits)
FSTX8006	Food safety management	(9 credits)
FSTX8007	Project *[Capstone experience]*	(12 credits)

Programme Structure of the Part-time Mode:		
Year 1 (39 credits)		
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)
Year 2 (30 credits)		
FSTX8005	Chemical and microbial hazards in food	(9 credits)
FSTX8006	Food safety management	(9 credits)
FSTX8007	Project *[Capstone experience]*	(12 credits)

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.

Assessment: Course work (25%); Examination (75%)

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.

Assessment: Examination (100%)

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.

Assessment: Course work (20%); Examination (80%)

FSTX7004 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.

Assessment: Course work (25%); Examination (75%)

FSTX8005 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.

Assessment: Course work (20%); Examination (80%)

FSTX8006 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.

Assessment: Course work (20%); Examination (80%)

FSTX8007 Project (12 credits) *[Capstone experience]*

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.

Assessment: Project (100%)

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

For students admitted in 2020-2021 and thereafter.

A candidate shall follow and be examined in at least 60 credits of courses including core courses (42 - 51 credits) and elective courses (9 -18 credits). For Part-time candidates, they will normally take 30 credits in their first year of study and 30 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.

Programme Structure of the Part-time Mode (from 2020-2021 onwards):	
The list of courses and their contents may be changed from time to time.	
Year 1:	
Core courses (30 – 33 credits):	
ENVM7003	Introduction to ecology (3 credits)
ENVM7012	Environmental economics and analysis (3 credits)
ENVM7013	Sustainability, society and environmental management (3 credits)
ENVM7014	Environmental quality management (6 credits)
ENVM7015	Research methods and report writing in environmental management (6 credits)
ENVM7016	Environmental policy (3 credits)
ENVM7017	Environmental law in Hong Kong (3 credits)
Select at least one field study course:	
ENVM7018	Environmental field studies (3 credits)
ENVM7019	Ecological field studies (3 credits)
Year 2:	
Core courses (12 – 18 credits):	
ENVM8006	Environmental impact assessment (3 credits)
Select either one of the two capstone experience courses, i.e. ENVM8004 or ENVM8021	

ENVM8004 #	Dissertation (15 credits) ***[Capstone experience]***
ENVM8021	Project (9 credits) ***[Capstone experience]***

Elective courses (9 – 18 credits):
(Depending on the core courses taken):

[Indicative only: courses' availability will vary from year to year]

ENVM8003	Conservation biology and management (3 credits)
ENVM8011	Environmental auditing and reporting (3 credits)
ENVM8012	Environmental health and risk assessment (3 credits) (May be taken in Year 1 summer semester)
ENVM8013	Air and noise pollution control and management (3 credits)
ENVM8014	Special topics in environmental management (3 credits)
ENVM8015	Directed studies in environmental management (6 credits)
ENVM8016	Conservation and management of freshwater resources (3 credits)
ENVM8017	Conservation and management of marine resources (3 credits)
ENVM8018	Urban planning and environmental management (3 credits)
ENVM8019	Corporate sustainability (3 credits)
ENVM8020	Green buildings and energy management (3 credits)

Notes: *Alternative courses from all other taught Masters' programmes at HKU might be accepted at the discretion of the Programme Director.*
 # If a part-time student wishes to take ENVM8004 Dissertation, he/she must obtain a Grade B+ or above in ENVM7015 Research methods and report writing in environmental management by May of the first study year. Students must have submitted their dissertation titles and supervisor's names to the School of Biological Sciences by June 30 and are expected to commence work on their dissertation during the summer vacation between their first and second years of study. Students are also required to attend a dissertation research colloquium in their first and second years of study. They have to deliver presentations 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 the School of Biological Sciences on or before the last Friday in May in the second academic year of study, unless otherwise permitted or required by the course coordinator(s). 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 2020-2021 onwards):

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

Core Courses (42 – 51 credits):	
ENVM7003	Introduction to ecology (3 credits)
ENVM7012	Environmental economics and analysis (3 credits)
ENVM7013	Sustainability, society and environmental management (3 credits)
ENVM7014	Environmental quality management (6 credits)
ENVM7015	Research methods and report writing in environmental management (6 credits)
ENVM7016	Environmental policy (3 credits)
ENVM7017	Environmental law in Hong Kong (3 credits))
ENVM8006	Environmental impact assessment (3 credits)
Select at least one field study course:	
ENVM7018	Environmental field studies (3 credits)
ENVM7019	Ecological field studies (3 credits)
Select either one of the two capstone experience courses, i.e. ENVM8004 or ENVM8021	
ENVM8004 #	Dissertation (15 credits) ***[Capstone experience]***
ENVM8021	Project (9 credits) ***[Capstone experience]***
Elective courses (9 – 18 credits): **(Depending on the core courses taken):** [Indicative only: courses' availability will vary from year to year]	
ENVM8003	Conservation biology and management (3 credits)
ENVM8011	Environmental auditing and reporting (3 credits)
ENVM8012	Environmental health and risk assessment (3 credits)
ENVM8013	Air and noise pollution control and management (3 credits)
ENVM8014	Special topics in environmental management (3 credits)
ENVM8015	Directed studies in environmental management (6 credits)
ENVM8016	Conservation and management of freshwater resources (3 credits)
ENVM8017	Conservation and management of marine resources (3 credits)

ENVM8018	Urban planning and environmental management (3 credits)
ENVM8019	Corporate sustainability (3 credits)
ENVM8020	Green buildings and energy management (3 credits)
ENVM8022	Environmental management internship (6 credits)

Notes: *Alternative courses from all other taught Masters' programmes at HKU might be accepted at the discretion of the Programme Director.*

[#] *If a full-time student wishes to take ENVM8004 Dissertation, he/she must pass a qualification assessment in September / October of the first study year. Students must have submitted their dissertation titles and supervisor's names to the School of Biological Sciences by October 30. 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 the School of Biological Sciences on or before the last Friday in June in the first academic year of their study, unless otherwise permitted or required by the course coordinator(s). On the successful completion of the degree, a copy of the outstanding dissertation may be lodged in the University Library for public access.*

B. COURSE CONTENTS

Core Courses

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.

Assessment: Written examination (100%)

ENVM7012 Environmental economics and analysis (3 credits)

The aim of this course is to equip students with the ability to undertake economic analyses of the environment. The course provides an introduction to economic concepts and principles and applies them to the analysis and management of environmental problems. The course covers the economic understanding of environmental problems (e.g. external costs and benefits, public goods, resource scarcity), economic instruments for environmental management (e.g. taxes, subsidies, tradable permits), methods for valuing environmental goods and services (market and non-market approaches), and economic tools for supporting decision-making (e.g. cost-benefit analysis). All topics will be illustrated with current environmental and policy issues to emphasize their relevance and applicability.

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

ENVM7013 Sustainability, society and environmental management (3 credits)

This course begins with intellectual debates on the definitions, conceptions and different interpretations of the notion of sustainable development. The course then moves on to explore and analyse the implementation of the sustainability concept at the macro- and the micro- levels, covering a wide range of issues from international agreements and campaigns to local projects and practice. This will be followed by a number of implementation tools and techniques including community engagement and sustainability assessment. The course concludes with a series of real-life case investigations on innovative models to achieve sustainability in different contexts.

Assessment: Course work (100%)

ENVM7014 Environmental quality management (6 credits)

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.

Assessment: Course work (30%) and written examinations (70%)

ENVM7015 Research methods and report writing in environmental management (6 credits)

This course is intended both as preparation for the dissertation or project course and as a general introduction to writing reports on environmental issues. Subjects covered include: research design, research methodology (quantitative and qualitative methods; basic data processing and analysis) and report writing. Other research skills such as avoiding plagiarism, literature search and review and giving oral presentations may also be taught.

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

ENVM7016 Environmental policy (3 credits)

This course focuses on key aspects of environmental policy-making and policy-implementation processes, such as how policy agendas emerge and evolve, how environmental discourse shapes policy outputs; and how institutions affect the trajectories and outcomes of environmental policy measures. Making references to local, national and international cases of successful and not-so-successful policies that pertain to the sustainable development agenda, the course also examines the theories and praxis of policy transfer and policy convergence, as well as the perennial problematics of policy integration, policy learning and policy failure.

Assessment: Course work (100%)

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%)

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 nature conservation through a series of field studies and visits to local and/or overseas organizations. Topics include, but not limited to, 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, service learning 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 6 sessions organized over the study period and may need to pay the participation fee of some local and/or non-local activities.

Assessment: Course work (100%)

ENVM7019 Ecological 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 and some optional field trips. Rapid biodiversity assessment methods and report writing skills will be taught. 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. Students completing this course shall be able to take part in ecological assessments.

Assessment: Course work (100%)

ENVM8004 Dissertation (15 credits) *[Capstone experience]*

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 during the second semester of the teaching programme. Substantial work, in particular, data collection and analysis, is required in this course.

Assessment: Individual presentation (10%), and a dissertation report of at least 15,000 words, excluding reference list and appendices (90%)

Prerequisite: Part-time students must obtain a Grade B+ or above in ENVM7015 Research methods and report writing in environmental management by May of the first study year. Full-time students must pass a qualification assessment in September / October of the first study year.

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 environment 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 (SEA), and case study applications in Hong Kong.

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

ENVM 8021 Project (9 credits) *[Capstone experience]*

This is a group project (2-3 students per group) to be carried out under the supervision of one or more teachers. The topic and content of the project will be agreed individually between students and the supervisor(s) which have to be endorsed by the respective course coordinators. Students may propose their own topics and approach potential supervisors, or they may consider those suggested by teachers. Apart from scientific research projects, creative projects such as the production of field guides, books, websites, videos, apps about the environment are encouraged.

Assessment: Individual project report (50%) and group presentation (50%)

Elective Courses

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 from a management perspective. 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 the world's biodiversity.

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

ENVM8011 Environmental auditing and reporting (3 credits)

This course provides an introduction on the concepts of environmental management, auditing and reporting. Detailed explanation of the development, implementation and continuous improvement of an environmental management system (EMS) based on ISO14001:2015 standards will be covered. With the understanding on the key elements of an EMS, audit methodology and skills based on ISO19011:2011 would be introduced with focus on environmental audit. Key elements of environmental audit under the Hong Kong EIA system and mechanism of carbon audit will also be covered. The function and importance of environmental reporting will be explained along with the contents of Global Reporting Initiative (GRI) Standards which is a guide for sustainability reporting.

Assessment: Course work (100%)

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 clean-up. 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, risk management and risk 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 (60%) and written examination (40%)

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 (30%) and written examination (70%)

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%)

ENVM8015 Directed studies in Environmental Management (6 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 an experienced Environmental Practitioner. The contents of this course will be agreed individually between the student and the supervisor, which has to be endorsed by the course coordinator. Directed studies may include traditional research projects generating scientific paper or other study projects with creative outputs in environmental management such as audit reports; booklets; pamphlets; field guides; manuals; teaching modules and so on. The course was designed to allow a flexible approach in fixing the content and output of the directed studies.

Assessment: A written report or other form of output to be agreed by the supervisor (50%); Supervisor's assessment (20%); Oral presentation (30%)

ENVM8016 Conservation and management of freshwater resources (3 credits)

The overall aim of this course is to introduce the global importance of freshwater resources to sustainable development of mankind. 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 particular emphasis placed on 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%)

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 community 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%)

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, conserving ecological sensitive areas and achieving the society's overall resilience. The course begins with an introduction to the fundamental functions and processes of planning. Illustrated with real-life case studies, the course then critically reviews the effectiveness of a collection of planning tools and methods, such as land use zonings, conservation trusts, partnership schemes, in resolving conflicts in both urban and rural contexts. The course adopts the Problem-based Learning (PBL) approach where students will take lead and debate on selected current environmental affairs such as planning and development on private land with high conservation value, planning for facilities with environmental nuisances, design and planning for quality open space and rural revitalisation for sustainable communities.

Assessment: Course work (100%)

ENVM8019 Corporate sustainability (3 credits)

Corporate sustainability focuses on the business sector's role and contribution to achieving sustainability. In recent years, the expectations of business to act sustainably are higher than ever before. The scope has extended from contributing to the social welfare of the society or avoiding environmental degradation to a new business approach that creates long term value for the business by embracing

opportunities and managing risks deriving from economic, environmental and social developments. The course examines the commonly used tools in corporate sustainability and corporate social responsibility (CSR), including shared value, corporate community investment and clean production. It reviews the business relationships with the environment and society expressed in the concepts of sustainable production and consumption. The course also emphasizes the importance of learning about current practice in the business sector, and therefore case studies will be used.

Assessment: Course work (100%)

ENVM8020 Green buildings and energy management (3 credits)

One of the ways to tackle global climate change is to significantly enhance energy efficiency especially in buildings. This course will introduce the global trends in the green building movement with focuses on current energy management in new and existing buildings in Hong Kong e.g. BEAM Plus. The course will introduce various aspects of energy efficiency including laws and codes; assessment tools; methods to analyse energy uses in different types of buildings and practical energy conservation measures. This course stresses on practical knowledge and experiences in energy management in buildings. Thus, experienced practitioners in the field are engaged to deliver some of the course content. The course is accredited by Hong Kong Green Building Council Limited and BEAM Society Limited. Starting from the Academic Year 2020-21, the students upon passing the examination of the course will be able to register as BEAM Affiliate by the Hong Kong Green Building Council Limited.

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

ENVM8022 Environmental management internship (6 credits)

This course provides an opportunity for students to undertake an internship in environmental management in universities, NGOs or commercial companies under the supervision of an experienced Environmental Practitioner or Faculty member. The student needs to work for at least 160 hours for the internship employer on either the first, second or summer semester. During the internship, the student needs to conduct a desktop study on a topic related to the internship job duties, which should be endorsed by the course coordinator. The written report for the internship shall contain a fully referenced report for the desk top study and some sharing and reflection of the internship experiences.

Assessment: Written report (60%); Supervisor’s assessment (20%); Oral presentation (20%)

Prerequisite: For Full-time students only

SYLLABUSES FOR THE DEGREE OF
MASTER OF SCIENCE IN THE FIELD OF SPACE SCIENCE

For students admitted in 2020-2021 and thereafter.

A. COURSE STRUCTURE

Each student must complete at least 60 credits of courses, split into 36 credits of core courses, 18 credits of electives, and 6 credits of a final project.

Core Courses	
SPSC7001	Space flight propulsion (6 credits)
SPSC7002	Introduction to space weather (6 credits)
SPSC7003	Remote sensing (6 credits)
SPSC7004	Radiation detection and measurement (6 credits)
SPSC7005	Space science entrepreneurship (6 credits)
SPSC7006	Small satellite design (6 credits)
Elective Courses*	
SPSC7011	Introduction to space plasma physics (6 credits)
SPSC7012	Climate change (6 credits)
SPSC7013	Habitable planets and the origin of life (6 credits)
SPSC7014	Big data, AI and machine learning in space science (6 credits)
SPSC7015	Introduction to planetary science (6 credits)
SPSC7016	Overview of space astrophysics (6 credits)
SPSC7017	Introduction to astrochemistry and astrobiology (6 credits)
SPSC7018	Project management for space science (6 credits)
STAT7102	Advanced statistical modelling (6 credits)
STAT6016	Spatial data analysis (6 credits)
ELEC6008	Pattern recognition and machine learning (6 credits)
ELEC6026	Digital signal processing (6 credits)
ELEC6065	Data compression (6 credits)
ELEC6100	Digital communications (6 credits)
Capstone Project	
SPSC7031	Space science final project (6 credits)

** Timetabling of courses may limit availability of some electives. The actual offering of such electives will be based on student demand.*

B. COURSE CONTENTS

SPSC7001 Space flight propulsion (6 credits)

This course covers an introduction to the basic concepts of space flight propulsion. Topics include: Mechanics of particle motions under central forces, Newton's law applied to the orbital mechanics of particles under central forces, orbital transfers, dynamics of mass-varying system, an application of kinetic principles to rocket and jet propulsion via the first-order differential equations, multi-stage

design for energy efficiency, particles under velocity-dependent resistance, terminal velocity and its application to parachute and small particulates, peak deceleration of spacecraft re-entry trajectories.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7002 Introduction to space weather (6 credits)

Our modern lifestyles rely on satellite technology which can be severely affected by the Earth's local particle environment. Much of this is due to the influence of the Sun, which emits large quantities of radiation and charged particles that interact with the Earth's magnetic field. This course will cover the fundamentals of space weather, from its origins, to its effects, and forecasting.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7003 Remote sensing (6 credits)

This course is focussed on the theory behind, and practical application of, planetary remote sensing. The course covers the use of visible, infrared, radar, and laser remote sensing data to analyse planetary surfaces. Specific applications will include compositional and morphological analyses to support geological studies, landing site characterisation, and exploration for natural resources in space.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7004 Radiation detection and measurement (6 credits)

This course will provide an overview of the various ways in which we can detect radiation to make physical measurements. The course will cover the fundamentals of radiation interactions, properties of radiation detectors, including some of the most commonly used ones (e.g. Proportional Counters, Geiger-Mueller Counters). The course will include discussions of the principles of detection and some practical applications.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7005 Space science entrepreneurship (6 credits)

Unlike the early days, space science in modern times is not driven just by governments. Businesses like SpaceX, Blue Origin, or Virgin Galactic are not only capturing people's imagination, but also proving that space provides big business opportunities. This course will cover the basics of designing, launching, and running a business, with a special emphasis on the space industry.

Assessment: coursework and written assignment (25%); midterm examination (20%); final case study and presentation (40%); Group discussions, attendance, and class engagements (15%)

SPSC7006 Small satellite design (6 credits)

Small satellites (sometimes referred to as microsatellites, CubeSats, etc.) are becoming increasingly popular. Once proposed mainly for educational purposes, due to their low cost and shorter development time scales, these days many such satellites are being proposed and launched with a range of cutting-edge scientific goals. This course will cover the practical aspects of designing a small satellite, based

on the principle of purchasing "off-the-shelf" components, and benefitting from "open source" solutions to many of the technical challenges. Topics include: science instruments and payloads, satellite subsystems, ground networks, space science data and software, ground networks, launchers, and operations.

Assessment: coursework (50%); project (50%)

SPSC7011 Introduction to space plasma physics (6 credits)

Most of space is filled with plasma, the fourth state of matter where freely moving charges from ionized gas interact with (and generate) electric and magnetic fields, leading to a complicated set of phenomena. This course will provide an introduction to the field, covering such topics as orbit theory, electromagnetic waves in cold plasmas, collision theory, magnetohydrodynamics, force-free magnetic-field configurations, stochastic processes, and interaction of particles and waves. The course will emphasize some of the applications of plasma physics in the fields of geophysics and astrophysics.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7012 Climate change (6 credits)

Global warming is one of the biggest challenges faced by this generation, posing potentially an existential threat to the planet: since 2001, the Earth has experienced 16 of the 17 warmest years in recorded history. The study of climate change from space has been one of the key goals of NASA going back to the 1960s. This course will cover the evidence for human-caused climate change, explaining the causes, including sources of greenhouse gas emissions. The course will explore all the various ways in which satellites are providing the necessary measurements, provide possible solutions. Topics include: Climate conditions on Earth, the greenhouse effect, satellite observations, climate modeling, future prospects for climate change mitigation.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7013 Habitable planets and the origin of life (6 credits)

The discovery of large numbers of exoplanets has provided the first solid piece of evidence that our Earth may not be as unique as our ancestors believed. The next step in humankind's quest for the search of the origin of life will involve finding planets that are close enough in their conditions to Earth to harbour life similar to our own. This course will examine the quest for life outside our planet, including the search for planets in the so-called habitable zone. The course will also cover the origin of life outside our solar system and describe the various space observations being carried out in this effort.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7014 Big data, AI and machine learning in space science (6 credits)

These areas overlap, are interdependent and increasingly influential in the real world under the broad umbrella of data science. Big data and data analytics have been widely used in different fields of physics and other sciences. They have direct application in Space and satellite technologies. This course introduces the basics of all these areas. Data analytics is the science of analyzing raw data to make conclusions, a particular challenge in the Big data era, while Machine learning (ML) is a technique enabling computers to learn without being explicitly programmed and is part of the broader concept of

Artificial Intelligence (AI). Key concepts across these overlapping and interdependent fields will be explored including practical processes, techniques and algorithms. There will be a focus on real-world examples with specific emphasis on applications in space and planetary sciences. The course will also cover some ML software packages in Python and R including basic techniques in supervised, unsupervised, and reinforcement learning. Examples in all areas will be drawn from fields such as astrophysics, particle physics and complex systems, including rare source identification from vast data, training sets, smart classification, time series, imaging and spectral analyses.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7015 Introduction to planetary science (6 credits)

We live in a golden age of planetary science, with new missions being proposed at an unprecedented rate by all the major space agencies. This course will provide an overview of planetary science, covering the major topics of the field: planetary dynamics, planetary properties, solar heating and energy transport, planetary atmospheres, planetary surfaces, planetary interiors, magnetospheres, meteorites and asteroids, comets, planet formation, and the search for extrasolar planets.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7016 Overview of space astrophysics (6 credits)

Astrophysics from space was historically proposed to cover those parts of the electromagnetic spectrum not visible from earth (e.g. X-rays, gamma rays), however, almost every part of the spectrum can benefit from space observations, removing the obstacles posed by our atmosphere. Some of the most iconic astrophysical images have been produced by the Hubble Space telescope, a relatively modest (in size) instrument which has made some stunning discoveries over the course of its almost 30-year lifetime. This course will provide an overview of past, present, and future astrophysical space missions, including their major science goals and achievements, and the technologies that made them possible.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7017 Introduction to astrochemistry and astrobiology (6 credits)

The notion that life may have originated in space has gained support in recent decades from the discovery of large numbers of complex molecules in space. How are these molecules detected? Where do they come from? Can these molecules eventually lead to the building blocks of life? This course will explore the tools, methods, and major results of astrochemistry and astrobiology, exploring in the process the origins of life in space.

Assessment: coursework (40%); midterm examination (20%); final examination (40%)

SPSC7018 Project management for space science (6 credits)

The course will cover the fundamental aspects of project management, as they apply to space projects. Topics will include: initiation of a project, performance specifications, technical aspects of a project cycle, project planning, project execution, risk assessment and mitigation, project closure. The course will introduce students to hands-on aspects of project management, including management tools.

Assessment: coursework (80%); final examination (20%)

STAT7102 Advanced statistical modelling (6 credits)

This course introduces modern methods for constructing and evaluating statistical models and their implementation using popular computing software, such as R or Python. It will cover both the underlying principles of each modelling approach and the model estimation procedures. Topics from: (i) Linear regression models; (ii) Generalized linear models; (iii) Mixed models; (iv) Kernel and local polynomial regression; (v) Generalized additive models; (vi) Hidden Markov models and Bayesian networks.

Assessment: coursework (50%); examination (50%)

STAT6016 Spatial data analysis (6 credits)

This course covers statistical concepts and tools involved in modelling data which are correlated in space. Applications can be found in many fields including epidemiology and public health, environmental sciences and ecology, economics and others. Covered topics include: (1) Outline of three types of spatial data: point-level (geostatistical), areal (lattice), and spatial point process. (2) Model-based geostatistics: covariance functions and the variogram; spatial trends and directional effects; intrinsic models; estimation by curve fitting or by maximum likelihood; spatial prediction by least squares, by simple and ordinary kriging, by trans-Gaussian kriging. (3) Areal data models: introduction to Markov random fields; conditional, intrinsic, and simultaneous autoregressive (CAR, IAR, and SAR) models. (4) Hierarchical modelling for univariate spatial response data, including Bayesian kriging and lattice modelling. (5) Introduction to simple spatial point processes and spatio-temporal models. Real data analysis examples will be provided with dedicated R packages such as geoR.

Assessment: coursework (50%); final examination (50%)

ELEC6008 Pattern recognition and machine learning (6 credits)

This course aims at providing fundamental knowledge on the principles and techniques of pattern recognition and machine learning.

Specifically, the course covers the following topics: Bayes decision theory; parametric and non-parametric methods; linear discriminant functions; unsupervised learning and clustering; feature extraction; neural networks; context-dependent classification; case studies.

Assessment: coursework (25%); written examination (75%)

ELEC6026 Digital signal processing (6 credits)

This course provides an introduction to the fundamental concepts of digital signal processing (DSP) including a wide variety of topics such as discrete-time linear time invariant systems, sampling theorem, z-transform, discrete-time/discrete Fourier transform, and digital filter design. Furthermore, the course will also discuss in detail about other advanced topics in digital signal processing such as multidimensional signals and systems, random processes and applications, and adaptive signal processing.

Assessment: coursework (20%); written examination (80%)

ELEC6065 Data compression (6 credits)

This course provides an introduction to the state-of-the-art compression techniques for typical media including files, digital images, videos and audios. Specifically, the course will discuss in detail about the coding and quantization techniques commonly used for images, videos and audios. Finally, the course will cover basic concept and terminologies of common image, video and audio standards.

Assessment: coursework (20%); written examination (80%)

ELEC6100 Digital communications (6 credits)

This course aims at enabling the fundamental understanding of the digital communication systems. After an overview on basic probability and random processes, the module will cover different modulations and their optimal decision rules, with an emphasis on signal space representation. Then, performance analyses under additive white Gaussian noise channel and fading channel are examined. This is followed by topics on spatial diversity and channel equalization.

Assessment: coursework (30%); written examination (70%)

SPSC7031 Space science final project (6 credits) *(Capstone Project)*

Students must carry out a research project in space science, under the guidance of a faculty member. Students are encouraged to approach faculty members in their areas of interest, in order to choose an appropriate project, which they will typically carry out over the course of the second semester. If students cannot choose, they will be offered a project (in consultation with the programme director), supervised by a member of our faculty. A final (oral) presentation is required and a report must be submitted.

Assessment: oral presentation (25%); final report (75%)
