Master of Science in the field of

Applied Geosciences

Apply now for entry in September 2019

THE UNIVERSITY OF HONG KONG
FACULTY OF SCIENCE

Professional Recognition

The Engineering Geology Theme and the Engineering Geology with HKIE Approved Courses Theme of the MSc in Applied Geosciences are accredited by the Geological Society of London, the body which awards the qualification Chartered Geologist. Applicants with an accredited MSc need fewer years of working experience to apply for Chartered Geologist.

The Geological Society
accredited degree programme

Fourteen courses of the MSc in Applied Geosciences are approved by the Hong Kong Institution of Engineers. These are the additional courses which graduates in Earth Sciences or Geology would need to meet the entry requirements of the HKIE in the Geotechnical Discipline.

Careers

The employers of recent MSc graduates include Airport Authority, Arup, Arcadis, Atkins, Dragages, Fugro, Gammon, Geotechnical Engineering Office, Jacobs, MTRC, Meinhardt and Vibro.

What will this MSc give you?

- The chance to work with top professors and leading practitioners from industry
- Technical knowledge and professional skills you can apply wherever in the world you are working
- An internship in industry for selected full-time students
- A valuable network of industry connections, career advice and *inspiration*

Scholarships and Financial Support

Association of Geotechnical and Geoenvironmental Specialists (Hong Kong) Scholarship

This $10,000 scholarship is awarded annually on the basis of academic achievement.

Government's Non-means Tested Loan Scheme

https://www.wfsfaa.gov.hk/

Prizes

Halcrow Prizes are awarded to the Best Student and for the Best Dissertation.

Courses Reimbursable by the Continuing Education Fund (CEF)

Courses in the programme:

- GEOS7012 Site Investigation and engineering geological techniques
- GEOS8101 Engineering geology and geotechnical design
- GEOS8102 Rock engineering and geomaterials

are reimbursable courses for the purposes of CEF.

Target Students

- **Engineering Geology Theme**
  Aim: to help engineering geologists improve their performance in professional work. Engineers and scientists wanting to advance their understanding of geology and the work of the engineering geologist are also invited to apply for admission. The theme concentrates on the application of geology and mechanics in geotechnical engineering and the development of engineering geological skills. Provides 11 of the additional courses which graduates in Earth Sciences or Geology would need to meet the entry requirements of the Hong Kong Institution of Engineers in the Geotechnical Discipline.

- **Engineering Geology with HKIE Approved Courses Theme**
  Provides all 14 of the additional courses which graduates in Earth Sciences or Geology would need to meet the entry requirements of the Hong Kong Institution of Engineers in the Geotechnical Discipline.

"The MSc really helped me to understand how to approach engineering geological problems. It built up my confidence as a young geologist in dealing with other professionals. I believe this is the best course of its type in East and Southeast Asia."

ABD Rasid Jaapar (MScAG 2006)
Managing Director, Geomapping Technology Sdn Bhd
President, Geological Society of Malaysia

"At HKU I got the chance to learn from world-class professors who have abundant working experience and are willing to share their knowledge. My MSc included an internship in Arup and on graduating I got a job in Hong Kong with Fugro."

LIN Mohan (MScAG 2018)
BSc Geology, Tongji University 2017
Assistant geologist, Fugro

"This MSc programme not only contains valuable subject matter; but also provides priceless opportunities to infuse the wisdom from the best minds in the field. I attribute much of my vocational achievement to this MSc programme, as it helps me to become a more effective and efficient Engineer"

Peter CHING (MScAG 2001)
Principal Manager Geotechnical,
Third Runway Division, Airport Authority HK

"The MSc developed my technical knowledge and critical thinking skills, which helps me deal with engineering geological problems more effectively in a global environment."

Olivia LAM (MScAG 2017)
International management trainee, Fugro

"The MSc programme helped me to establish the foundation for my professional career by developing practical analytical skills, a research-oriented view and a strong understanding of the engineering geology environment in Hong Kong, which I can rely on confidently, on a daily basis."

Janice CHOI (MScAG 2010)
Assistant resident engineer, AECOM

"The MSc delivered both theoretical and practical knowledge in the field of engineering geology. This knowledge proved to be very valuable in my career in contractor and consultant firms."

Caim CHAN (MScAG 2015)
Engineering geologist, Golders

"The MSc program helped me to be a better geologist. We received the most comprehensive and state-of-the-art training from experts in academic, government and private sectors. It was hard work but I will never regret my efforts!"

Xavier SHUM (MScAG 2017)
Assistant geologist, Fugro

Programme 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.

Engineering Geology Theme (66 credits)

Core courses

GEOS7010	Geology principles and practice (6 credits), for non-geologists
GEOS7011	Advanced geology of Hong Kong (6 credits), for geologists OR
GEOS7033	Geology of Hong Kong (6 credits), for non-geologists
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	Geological fieldwork I (3 credits), for non-geologists OR
GEOS8021	Geological fieldwork II (3 credits), for geologists
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	†ΔBasic structural mechanics and behaviour (3 credits)

Elective courses

GEOS7022	Course of directed studies (3 credits)

Certain other courses may be accepted as electives at the discretion of the programme director.

* For geologists

Δ Not a core course for full-time students taking course GEOS7022

† Graduates in Civil Engineering cannot take this course for credits.

The design of the curriculum of the Engineering Geology theme (part-time)

term	Mechanics	Engineering	Integrated studies	Geology	
4th		Rock engineering GEOS8102	Dissertation project GEOS8020 Seminars GEOS8003		18
3rd		Geotechnical engineering GEOS8101	Prof practice GEOS8002 Dissertation project	Landslide studies GEOS8104	15
2nd	Structures GEOS8204 Hydrogeology GEOS8001	Site investigation GEOS7012	Dissertation project GEOS7020	Geological Fieldwork GEOS8021	18
1st	Soil & Rock mechanics GEOS7015 GEOS7016			Geology of HK GEOS7011	15
	12	18	24	12	credits

66 credits core courses (for Geologists)

Engineering Geology with HKIE Approved Course 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)

The design of the curriculum of the Engineering Geology with HKIE Approved Courses theme for Geologists (part-time)

term	Mechanics	Engineering	Integrated studies	Maths and management	
4th		Rock engineering GEOS8102	Dissertation project GEOS8020 Seminars GEOS8003		18
3rd		Geotechnical engineering GEOS8101	Prof practice GEOS8002 Dissertation project	Mathematics II GEOS8206	18
2nd	Structures GEOS8204 Hydrogeology GEOS8001	Site investigation GEOS7012	Dissertation project GEOS7020		18
1st	Soil & Rock mechanics GEOS7015 GEOS7016			Mathematics I GEOS8205 Management GEOS7024	15
	12	18	24	15	credits

69 credits core courses

Study Load

To complete the MSc curriculum students are required to pass courses amounting to 66 or 69 credits. Learning hours will amount to approximately 1440 hours, including about 360 hours for the Project, and contact hours will be about 400 hours. The 2-year part-time programme of studies imposes a heavy workload on a part-time student in a full-time job - an annual MSc workload of 720 hours is approximately forty percent of the number of working hours of a full-time job. Students are expected to work year-round and teaching is conducted during Reading Weeks and in the summer semester.

Description of Selected Courses (Provisional)

GEOS7010 Geology principles and practice (6 credits) (18 hrs lec + tut)
Course coordinator and teacher: Dr Samuel W P Ng
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) (36 hrs lec + fws)
Course coordinator: Dr Jason Ali (taught by Dr Ali and Prof Rod Sewell)
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) (36 hrs lec + tut)
Course coordinator: Prof R P Martin (taught by Prof Martin, Ir Kevin Styles and Prof Philip Chung)
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.

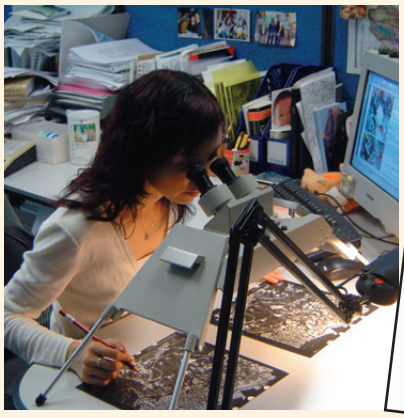
Assessment: Course work (30%) and written examination (70%)

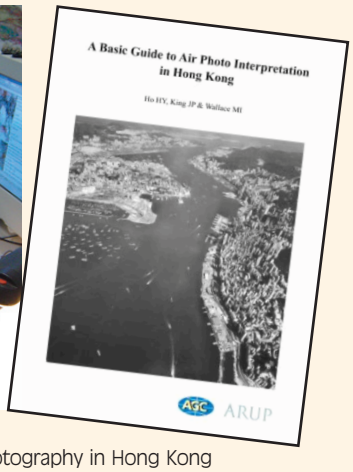
GEOS7015 Rock mechanics (3 credits) (18 hrs lec + tut)
Course coordinator: Dr Louis N Y Wong (taught by Dr Wong and Ir Ivan Ho)
The course introduces the basic concepts of rock mechanics used in geotechnical practice. Topics include index properties, strength and deformability of intact rock; distribution 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) (18 hrs lec + tut)
Course coordinator: Prof Philip Chung (taught by Prof Chung and Ir Florence Ko)
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%)





"In view of the wealth of historical air photography in Hong Kong but lack of an affordable guidance manual, I was inspired to write my MSc dissertation on application of aerial photography in geotechnical practice. We then published the HK API guide in 2006."

Ho Hoi Yan (MScAG 2004)
Arup, GEO

GEOS7020 Project Part I (6 credits) (pro + dis)
Course coordinator: Prof Y C Chan
The first phase of an independent self-directed 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.

Assessment: Course work (100%)

GEOS7021 Geological fieldwork I (3 credits) (18 hrs lec + fws)
Course coordinator and teacher: Dr Xuran Zuo
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)
Course coordinator: Prof A W Malone
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) (18 hrs lec + tut)
Course coordinator: Prof A W Malone
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; contract 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) (36 hrs lec + fws)
Course coordinator: Dr Jean Wong (taught by Dr Wong and Dr M C Cheung)
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.

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

GEOS8001 Hydrogeology (3 credits) (18 hrs lec + tut)
Course coordinator and teacher: Prof J Jiao
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) (18 hrs lec + tut)
Course coordinator: Prof Y C Chan (taught by Prof Chan and Mr Barry Hoy)
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) (18 hrs lec + tut)
Course coordinator: Prof A W Malone
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.

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

GEOS8020 Project Part II (12 credits) (pro + dis)
Course coordinator: Prof Y C Chan

The second phase of an independent self-directed 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.

Assessment: Course work (100%)

GEOS8021 Geological fieldwork II (3 credits) (18 hrs fws)
Course coordinator: Dr Jess King
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%)

GEOS8101 Engineering geology and geotechnical design (6 credits) (36 hrs lec + tut)
Course Coordinator: Prof A W Malone (taught by Prof Philip Chung, Dr Vickie Kong and Prof Malone)
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.

Assessment: Course work (30%) and written examination (70%)
Pre-requisite: GEOS7016

GEOS8102 Rock engineering and geomaterials (6 credits) (36 hrs lec + tut)
Course Coordinator: Dr Louis N Y Wong (taught by Dr Wong and Ir Patrick Chau)
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 analysis 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.

Assessment: Course work (30%) and written examination (70%)
Pre-requisite: GEOS7015

GEOS8104 Natural Hillside Landslide and Hazard Studies (3 credits) (18 hrs lec + tut)
Course coordinator: Mr Jonathan Hart (taught by Mr Hart and Prof R P Martin)
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) (18 hrs lec + tut)
Course coordinator and teacher: Ir Philip C T Kwok
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) (36 hrs lec + tut)
Course coordinator and teacher: Dr F L Tsang
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) (36 hrs lec + tut)
Course coordinator and teacher: Dr F L Tsang
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%)

Notes:
lec: Lecture; tut: Tutorial; fws: Fieldwork supervision;
dis: Dissertation supervision; pro: Project supervision

Programme Duration and Class Schedules

The part-time programme extends over two academic years of part-time study and the full-time programme extends over one academic year. 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 will 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. All lectures are given in English at the HKU main campus.

Tuition Fees

The annual composition fee for the academic year 2019-20 is HK$130,000#. Part-time students will pay HK$65,000# per year for two years. Payment can be paid in two instalments each year.

 # Subject to approval

Admission Requirements

Applicants should possess a Bachelor's degree with First or Second Class Honours (or GPA equivalent) in Science, Engineering or a related subject.

Application

Application for full-time and part-time study opens in December 2018 is extended to
Non-local applications deadline: May 31, 2019
Local applications deadline: June 28, 2019

Full-time students wishing to take an internship as part of their programme should apply early.

Online application
https://aal.hku.hk/tpg

Enquiries

Admissions Tutor
Professor Andrew Malone
BBS; BSc *Leeds*; PhD *Lond*; FGS; FICE; RGE
Department of Earth Sciences
Room 309 James Hsioung Lee Science Building
Tel: 2559 2555 / 2857 8247 Fax: 2517 6912
E-mail: awmalone@hku.hk

Programme Director
Dr Louis N Y Wong
BSc *HKU*; PhD *MIT*; FGS
Department of Earth Sciences
Room 309 James Hsioung Lee Science Building
Tel: 2241 5970 Fax: 2517 6912
E-mail: lnywong@hku.hk

Associate Programme Director
Professor Y C Chan
BBS; BSc *HKU*; MSc *Lond*; DIC; FHKIE; MIStructE
Department of Earth Sciences
Room 309 James Hsioung Lee Science Building
Tel: 2857 8247 Fax: 2517 6912
E-mail: ycycchan@hku.hk

Validity

This booklet was prepared in November 2018 and information in it may have been superseded by subsequent changes.

Part-time Lecturers

Ir P K S Chau	BEng, MEng *McGill*; MHKIE; MIOM3; CEng; PEng (Ont) *GEO*
Prof P W K Chung	BSc *HKU*; MSc *Lond*; DIC; CEng; MHKIE; FGS *GEO*
Mr J Hart	BSc *Edin*; MSc *Lond*; CGeol *GeoRisk Solutions Ltd*
Ir I M L Ho	BEng MPhil *HKUST*; MHKIE; MICE; CEng *GEO*
Mr B P Hoy	Solicitor Hong Kong, *Robertsons*
Ir Florence W Y Ko	BEng *HKUST*; LLB *Lond*; MSc *IC*; MA *HKCityU*; MICE; MHKIE; CEng *GEO*
Dr Vickie W W Kong	BEng, MEng *Auckland*; PhD UWA; MICE; MHKIE; CEng *GEO*
Ir P C T Kwok	MSc *HKU*; MHKIE; RSE *Caritas*
Mr M H Y Lam	Solicitor Hong Kong *Clyde & Co*
Prof R P Martin	BSc PhD *Lond*; MIMM; CEng; CGeol *Geoconsult HK*
Prof R J Sewell	PhD *Cantab HK Geological Survey GEO*
Ir K Styles	BSc *UNSW*; CGeol; CEng; FHKIE *Fugro*

Further Information

Programme details can be downloaded from
https://www.scifac.hku.hk/prospective/tpg/about

https://www.earthsciences.hku.hk/current-students/postgraduate-students/taught-postgraduates