Master of Science in the field of
Applied Geosciences
Apply now for entry in September 2019
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.

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.

“What 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 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, Colders

“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 (5 credits), for non-geologists OR GEOS8021 Geological Fieldwork I (5 credits), for geologists
- GEOS98001 Hydrogeology (5 credits)
- GEOS98002 Professional practice in applied geosciences (3 credits)
- GEOS98003 Seminars on unforeseen ground conditions, geotechnical and environmental failures (3 credits)
- GEOS98020 Project Part II (12 credits)
- GEOS98101 Engineering geology and geotechnical design (6 credits)
- GEOS98102 Rock engineering and geomatetals (6 credits)
- GEOS98104 *Natural hillside landslide and hazard studies (3 credits)
- GEOS98204 *Basic 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
† Not a core course for full-time students taking course GEOS7022
† Graduates in Civil Engineering cannot take this course for credits.

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 Geomatetals (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)

<table>
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<th>Term</th>
<th>Mechanics</th>
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<td>Site investigation GEOS98001</td>
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<td>Site investigation GEOS95501</td>
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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.
Arup, GEO

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 (50%) and written examination (70%)

geos7015 rock mechanics (3 credits) (18 hrs lec + tut)

course coordinator: Dr Louis Y Y Wong (taught by Dr Wong and Ir Ivan Hoi)

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 (50%) and written examination (70%)

geos7016 soil mechanics (3 credits) (18 hrs lec + tut)

course coordinator: Prof Phillip 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 (50%) and written examination (70%)

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 Kuran 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 (50%) 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 hoi)

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 (50%) 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

ho hoi yan

"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.”

Arup, GEO
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 (50%) 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 differential equations, applications of derivatives, second 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 (50%) 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/- distributions).

Assessment: Course work (50%) 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.

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 and is extended to.
Non-local applications deadline: May 10, 2019
Local applications deadline: May 31, 2019

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

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

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, MIOIM, CEng, PEng (Ont) GEO
Prof P W K Chung  BSc HKU, MSc Lond, DIC, CEng, MHKIE, FGEO 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  BSc HKU, MHKIE, RGE Canitas
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

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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