

## **REGULATIONS FOR THE DEGREE OF MASTER OF SCIENCE (MSc)**

*(See also General Regulations)*

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 (MSc) 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 Materials Science.

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### **Admission requirements**

- Sc20** To be eligible for admission to the courses leading to the degree of Master of Science, 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 from this University or another University or comparable institution accepted for this purpose.
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**Sc21** 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 can demonstrate adequate preparation for studies at this level and satisfies the examiners in a qualifying examination.

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### **Qualifying examination**

- Sc22**
- (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 degree**

- Sc23** To be eligible for the award of the degree of Master of Science, 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**

**Sc24** The curriculum shall extend over not less than two academic years of part-time study, with a minimum of 300 hours of prescribed work, and shall include a written examination comprising not less than four written papers.

### **Completion of curriculum**

- Sc25** To complete the curriculum, a candidate
- (a) shall follow courses of instruction and complete satisfactorily all prescribed written, practical and field work;
  - (b) shall complete and present a satisfactory dissertation or project on a subject within the candidate's approved field of study or complete courses with equivalent units as a replacement; and
  - (c) shall satisfy the examiners in all prescribed written papers and in any prescribed oral or practical examination.
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### **Title of dissertation or project**

**Sc26** The title of the dissertation or project shall be submitted for approval by March 15 of the first year of study in which the teaching programme ends and the dissertation or project report shall be submitted not later than April 15 of the second year of study. The 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 co-worker, which shows his/her share of the work) undertaken after registration as a candidate for the degree.

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### **Examinations**

**Sc27** 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.

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**Sc28** A candidate who has failed to satisfy the examiners at his/her first attempt in not more than half of the number of papers in the written examination held during any of the academic years of study may be permitted to present himself/herself for re-examination in the failed paper or papers at a specified subsequent examination, with or without repeating any part of the curriculum.

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**Sc29** A candidate who is re-examined in any paper shall not be eligible for the award of more than a pass grade in that paper.

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**Sc30** A candidate who has failed to present a satisfactory dissertation or project report may be permitted to submit a new or revised dissertation or project report within a specified period.

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**Sc31** 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.

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**Sc32** A candidate who is unable because of his/her illness to be present for one or more papers in any written examination other than that held in the candidate's final academic year of study, may apply for permission to be present at a supplementary examination to be held before the beginning of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from the examination.

- Sc33** A candidate who
- (a) has failed to satisfy the examiners in more than half the number of courses to be examined during any of the academic years of study, or in any course at a repeated attempt; or
  - (b) is not permitted 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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### **Examination results**

**Sc34** At the conclusion of the examination, a pass list shall be published in alphabetical order. 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.

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

### A. COURSE STRUCTURE (Provisional)

<b>Year 1</b>			
<b>Core Courses (30 credits)</b>			
GEOS7010	Geology for Engineers (6 credits) <b>OR</b>		
GEOS7011	Advanced Geology of Hong Kong (6 credits)		
GEOS7012	Site Investigation and Engineering Geological Techniques (6 credits)		
GEOS7004	Earth Science and Environmental Management (3 credits)		
GEOS7020	Project I (3 credits)		
GEOS7015	Rock Mechanics (3 credits)		
GEOS7016	Soil Mechanics (3 credits)		
GEOS7021	Geological Fieldwork I (3 credits)		
GEOS8001	Hydrogeology (3 credits)		
<b>Year 2</b>			
<b>Core Courses (21 credits)</b>			
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)		
GEOS8005	Field Testing and Instrumentation in Engineering Geology (3 credits)		
GEOS8021	Geological Fieldwork II (3 credits)		
<b>Elective Courses (15 credits)</b>			
<i>Engineering Geology Theme</i>	<i>Environmental Geology Theme</i>	<i>Geosciences with Sustainable Development Theme</i>	<i>General</i>
<p><u>Required:</u> GEOS8101 Engineering Geology and Geotechnical Design (6 credits)</p> <p>GEOS8102 Rock Engineering and Geomaterials (6 credits)</p> <p>(Passes in GEOS7015 and GEOS7016 respectively are prerequisites for these courses)</p> <p><u>Plus a course from the Environmental Geology Theme list or another approved course to provide at least 3 credits.</u></p> <p><i>Full-time students may choose day-time courses.</i></p>	<p><u>Required:</u> GEOS8201 Applied Geochemistry (3 credits) GEOS8203 Geohazards (3 credits)</p> <p><u>Plus courses from the following list to provide at least 9 credits:</u> ENVM7002 Environmental Economics (3 credits) ENVM7010 Case Studies in Environmental Management (3 credits) ENVM7011 Environmental Law and Policy in Hong Kong (3 credits) ENVM8006 Environmental Impact Assessment (3 credits) ENVM8008 Special Topics in Solid Waste and Water Quality Management (3 credits)</p> <p>GEOS7011 Advanced Geology of Hong Kong (6 credits) (a Pass in GEOS7010 is a prerequisite for this course)</p> <p>GEOG7220 Environmental Mapping and Risk Assessment (6 credits)</p>	<p><u>Required:</u> ENVM7002 Environmental Economics (3 credits) ENVM7004 Planning, Environment &amp; Sustainability (6 credits) ENVM7011 Environmental Law &amp; Policy in Hong Kong (3 credits)</p> <p><u>Plus courses from the list of elective courses to provide at least 6 credits.</u></p>	<p><i>Students not enrolled in a themes must complete any combination of at least 15 credits from the list of elective courses in addition to the core.</i></p>

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

Timetabling of courses may limit availability of some elective courses.

For students following the one-year full-time programme:

1. Students will follow the same curriculum (66 credits) as the part-time programme, except that only the Engineering Geology option will be offered and GEOS7022 Course of Directed Studies (3 credits) will be taken.
  2. Student will join the evening classes of the part-time programme.
  3. Students' academic activities will be managed by a staff member as tutor.
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## **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.

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### **GEOS7010 Geology for Engineers (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. Several full-day fieldtrips during the weekends are required as part of the course.

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### **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. Several fieldtrips during the weekends are required as part of the course.

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### **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.

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### **GEOS7015 Rock Mechanics (3 credits)**

The course teaches the basic rock mechanics theory used in geotechnical practice. Topics include classification and index properties of rocks, rock strength and failure criteria, initial stresses in rocks and stress measurement, planes of weakness in rocks, deformability of rocks and rock mass classification.

**GEOS7016 Soil Mechanics (3 credits)**

An examination of the basic soil mechanics theory used in geotechnical practice. Topics include soil classification and index properties, pore pressure and effective stress, compression, swelling and consolidation, strength and stiffness of soil.

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**GEOS7020 Project I (3 credits)**

The first phase of an independent study of a problem in environmental or engineering geology. 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.

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**GEOS7021 Geological Fieldwork I (3 credits)**

Self-directed study in the field over a 12-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.)

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**GEOS7022 Course of Directed Studies (3 credits)**

The objective of this course is to strengthen the academic ability of the civil engineer with respect to geology or the graduate geologist's grasp of the principles of mechanics. The contents of the course will be individually decided for each full-time student by the student's tutor and the programme director. The course will include some of the following activities: laboratory work, reading, supplementary assignments, class exercises, fieldwork. Academic attainment will be assessed through grading of class exercises and supplementary assignments.

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**GEOG7220 Environmental Mapping and Risk Assessment (3 credits)**

The integration of digital terrain modelling with spatial and statistical analysis makes GIS a powerful tool for environmental mapping and risk assessment. Landslide, for example, has been a widespread phenomenon in Hong Kong that hampers development into hilly regions prone to frequent landslide occurrences. The ability to map areas that are more risky than others is therefore important in hazard mitigation as well as land development planning.

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**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.

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**GEOS8002 Professional Practice in Applied Geosciences (3 credits)**

An examination of issues in professional practice in applied geoscience, such as the role of the engineering geologist, regulation of practice, professional ethics and law for professional geologists, engineering contracts, social topics and risk and safety management.

**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 settlement and environmental disasters. Presentations of facts and opinions are given by students based on suggested reading material. The seminars are facilitated mainly by experts who were intimately involved in the case.

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**GEOS8005 Field Testing and Instrumentation in Engineering Geology (3 credits)**

An overview of field testing and instrumentation and geophysical techniques commonly used in geotechnical practice.

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**GEOS8020 Project II (9 credits)**

The second phase of an independent study of a problem in environment or engineering geology and the preparation of a project report of about 8000 words conducted under the supervision of a staff member. Professional geologists are expected to undertake a field mapping task as part of their project.

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**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.)

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**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, marine reclamations, earth pressure and retaining structures and piled foundations.

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**GEOS8102 Rock Engineering and Geomaterials (6 credits)**

Overview of the engineering geology of rock masses including quantification of rock mass parameters, foundation design, rock slopes and foundations, underground openings, and of quarrying, as well as common geological materials of economic importance in Hong Kong such as rock aggregates.

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**GEOS8201 Applied Geochemistry (3 credits)**

An introduction to the applications of geochemistry to environmental problems, with an emphasis on Hong Kong: basics of analytical geochemistry; chemical weathering; clay mineralogy; aqueous geochemistry and case studies.

**GEOS8203 Geohazards (3 credits)**

A review of the science relating to various natural hazards (flooding, landslides, seismic, volcanic) and the approaches to safety management.

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**ENVM7002 Environmental Economics (3 credits)**

Economic analysis approaches environmental management questions through the systematic comparison of benefits and costs associated with the various technological and planning options. Such comparisons are particularly difficult for the environment because the benefits (and sometimes the costs) are not in money terms. This course provides a summary of basic concepts in economic analysis and an introduction to project evaluation techniques.

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**ENVM7004. Planning, environment and sustainability (3 credits)**

This course focuses on the interface between planning systems and environmental management using the concept of sustainable development as an integrating conceptual framework. The evolution of the concept of sustainability is discussed and attention is focused on the development and use of sustainability indicators, policies for sustainability and the transition to sustainable development paths.

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**ENVM7010 Case Studies in Environmental Management (3 credits)**

This course consists of a series of special topics, drawn from both Hong Kong and abroad, which illustrate how the various professional disciplines come together in the treatment of environmental problems.

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**ENVM7011 Environmental Law and Policy in Hong Kong (3 credits)**

This course consists of two major elements:

- (a) Environmental policy making in selected Asian countries to set Hong Kong's evolving environmental policy framework in a broader regional context - comparative analysis of environment, the nature of policy mechanisms used by different countries and modes of policy implementation; and
  - (b) Legal aspects of environmental pollution, primarily in the Hong Kong context; the basic features of the Hong Kong Legal system; common law applicable to environmental control, focusing on such matters as strict liability and the torts of nuisance, trespass and negligence; statutory controls relating to environmental protection.
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**ENVM8006 Environmental Impact Assessment (3 credits)**

Origins and development of EIA; impact assessment methodologies; ecological aspects of EIA; project and strategic assessments; EIA and the decision making process; EIA in Hong Kong; case study applications of EIA.

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**ENVM8008 Special Topics in Solid Waste and Water Quality Management (3 credits)**

The aim of the course is to introduce students to a selection of special problems in solid waste and water quality management as a follow up to the introductory course on "Environmental Pollution and its Control" (ENVM7009) in Year 1.



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

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### **A. COURSE STRUCTURE (Provisional)**

All courses in this programme are compulsory. A candidate shall be examined shortly after the completion of each course.

The list of courses, and their contents set out thereafter, may be changed from time to time.

#### **First Year**

FOOD7001	Quality assurance and management (6 credits)
FOOD7002	GMP and environmental management (6 credits)
FOOD7003	Food quality preservation and evaluation (6 credits)
FOOD7004	HACCP and food laws (6 credits)
FOOD7005	R&D and export market strategies (9 credits)

#### **Second Year**

FOOD8006	Marketing management (6 credits)
FOOD8007	Financial control (6 credits)
FOOD8008	Organisational behaviour (6 credits)
FOOD8009	Project (15 credits)

Total: 66 credits

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### **B. COURSE CONTENTS (Provisional)**

#### **FOOD7001 Quality assurance and management (6 credits)**

An overview on quality management will be presented. Case studies will be used to generate in-depth discussion on relevant topics.

The management of food laboratories will also be described, with a review of the modes of infectious disease transmission followed by discussion on microbial and other contaminants of relevance to South East Asia. Standard assays as well as newer methods will be covered. Guidelines of the Department of Health on acceptable limits and routine inspection procedures will be discussed.

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#### **FOOD7002 GMP and environmental management (6 credits)**

Good manufacturing practice has a significant impact on the daily operation of a food processing facility. Quality products and a safe work place are important components of a good company. This course will focus on issues arising from GMP and aspects of the physical design of a food processing facility which impact the safety of workers and products. There will be emphases on the sources of contamination, sanitation techniques for production site and personnel, pest control, and contingency plan for the production line. Quality assurance and HACCP will be discussed as well.

Proper handling of waste is closely related to the issue of food safety and in a broader context it has an eventual impact on the environment. This course will cover waste treatment and disposal, environmental impact assessment, operational procedures to implement ISO 14000, and laws and regulations on pollution control enforced by the Hong Kong Environmental Protection Department.

**FOOD7003 Food quality preservation and evaluation (6 credits)**

The effects of processing and packaging on the physical and chemical characteristics of food products will be discussed. Emphasis will be placed on the freezing technology of marine products and frozen dim sums. Analytical methods for sensitive nutrients and techniques to preserve the characteristic aroma and taste of a product in processing modification will be reviewed. Issues related to nutrient enrichment and fortification will be discussed.

Sensory evaluation as an important component of food product development and marketing will be covered. Various evaluation methods and analytical techniques will be discussed in a case study setting.

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**FOOD7004 HACCP and food laws (6 credits)**

As a core quality management tool in the food industry, the relevance, impact and use of HACCP in manufacturing and catering will be discussed. Topics covered will include the integration of HACCP and ISO 9000 as well as the practical implementation of HACCP using Asian case studies.

The course will provide student with a proper perspective on local, Chinese and international food laws and regulations. Familiarisation with international agencies such as the Codex Alimentarius Commission. Issues related to food inspection, food additives, and contaminants as well as the concept of and procedural details in attaining ISO registration will be discussed.

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**FOOD7005 R&D and export market strategies (9 credits)**

The role of research from the management perspective, the R & D process and the impact of technological innovation on the development of new products will be discussed.

Cultural aspects will be emphasized as an important consideration in developing new market frontiers. The strengths and weaknesses of major “Chinese food” manufacturers will be analyzed. Areas of potentials will be identified and explored.

Basic concepts of intellectual property rights will also be described in this course: copyright, trademarks, trade secrets, patents. Patent strategy for research-intensive technology companies. Practical aspects and international considerations in filing for patent protection.

The application of information technology in food manufacturing and catering will be discussed.

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**FOOD8006 Marketing management (6 credits)**

The course is designed to provide an understanding of the role of marketing in the business organization and its contribution to business success. Students will be taught in an applications oriented framework to become familiar with the various marketing concepts, marketing programs and planning and control of marketing strategies. On completion of the course students will be able to analyze customer requirements, the competitive environment and to formulate effective marketing program. Perspectives of local food manufacturers will be introduced through special seminars.

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**FOOD8007 Financial control (6 credits)**

The course aims to equip non-accounting professionals with the skills required to analyse and interpret the major financial reports prepared by businesses. The focus of the course is on providing a user perspective of the financial statements rather than on specific preparation concepts. In addition, the course addresses principles of basic financial management and explains the need for internal control procedures. Particular emphasis is given to developing an understanding of the balance sheet, profit and loss statement, and cash flow statement. The relationship between the statements will be explained and illustrated in detail. A framework for making business decisions by analysing a set of financial statements using simple techniques will also be developed.

**FOOD8008 Organisational behaviour (6 credits)**

The course aims to equip students with a better understanding of the complex array of behaviours in organisational life. It will analyse the determinants of human behaviour in an organisation at the individual, group and organisational levels. Topics covered will include motivation, performance management, group dynamics, leadership, organisational culture, management of conflict, management ethics, and the management of change.

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**FOOD8009 Project (15 credits)**

This is an individual or group research project to be carried out under the supervision of one or more faculty members. Students may propose their own topics and approach potential supervisors, or they may consider those suggested by the faculty members. The proposed project title must be submitted for approval by June 30 of the first year of their study. The candidate shall make a formal presentation on the subject of his project during the final semester of the teaching programme. The deadline for submission of the project report is April 30.

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**SYLLABUSES FOR THE DEGREE OF  
MASTER OF SCIENCE IN THE FIELD OF MATERIALS SCIENCE**

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**A. COURSE STRUCTURE (Provisional)**

The list of courses, the year of teaching, and their contents set out below, may be changed from time to time.

The typical loading of a 6 credit course is equivalent to 3 hours of lectures per week for 12 weeks. Some courses will have a combination of lectures and laboratory classes with an equivalent loading.

**First year (27 credits)**

All courses are compulsory:

MASC7001	Introduction to Materials Science (6 credits)
MASC7002	Properties and Applications of Materials (6 credits)
MASC7003	Nanostructured Materials (6 credits)
MASC7004	Materials Characterization (9 credits)

**Second year (24 credits)**

Four out of the five following courses will be offered:

MASC8001	Thin Film Physics and Technology (6 credits)
MASC8002	Microelectronics and Optoelectronics: Devices and Applications (6 credits)
MASC8003	Macromolecular Science (6 credits)
MASC8004	Mechanical Service Behaviour of Materials (6 credits)
MASC8006	Biomaterials (6 credits)

\* When a suitable supervisor is available, qualified students may select MASC8005 Project (12 credits) to replace either two out of the five courses.

**B. COURSE CONTENTS (Provisional)****First Year****MASC7001 Introduction to Materials Science (6 credits)**

To provide basic knowledge of materials, their classifications and properties in relation to atomic and microscopic structures. Course contents include structure and bonding, solid state chemistry and physics, mechanical properties of materials, equilibrium and non-equilibrium structures, grain boundaries, elasticity, metals, ceramics, electronic, magnetic, and optical properties.

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**MASC7002 Properties and Applications of Materials (6 credits)**

To provide a broad overview of the properties, the design and applications of various materials. Course contents include introduction to polymer science; structure-property relationship of materials, optical, electrical, magnetic, liquid crystalline and information storage properties and their applications. Hands on experience through laboratory classes.

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**MASC7003 Nanostructured Materials (6 credits)**

Nanostructured Materials is a new generation of materials. The course is designed to introduce synthesis, structural and optical characterization, and technological applications of nanostructured materials. Several special topics are given to reflect the latest developments in nanostructured materials.

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**MASC7004 Materials characterization (9 credits)**

To provide students with knowledge of advanced instrumentation, techniques and their applications in the characterization studies in materials science. Laboratory classes will be scheduled.

Course contents include selected topics from the following:

Imaging techniques: Scanning Electron Microscopy (SEM), Scanning Transmission Electron Microscopy (STEM), Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM); Electronic and Chemical Characterization: X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy (AES), X-ray Absorption Edge Spectroscopy and Extended X-ray Absorption Fine Structure Spectroscopy (EXAFS), Low Energy Electron Diffraction (LEED), Reflection High Energy Electron Energy Diffraction (RHEED), High Resolution Electron Energy Loss Spectroscopy (HREELS), Surface Enhanced Raman Spectroscopy (SERS), Laser Induced Fluorescence (LIF), Induction Coupled Plasma (ICP); Polymer Characterization: Gel Permeation Chromatography (GPC), Thermal Gravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC). Fourier transform and analysis, spherical harmonics, basic programming, x-ray diffraction methods, XRD, vibrational spectroscopy: Infrared absorption, Raman scattering.

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**Second Year (Select four courses or two courses plus MASC8005)****MASC8001 Thin Film Physics and Technology (6 credits)**

This course covers the basic theory and techniques of physical deposition processes and thin film applications in materials science.

The course deals with the theory of material growth and epitaxy, lattice engineering, basic knowledge of vacuum technology, working principles of various thin film deposition processes, micro structures, and lithography. It introduces various thin films of novel materials, multilayer structures, and their industrial applications. Some experiment sessions will be scheduled.

**MASC8002 Microelectronics and Optoelectronics: Devices and Applications** (6 credits)

This course introduces the most commonly used solid-state devices for microelectronic and optoelectronic applications. Emphasis is put on the basic principle of operation of these devices. Relevant circuitry with which such devices are used will also be presented.

Course contents include: Bipolar junction transistor and field-effect transistor (MOSFET) and their uses in signal amplifier, digital logic gates, etc. Light emitting diode (LED) and semiconductor laser diodes (LD), photo-detector and solar cell. Some modern devices such as quantum well laser, hetero-junction transistor (HBT, HEMT).

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**MASC8003 Macromolecular Science** (6 credits)

To provide an in-depth knowledge on more advanced topics related to macromolecular-based materials. Course contents include advanced polymerization, copolymerization; polymerization kinetics; block polymers; polymers for photonic applications; polymer processing; polymer blends; engineering plastics; photoresist materials; molecular films and membranes; compatible materials; modelling; selected topics.

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**MASC8004 Mechanical Service Behaviour of Materials** (6 credits)

To provide students coming from a science background with the following:

- (a) the relevant physical basis for the understanding and prediction of the mechanical service behaviour of materials in industrial applications;
- (b) the knowledge to engineer the microstructure in such a way that the service behaviour of materials can be improved.

Course contents include yield; fracture; fatigue; creep; corrosion; case studies.

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**MASC8005 Project** (12 credits)

The course provides experience of materials scientific research by planning and carrying out a small project under the supervision of a member of staff. A limited number of projects are available and only qualified students may be admitted. This course is equivalent to two 6 credit courses.

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**MASC8006 Biomaterials** (6 credits)

This course aims at providing students with an understanding of the various materials engineering issues and challenges concerning successful design of implants and prostheses in medical engineering. The microstructure, properties and processing methods of the various types of materials, and their interactions with the human body, which dictate their selection, will be introduced.

Course contents include: Concept of biomaterial; metallic implant materials, bioceramics, biopolymer and composite implant materials, tissue response to implants, medical devices and evaluation, soft and hard tissue replacement, introduction to tissue engineering.