

REGULATIONS FOR THE POSTGRADUATE DIPLOMA IN EARTH SCIENCES (PGDES)

(See also General Regulations)

The Postgraduate Diploma in Earth Sciences is a postgraduate diploma awarded for the satisfactory completion of a prescribed course of study in Earth Sciences.

Admission requirements

ES1 To be eligible for admission to the courses leading to the Postgraduate Diploma in Earth Sciences, a candidate

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

ES2 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

ES3

- (a) A qualifying examination may be set to test the candidate's academic ability or his/her ability to follow the courses of study prescribed. It shall consist of one or more written papers or their equivalent and may include a project report.
 - (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 diploma

ES4 To be eligible for the award of the Postgraduate Diploma in Earth Sciences (PGDES), a candidate

- (a) shall comply with the General Regulations; and
 - (b) shall complete the curriculum and satisfy the examiners in accordance with the regulations set out below.
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Length of curriculum

ES5 The curriculum of the part-time mode shall extend over not less than two academic years of part-time study and of the full-time mode over not less than one academic year. A candidate shall not be permitted to complete the curriculum in more than three academic years, except with the approval of the Faculty Board.

Completion of curriculum

- ES6** To complete the curriculum, a candidate
- (a) shall follow courses of instruction and complete satisfactorily all prescribed written, practical and field work; and
 - (b) shall satisfy the examiners in all prescribed written papers and in any prescribed oral or practical examination.
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Examinations

ES7 An assessment of the candidate's coursework during his/her studies, including completion of written assignments and participation in field work or laboratory work, as the case may be, is taken into account in determining the candidate's result in each course.

ES8 A candidate who has failed to satisfy the examiners at his/her first attempt in courses totalling not more than half of the number of credits of courses 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.

ES9 A candidate who is re-examined in any course shall not be eligible for the award of more than a pass grade in that paper.

ES10 A candidate who has failed to satisfy the examiners 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.

ES11 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.

ES12 A candidate who has failed to satisfy the examiners in more than half the number of credits of courses to be examined during any of the academic years, or in any course at a repeated attempt; may be recommended for discontinuation for studies.

Examination results

ES13 At the conclusion of the examination, a pass list shall be published. A candidate who has shown exceptional merit at the whole examination may be awarded a mark of distinction, and this mark shall be recorded in the candidate's degree diploma.

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

- ES14**
- (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.

SYLLABUSES FOR THE DEGREE OF POSTGRADUATE DIPLOMA IN EARTH SCIENCES (PGDES)

For students admitted in 2015-16.

A. COURSE STRUCTURE

To be eligible for the award of the Postgraduate Diploma in Earth Sciences a student shall complete all core courses and elective courses totalling 30 credits.

Core Courses (15 credits)

- GEOS7010 Geology Principles and Practice (6 credits)
- GEOS7011 Advanced Geology of Hong Kong (6 credits) **OR**
- GEOS7033 Geology of Hong Kong (6 credits)
- GEOS7021 Geological Fieldwork I (3 credits)

Elective Courses (15 credits)

- GEOS7004 Earth Science and Environmental Management (3 credits)
 - GEOS7027 Earth systems (6 credits)
 - GEOS8201 Applied Geochemistry (3 credits)
 - GEOS8202 Development and Management of Mineral Resources (3 credits)
 - GEOS8207 Global Climate (6 credits)
 - GEOS8208 Climate Change and the Environment (6 credits)
 - GEOS8209 Climate Change and Society (6 credits)
 - GEOS8213 Global tectonics (6 credits)
 - GEOS8221 Earth Resources (6 credits)
- Daytime courses (prerequisites and Grade bars apply)
- GEOS7032 Introduction to atmosphere and oceans (6 credits)
 - GEOS7034 Regional Geology (6 credits)
 - GEOS8214 Structural Geology (6 credits)
 - GEOS8215 Sedimentology (6 credits)
 - GEOS8218 Meteorology (6 credits)
 - GEOS8219 Igneous and Metamorphic Petrology (6 credits)
 - GEOS8220 Mineralogy and Geochemistry (6 credits)
 - GEOG7129 Climate Change, Environmental Resources and Human Carrying Capacity in China (6 credits)
 - GEOG7118 China: Environment and Sustainable Development (6 credits)
 - GEOG7130 China's Natural Environment and Resources (6 credits)

Certain courses not included in the list above may be accepted as alternative electives at the discretion of the programme director. Some courses are provided on demand. Timetabling of courses may limit the availability of some elective courses. Certain courses have prerequisites and Grade bars. Teaching will take place mainly on weekday evenings but students are expected to undertake field and laboratory work during weekends. 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.

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.

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

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.)

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.

GEOS7032 Introduction to atmosphere and oceans (6 credits)

This course introduces the atmosphere and hydrosphere systems, and explains at a basic level how they interact with one another. Topics covered include: Geological forces shaping the floor of the Oceans and Seas; Heating Earth's surface and Atmosphere; Moisture and Atmospheric Stability; Forms of condensation and precipitation; Hydrological Cycle; Air Pressure and Winds; Atmospheric Circulation and Weather Systems; Ocean Circulation; Waves; Tides; Coasts; Groundwater basics, usage, contamination, caves and karst; Glaciers and glacial landscapes; Climate system, proxy data, causes of climate change; Effects of climate change.

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

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.

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

GEOS8202 Development and Management of Mineral Resources (3 credits)

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

GEOS8207 Global Climate (6 credits)

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

GEOS8208 Climate Change and the Environment (6 credits)

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

GEOS8209 Climate Change and Society (6 credits)

This course will explore the role of humans in global change and the environmental responses to such

changes. It will also take a look at human evolution and migration from a paleoenvironmental perspective.

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.

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.

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.

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.

GEOS8219 Igneous and Metamorphic Petrology (6 credits)

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

GEOS8220 Mineralogy and Geochemistry (6 credits)

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

GEOS8221 Earth Resources (6 Credits)

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

Pre-requisite course: Pass in GEOS7010

GEOG7129 Climate Change, Environmental Resources and Human Carrying Capacity in China (6 credits)

The course introduces the concept of human carrying capacity in China. The capacity symbolizes the balance between population size and environmental resources. In Chinese history, it is shown that the human carrying capacity was periodically shrunk by climate deterioration and human-induced environmental degradation, resulting in catastrophic social consequences such as wars, population collapses and even dynastic changes. Based upon the lessons of the past, together with recent trends in climate change and social development, the human carrying capacity in contemporary China will be systematically examined. Some controversial issues related to man-environment interaction will also be discussed.

GEOG7118 China: Environment and Sustainable Development (6 credits)

This course comprises three main sections. Section I provides an overview of the state of China's natural environment. This is followed by a discussion of the institutional, legislative and administrative systems for environmental protection and nature conservation. Finally, Section III assesses government policies for sustainable development as stipulated in recent Five-Year Plans and in China's Agenda 21.

GEOG7130 China's Natural Environment and Resources (6 credits)

The course firstly provides an explanation of basic natural environmental elements of China. Based on understanding and distribution of these elements, Chinese physical environment is then regionalized and the individual environmental regions are discussed in detail. The course also covers the utilization and transformation of natural environment since civilization and the major environmental problems in different regions. This course involves a compulsory field trip to China.

C. PROGRAMME LEARNING OUTCOMES

1. Can use the terminology and concepts required for a basic understanding of the Earth Sciences.
 2. Can recognise the common rocks and minerals; can explain the rock cycle; can describe the main geological structures and processes; can use plate tectonic theory to explain geological phenomena.
 3. Has a sufficient understanding of geology to be able to teach the earth science components of the Hong Kong Diploma of Secondary Education curriculum (for teachers).
 4. Has a sufficient understanding of the geology of Hong Kong to interpret the 1:20 000 Geological Maps and explain observations at key field localities in the context of the regional geological history.
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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.
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