

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

For students admitted in 2016-2017 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 three fields: Applied Geosciences, Food Industry: Management and Marketing and Food Safety and Toxicology.

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; and
 - (iii) 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.
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Qualifying examination

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- (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.
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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 the Regulations for Taught Postgraduate Curricula; and

- (ii) shall complete the curriculum and satisfy the examiners in accordance with these regulations and syllabuses.
- (b) A candidate (either full-time or 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 satisfied the requirements for the award of Postgraduate Diploma in Earth Sciences (PGDES) may be allowed to exit with a 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.

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

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- (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.

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 the 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 15 and the dissertation shall be submitted not later than the last Friday in June of the first year of study;
 - (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 1 of the first academic year and the dissertation shall be submitted not later than the last Friday in May of the second year of study.

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.
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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.
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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

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

(for students admitted in 2016-17)

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.

FIVE THEME OPTIONS

ENGINEERING GEOLOGY THEME

Core Courses (63 credits)

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 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)

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

ENVIRONMENTAL GEOLOGY THEME

Core Courses (51 credits)

GEOS7004	Earth science and environmental management (3 credits)
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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)
GEOS7020	Project I (3 credits)
GEOS7021	Geological fieldwork I (3 credits)
GEOS7035	* Intermediate geology (6 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	* Geology principles and practice (6 credits)
GEOS7011 OR GEOS7033	Advanced geology of Hong Kong (6 credits) OR Geology of Hong Kong (6 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological fieldwork I (3 credits)
GEOS7035	* Intermediate geology (6 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 (39 credits)

GEOS7010	* Geology principles and practice (6 credits)
GEOS7011 OR GEOS7033	Advanced geology of Hong Kong (6 credits) OR Geology of Hong Kong (6 credits)
GEOS7020	Project I (3 credits)
GEOS7021	Geological fieldwork I (3 credits)
GEOS7035	* Intermediate geology (6 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)
GEOS7034	Regional geology (6 credits) daytime course
GEOS7035	* Intermediate geology (6 credits)
GEOS8021	Geological fieldwork II (3 credits)
GEOS8104	Natural hillside landslide and hazard studies (3 credits)
GEOS8213	Global tectonics (6 credits)
GEOS8214	Structural geology (6 credits) daytime course
GEOS8215	Sedimentology (6 credits) daytime course
GEOS8218	Meteorology (6 credits) daytime course
GEOS8219	Igneous and metamorphic petrology (6 credits) daytime course
GEOS8220	Mineralogy and geochemistry (6 credits) daytime course
CIVL6079	Slope engineering (6 credits)
ENVM8006	Environmental impact assessment (3 credits)
ENVM8012	Environmental health and risk assessment (3 credits)
ENVM8016	Conservation and management of freshwater ecosystems (3 credits)
EASC2402	Field methods (6 credits)
EASC2407	Mineralogy (6 credits)
EASC3402	Petrology (6 credits)
EASC3403	Sedimentary environments (6 credits)
EASC3404	Structural geology (6 credits)
EASC3409	Igneous and metamorphic petrogenesis (6 credits)
EASC4406	Earth dynamics and global tectonics (6 credits)
EASC4407	Regional geology (6 credits)
EASC4955	Integrated field studies (6 credits)

Certain courses not included in the list above may be accepted as alternative electives at the discretion of the programme director. Students may take up to 12 credits of the listed EASC courses. 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 may be 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 (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.

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

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 (30%) and written examination (70%)

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

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 (40%) and written examination (60%)

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. 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%)

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.

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

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.

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

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%)

GEOS7034 Regional geology (6 credits)

To examine the key events and phenomena associated with the tectonic evolution of East-SE-South Asia, including that of Hong Kong. Introduction; Tools; China assembly; China origins; Emeishan LIP, SW China; Mesozoic South China; Geology of HK: igneous; HK sed; deep structure; upper-level structure; Philippine Sea Plate-Taiwan; Tibet: India-Asia collision SE Asia (Java orogen, Sumatra orogen, Banda Sea, Molucca Sea, South China Sea); Formation and evolution of Archean crust in the Eastern Block of the North China Craton: Plate tectonics vs. mantle plumes; Paleoproterozoic amalgamation of the North China Craton; Late Mesoproterozoic to early Neoproterozoic igneous events in the Yangtze Block: review of recently proposed models; Supercontinents from Columbia, through Rodinia, to Pangea: records in Chinese blocks.

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

GEOS7035 Intermediate geology (6 credits)

The course gives an introduction to mineralogy, petrology and structural geology for non-geologists who have passed the prerequisite courses GEOS7010 and GEOS7021 to prepare them to take course GEOS7033 Geology of Hong Kong.

Pre-requisite courses: Pass in GEOS7010 and GEOS7021

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

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.

Assessment: Course work (100%)

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.

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

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. 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

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%)

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

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%)

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.

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

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.

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

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.

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

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.

Assessment: Examination (40%), laboratory reports (20%), presentation (10%) and test (30%)

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.

Assessment: Assignments (25%), examination (50%), project report (25%)

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.

Assessment: Assignments (50%) and examination (50%)

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.

Assessment: Assignments (50%) and examination (50%)

CIVL6079 Slope engineering (6 credits)

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

Assessment: Course work (20%) and examination (80%)

ENVM7013 Sustainability, society and environmental management (3 credits)

This course begins with the intellectual debates on the definitions, conceptions and different interpretations of the notion of sustainable development. The course then moves on to exploring ways of analysing and implementing sustainable development at the macro- and the micro- levels, ranging from governance and institutional arrangements to projects and practice. A number of tools for sustainable development are also explained including community engagement and sustainability assessment. Each year there will be a special focus on a thematic area such as low carbon living, sustainable neighbourhood, farming revitalisation and environmental education etc to illustrate the challenges of implementing both local and global sustainability.

Assessment: Course work (100%)

ENVM7016 Environmental policy (3 credits)

This course focuses on processes of environmental policy making: the nature of policy making processes, how policy agendas emerge and evolve, environmental discourse and policy making, institutional structures for environmental policy making, collective action problems, policy integration, policy diffusion and convergence, policy failure 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: 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%)

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

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%)

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%)

EASC2402 Field methods (6 credits)

This course is hands-on field and class-based that introduces basic geological field and mapping techniques and the use of geological equipment and air photographs, an overview of the geology of Hong Kong.

Assessment: Assignments (10%), Report (70%) and Test (20%)

EASC2407 Mineralogy (6 credits)

This course is to provide essential knowledge of mineralogy, to familiarize students with common minerals that are basis for study of petrography of igneous, sedimentary and metamorphic rocks.

Assessment: Assignments (50%) and examination (50%)

EASC3402 Petrology (6 credits)

To give students an understanding of the features in sedimentary, igneous and metamorphic rocks, as well as the ability to identify major rock types and their textures and structures in both hand specimens and under microscope.

Assessment: Assignments (50%) and examination (50%)

EASC3403 Sedimentary environments (6 credits)

This course discusses the origin, diagenesis, classification and economic importance of sedimentary rocks. Students will learn features and processes of sedimentary geology, paleontology and depositional processes.

Assessment: Examination (40%), Laboratory reports (20%), Presentation (10%) and Test (30%)

EASC3404 Structural geology (6 credits)

The course covers the mechanical properties of rocks and how and why rocks deform, geological maps and their use in interpreting structure.

Assessment: Assignments (50%) and examination (50%)

EASC3409 Igneous and metamorphic petrogenesis (6 credits)

This course is to provide a comprehensive coverage of the principles and techniques used in the study of petrogenesis of igneous and metamorphic rocks and their cause-and-effect relationships with tectonic settings and crustal evolution.

Assessment: Assignments (50%) and examination (50%)

EASC4406 Earth dynamics and global tectonics (6 credits)

Review the concepts and processes that shape the configuration of the Earth, from core to crust. This course is intended to provide students with an understanding of the driving forces of Earth processes and the global outcome of these processes through an examination of direct and indirect observations, the evolution of hypotheses, and critical thinking.

Assessment: Assignments (20%), essay (50%) and examination (30%)

EASC4407 Regional geology (6 credits)

This course is to examine the key events and phenomena associated with the tectonic evolution of East-SE-South Asia, including that of Hong Kong.

Assessment: Assignments (50%) and examination (50%)

EASC4955 Integrated field studies (6 credits)

The aims of a geological field camp are to provide 1) essential training and experience in geological mapping techniques and 2) opportunities to study at first-hand areas of particular geological interest and importance of an overseas locality. The course requires integration of geological knowledge from multiple geological disciplines.

Assessment: Report (90%) and test (10%)

C. PROGRAMME LEARNING OUTCOMES

1. Can apply geological knowledge and skills in the solution of problems in the student's discipline.
 2. Can explain and critically assess the 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 professional qualifying body and by the university.
 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 (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 good, 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 generally competent 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.