**REGULATIONS FOR THE DEGREES OF**
**MASTER OF SCIENCE (MSc) AND MASTER OF SCIENCE IN ENVIRONMENTAL MANAGEMENT (MSc[EnvMan])**
For students admitted in 2024-25 and thereafter

*(See also General Regulations and Regulations for Taught Postgraduate Curricula)*

Any publication based on work approved for a higher degree should contain a reference to the effect that the work was submitted to the University of Hong Kong for the award of the degree.

The degree of Master of Science is a postgraduate degree awarded for the satisfactory completion of a prescribed course of study in one of the following six fields: Applied Geosciences, Chemical Technologies for Health and Materials, Food Industry: Management and Marketing, Food Safety and Toxicology, Physics and Space Science.

The degree of Master of Science in Environmental Management is a postgraduate degree awarded for the satisfactory completion of a prescribed course of study in Environmental Management.

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**Admission requirements**

**Sc21**

(a) To be eligible for admission to the courses leading to the degree of Master of Science or Master of Science in Environmental Management, a candidate

(i) shall comply with the General Regulations and the Regulations for Taught Postgraduate Curricula;
(ii) shall hold a Bachelor's degree with honours of this University; or another qualification of equivalent standard of this University or another University or comparable institution accepted for this purpose;
(iii) in respect of the courses of study leading to the degree of Master of Science in the field of Space Science, shall hold a Bachelor's degree in a relevant science or engineering discipline, and prior knowledge expected in basic college-level physics, mathematics, statistics, and computer programming;
(iv) in respect of the courses of study leading to the degree of Master of Science in the field of Physics, a Bachelor's degree with honours in a relevant science (e.g. physics, astronomy, earth science, mathematics) or engineering, and prior knowledge expected in university-level electromagnetism, quantum mechanics and thermodynamics, university-level linear algebra and multi-variable calculus, basic statistics, and some computer programming experience (e.g. coding in C++, Mathematica, Matlab or Python);
(v) in respect of the courses of study leading to the degree of Master of Science in the field of Chemical Technologies for Health and Materials, a Bachelor's degree with honours in a relevant science (e.g. chemistry, biochemistry, biotechnology, health science, material science, medical or food analysis) or engineering (e.g. chemical engineering, environmental engineering, materials or mechanical engineering) discipline is preferred; and
(vi) shall satisfy the examiners in a qualifying examination if required.

(b) A candidate who does not hold a Bachelor's degree with honours of this University or another qualification of equivalent standard may in exceptional circumstances be permitted to register if the candidate demonstrates adequate preparation for studies at this level and satisfies the examiners in a qualifying examination.

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**Qualifying examination**

**Sc22**

(a) A qualifying examination may be set to test the candidate's academic ability to follow the course of study prescribed. It shall consist of one or more written papers or equivalent and may include a project proposal.

(b) A candidate who is required to satisfy the examiners in a qualifying examination shall not be permitted to register until he/she has satisfied the examiners in the examination.

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**Award of degree**

**Sc23** To be eligible for the award of the degree of Master of Science or Master of Science in Environmental Management, a candidate

(i) shall comply with the General Regulations and the Regulations for Taught Postgraduate Curricula; and

(ii) shall complete the curriculum and satisfy the examiners in accordance with these regulations and syllabuses.

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**Advanced standing**

**Sc24** In recognition of studies completed successfully before admission to the Master of Science in Environmental Management, Master of Science in the field of Applied Geosciences, Master of Science in the field of Space Science, and Master of Science in the field of Chemical Technologies for Health and Materials, advanced standing of up to 12 credits may be granted to a candidate with appropriate qualification and professional experiences, on production of appropriate certification, subject to the approval of the Board of the Faculty. Credits gained for advanced standing shall not be included in the calculation of the GPA but will be recorded on the transcript of the candidate. The candidate should apply before commencement of first year of study via the Department and provide all the supporting documents.

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**Period of study**

**Sc25**

(a) The curriculum of the Master of Science (except Master of Science in the field of Food Industry: Management and Marketing, and Master of Science in the field of Chemical Technologies for Health and Materials) or the Master of Science in Environmental Management shall normally extend over one academic year of full-time study or two academic years of part-time study. Candidates in either degree shall not be permitted to extend their studies beyond the maximum period of registration of two academic years of full-time study or three academic years of part-time study, unless otherwise permitted or required by the Board of the Faculty.

(b) The curriculum of the Master of Science in the field of Food Industry: Management and Marketing shall normally extend over one academic year of full-time study. Candidates shall not be permitted to extend their studies beyond the maximum period of registration of two academic years of full-time study, unless otherwise permitted or required by the Board of the Faculty.

(c) The curriculum of the Master of Science in the field of Chemical Technologies for Health and Materials shall normally extend over one and a half academic years of full-time study. Candidates shall not be permitted to extend their studies beyond the maximum period of

registration of three academic years of full-time study, unless otherwise permitted or required by the Board of the Faculty.

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**Completion of curriculum**

**Sc26** To complete the curriculum of the Master of Science or Master of Science in Environmental Management, a candidate

(a) shall satisfy the requirements prescribed in TPG 6 of the Regulations for Taught Postgraduate Curricula;
(b) shall follow courses of instruction and complete satisfactorily all prescribed written, practical and field work;
(c) shall complete and present a satisfactory dissertation or project on an approved subject or complete courses with equivalent credits as a replacement; and
(d) shall satisfy the examiners in all courses prescribed in the respective syllabuses.

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**Dissertation or Project**

**Sc27** The title of the dissertation or project shall

(a) for the full-time mode of Master of Science (except MSc in Environmental Management and MSc in the field of Food Industry: Management and Marketing), be submitted for approval by October 15 and the dissertation or project report shall be submitted not later than August 15 in the subsequent year;
(b) for the full-time curriculum of MSc in the field of Food Industry: Management and Marketing, be submitted by April 30 and the dissertation or project report shall be submitted not later than August 15 of the first year of study, unless otherwise permitted or required by the course coordinator(s);
(c) for the full-time curriculum of MSc in Environmental Management, be submitted by October 30 and the dissertation or project report shall be submitted not later than the last Friday in June of the first year of study, unless otherwise permitted or required by the course coordinator(s);
(d) for the part-time curriculum (except Master of Science in the field of Applied Geosciences, Master of Science in the field of Physics and MSc in Environmental Management), be submitted for approval by March 15 of the first year of study and the dissertation or project report shall be submitted not later than July 1 of the second year of study;
(e) for the part-time curriculum of MSc in Environmental Management, be submitted by June 30 of the first academic year, unless otherwise permitted or required by the course coordinator(s). The dissertation shall be submitted not later than the last Friday in May of the second year of study and the project report shall be submitted not later than the last Friday in June of the second year of study, unless otherwise permitted or required by the course coordinator(s);
(f) for the full-time curriculum of Master of Science in the field of Physics, be submitted by November 30 and the dissertation or project report shall be submitted not later than the first Friday in June of the first year of study;
(g) for the part-time curriculum of Master of Science in the field of Physics, be submitted by November 30 of the first academic year and the dissertation or project report shall be submitted not later than the first Friday in June of the second year of study.
(h) for the full-time curriculum of Master of Science in the field of Chemical Technologies for Health and Materials, be submitted by March 30 of the first academic year and the dissertation or project report shall be submitted by November 30 of the second year of study.

**Sc 28** A candidate shall submit a statement that the dissertation or project represents his/her own work (or in the case of co-joint work, a statement countersigned by his/her co-worker, which shows his/her share of the work) undertaken after registration as a candidate for either degree.

**Assessments**

**Sc29** The assessment in any course shall consist of elements prescribed by the course teachers, and will normally comprise either written coursework alone, or coursework combined with formal examinations; in either case participation in field work or practical work may form part of the assessment.

**Sc30** A candidate who has failed to satisfy the examiners

(a) at his/her first attempt in any course in the examination held during any of the academic years of study may be permitted to present himself/herself for re-examination in the course or courses at a specified subsequent examination, with or without repeating any part of the curriculum;
(b) at his/her first submission of dissertation or project report may be permitted to submit a new or revised dissertation or project report within a specified period;
(c) in any prescribed fieldwork or practical work may be permitted to present himself/herself for re-examination in fieldwork or practical work within a specified period.

**Sc31** Failure to take the examination as scheduled, normally results in automatic course failure. A candidate who is unable because of illness to be present at any examination of a course, may apply for permission to be present at some other time. Any such application shall be made on the form prescribed within seven calendar days of the examination concerned.

**Discontinuation**

**Sc32** A candidate who
(a) has failed to satisfy the examiners in more than half the number of credits of courses during any of the academic years or in any course at a repeated attempt, or
(b) is not permitted or fails to submit a new or revised dissertation or project report, or
(c) has failed to satisfy the examiners in their dissertation or project report at a second attempt, may be recommended for discontinuation of studies.

**Assessment results**

**Sc33** On successful completion of the curriculum, candidates who have shown exceptional merit may be awarded a mark of distinction, and this mark shall be recorded in the candidates' degree diploma.

**Grading systems**

**Sc34** Individual courses shall be graded according to one of the following grading systems as determined by the Board of Examiners:

(a) Letter grades, their standard and the grade points for assessments as follows:

| Grade | Standard | Grade Point |
|---|---|---|
| A+ | Excellent | 4.3 |
| A | | 4.0 |
| A- | | 3.7 |
| B+ | Good | 3.3 |
| B | | 3.0 |
| B- | | 2.7 |
| C+ | Satisfactory | 2.3 |
| C | | 2.0 |
| C- | | 1.7 |
| D+ | Pass | 1.3 |
| D | | 1.0 |
| F | Fail | 0 |

or

*(b) 'Pass' or 'Fail'

#(c) 'Distinction', 'Pass' or 'Fail'

Courses which are graded according to (b) above will not be included in the calculation of the GPA.

*Only applies to certain courses in MSc in the field of Applied Geosciences, and MSc in the field of Physics

#Only applies to certain courses in MSc in the field of Chemical Technologies for Health and Materials

**SYLLABUSES FOR THE DEGREE OF**
**MASTER OF SCIENCE IN THE FIELD OF CHEMICAL TECHNOLOGIES FOR HEALTH AND MATERIALS**
**(for students admitted in 2024-25 and thereafter)**

The Department of Chemistry offers a postgraduate curriculum leading to the degree of Master of Science in the field of Chemical Technologies for Health and Materials in one and a half years full time mode. This MSc programme endeavours to equip students with in-depth knowledge in relevant subject areas, advanced transferable skills and innovative mindset, enabling them to achieve breakthroughs in workplace and research. The MSc programme focuses on the two most prominent scientific frontiers in chemical technologies: health science and material technologies. The contents cover a wide range of subjects from drug design and synthesis, quality assurance, modern analysis techniques to energy harvesting, conversion and storage, as well as technology transfer. Along with core and elective lecture modules, the programme also offers laboratory and project-based practical courses, offering extensive hands-on experience. The qualification is a valuable asset for individuals seeking careers in industry, start-up business, education. or pursuing further postgraduate studies.

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## STRUCTURE AND EVALUATION

Each student must complete 72 credits of courses. If a student selects a course whose contents are similar to a course (or courses) which he/she has taken in his/her previous study, the Department may not approve the selection in question.

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## A. COURSE STRUCTURE

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

| **Programme Structure of the Full-time Mode** | | |
|---|---|---|
| **Compulsory Courses (30 credits)** | | |
| CTHM7101 | Advanced Chemical Instrumentation and Data Analysis | (6 Credits) |
| CTHM7104 | Frontiers in Modern Materials | (6 Credits) |
| CTHM7105 | Innovation, Technology Transfer and Entrepreneurship | (6 Credits) |
| CTHM7106 | Bioanalytical methods: principles and diagnostic applications | (6 Credits) |
| CTHM8101 | Research and Development Seminar | (6 Credits) |
| **Elective Courses (18 credits)** | | |
| CTHM7102 | Synthesis for Drugs and Advanced Materials | (6 Credits) |
| CTHM7103 | New Technologies and Applications in Chemical Biology | (6 Credits) |
| CTHM7107 | Green and Sustainable Chemistry | (6 Credits) |
| CTHM7108 | Quality Assurance and Regulatory Compliance | (6 Credits) |
| CTHM7109 # | Big Data Analysis in Analytical Science | (6 Credits) |
| CHEM6113 | Advanced Materials | (6 Credits) |
| CHEM6144 | Medicinal Chemistry | (6 Credits) |
| COMP7404 # | Computational Intelligence and machine learning | (6 Credits) |
| STAT8017 # | Data Minding Techniques | (6 Credits) |

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|---|---|---|
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| **Capstone Course (24 credits)** | | |
| CTHM8102 | Research Project and Dissertation | (24 Credits) |

# Students have the option of taking either CTHM7109, COMP7404 or STAT8017 as one elective. However, they cannot take more than one among these three courses.

**B. COURSE CONTENTS**

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**Compulsory Courses**

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**CTHM7101 Advanced chemical instrumentation and data analysis**

The aim of this course is to provide students with an understanding of advanced modern chemical instrumentation, covering both fundamental principles and practical aspects of instrument design for qualitative and quantitative chemical analysis. The course emphasizes bridging theory and practice to address real-life problems. The frontiers in electrochemical technologies, mass spectrometry analysis and machine learning for chemical analysis will be discussed.

Assessment: Course work (50%); Examination (50%)

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**CTHM7104 Frontiers in modern materials**

This course provides an in-depth exploration of modern materials chemistry, with a focus on bridging fundamentals and practical applications. The topics include functional materials and nanodevices for energy conversion and storage, environmental issues, biomedicine, and optoelectronics. The course also covers the fundamentals of materials chemistry, design strategies, synthesis, device preparation, and characterization. Throughout the course, students will learn about the latest techniques used in materials chemistry and gain hands-on experience.

Assessment: Course work (50%); Examination (50%)

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**CTHM7105 Innovation, technology transfer and entrepreneurship**

This course provides students exposure into how science/technology startup is conceived and established. From laboratory scientific research results to successful technology concepts and products, the students who are interested in technology transfer and entrepreneurship need to build up a spectrum of knowledge and practical experiences from technology analyses, product ideation, value evaluation, business plan, IP preparation, all the way to team building, funding raising, and go-to-market strategy. Students in this course will obtain essential understanding of how tech startup is built and triumphed, which is a key introductive step in becoming future technology transfer professionals and entrepreneurs.

Assessment: Course work (100%)

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**CTHM7106 Bioanalytical methods: principles and diagnostic applications**

This course provides an overview of bioanalytical methods for disease diagnostics and sensing applications. Course contents cover the principles and applications of modern bioanalytical techniques. Selected topics include chemistry of MRI and contrast agents, point-of-care testing, microfluidics, mass spectrometry, next-generation DNA sequencing and other nucleic-acid-based analysis, and separation science. Other emerging technologies and the latest development in bioanalytical chemistry will also be discussed.

Assessment: Course work (50%); Examination (50%)

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**CTHM8101 Research and development seminar**

The course consists of a series of seminars, which are designed to acquaint students with the latest advancements and developments in chemical technologies that are relevant to health, well-being, materials synthesis, and analysis. The seminar series will cover topics such as the latest advancements in chemical technologies, new materials and their applications, synthesis and analysis techniques, biochemical processes involved in drug discovery and development, and other related topics. Students will present their literature research and findings in class and receive feedback from their peers and instructors.

Assessment: Course work (100%)

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**Elective Courses**

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**CTHM7102 Synthesis for drugs and advanced materials**

This course provides a comprehensive training on synthetic methods that are applicable to the preparation of pharmaceuticals and organic materials. Current organic transformations, including oxidations/reductions, substitutions, enolate chemistry, and transition metal-catalyzed transformations will be covered. A focus of this course is the application of these methods in the synthesis of drugs and materials, with discussions on multiple examples in both academia studies and industrial manufacturing.

Assessment: Course work (50%); Examination (50%)

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**CTHM7103 New technologies and applications in chemical biology**

This course covers state-of-the-art advancements in technologies to probe chemistry in cells, with a primary focus on the latest development and application of technologies for examining cellular processes, molecular interactions, and their implications in biology and medicine. The novel technologies probing cellular chemistry using chemical biology, synthetic biology, and genome engineering methodologies, as well as techniques for single-cell analysis, microscopy, and mass spectrometry analysis, will be discussed. Extensions of these application to disease treatments will be introduced.

Assessment: Course work (50%); Examination (50%)

**CTHM7107 Green and sustainable chemistry**

The principles and practices of green chemistry, focusing on renewable energy, green catalysis, and carbon neutrality will be discussed. The course covers the chemistry underlying renewable energy technologies; green catalysis in the synthesis of important chemicals, such as pharmaceuticals and polymers; and investigates the concept of carbon neutrality such as carbon capture and storage. Through a combination of lectures, readings, and case studies, students will learn about the principles and applications of green chemistry, as well as the environmental and economic benefits of this approach.

Assessment: Course work (50%); Examination (50%)

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**CTHM7108 Quality assurance and regulatory compliance**

A good grasp of effective practices to maintain service quality and adhere to government legislations and regulatory guidelines is vital for entering into the industry. Building upon basic metrology concepts and techniques used in quality control, this course aims to provide a thorough understanding of the principles and requirements for both management and technical aspects of the international standard ISO/IEC 17025:2017, along with other management standards such as Good Laboratory Practice (GLP) and Good Manufacturing Practice (GMP). Practical guidelines for establishing, implementing and maintaining a quality management system for laboratory operation are given. Requirements of internal and external audits as stipulated in ISO/IEC 17025:2017, and criteria from accreditation bodies such as Hong Kong Accreditation Service (HKAS) and China National Laboratory Accreditation Committee (CNAS) are also addressed. Extensions of these concepts in clinical trials will be introduced. Emphasis is also given to technical requirements for different disciplines.

Assessment: Course work (100%)

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**CTHM7109 Big data analysis in analytical science**

This course focuses on the application of big data analytics in analytical chemistry, health and materials sciences. It introduces students to the principles of big data analytics, current challenges, most recent development, and opportunities presented in the field. Case studies on big data analytics in chemistry, including the use of advanced analytics in the areas of drug discovery, diagnosis, materials development and environmental analysis will also be discussed.

Impermissible Combination: Students should not be taking or have taken STAT8017 Data mining techniques or COMP7404 Computational intelligence and machine learning

Assessment: Course work (100%)

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**CHEM6113 Advanced materials**

This course gives a comprehensive overview on materials chemistry. It focuses on the application of materials in advanced technology for renewable energy, catalytic devices, sustainable resourcification, wearable biosensors, nanoelectronics, membrane technology, and other specialty applications. The most recent development, synthesis, and characterization in materials chemistry will also be discussed.

Assessment: Course work (50%); Examination (50%)

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**CHEM6144 Medicinal chemistry**

This course covers the chemical principles of drug design and drug action. It discusses the drug discovery, design, and development; as well as drug metabolism; prodrugs and drug delivery. It serves as an introduction to the current development of bioorganic/inorganic chemistry, pharmaceutical chemistry, and biotechnology.

Assessment: Course work (50%); Examination (50%)

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**COMP7404 Computational intelligence and machine learning**

This course will teach a broad set of principles and tools that will provide the mathematical, algorithmic and philosophical framework for tackling problems using Artificial Intelligence (AI) and Machine Learning (ML). AI and ML are highly interdisciplinary fields with impact in different applications, such as, biology, robotics, language, economics, and computer science. AI is the science and engineering of making intelligent machines, especially intelligent computer programs, while ML refers to the changes in systems that perform tasks associated with AI. Ethical issues in advanced AI and how to prevent learning algorithms from acquiring morally undesirable biases will be covered.

Topics may include a subset of the following: problem solving by search, heuristic (informed) search, constraint satisfaction, games, knowledge-based agents, supervised learning, unsupervised learning; learning theory, reinforcement learning and adaptive control and ethical challenges of AI and ML.

Impermissible combination: Students should not be taking or have taken CTHM7109 Big data analysis in analytical science or STAT8017 Data mining techniques

Assessment: Course work (50%); Examination (50%)

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**STAT8017 Data mining techniques**

With the rapid developments in computer and data storage technologies, the fundamental paradigms of classical data analysis are mature for change. Data mining techniques aim at helping people to work smarter by revealing underlying structure and relationships in large amounts of data. This course takes a practical approach to introduce the new generation of data mining techniques and show how to use them to make better decisions. Topics include data preparation, feature selection, association rules, decision trees, bagging, random forests and gradient boosting, cluster analysis, neural networks, introduction to text mining.

Impermissible Combination: Students should not be taking or have taken CTHM7109 Big data analysis in analytical science or COMP7404 Computational intelligence and machine learning

Assessment: Course work (100%)

**Capstone Course**

**CTHM8102 Research project and dissertation**

The Research Project and Dissertation provides students with the opportunity to conduct original research and development project in the field of chemistry and related areas. Students will work with experienced faculty members to conduct advanced independent research projects in areas such as biomaterials, drug delivery, biocatalysis, green synthesis and analytical chemistry; which will be the basis of their thesis.

The course provides comprehensive training in design and conduct experiments, data analysis, and critical thinking. Students will learn how to design and conduct experiments, analyze experimental data, and write a high-quality research thesis. This course includes lectures, seminars, laboratory work, and independent research; which provides students with advanced knowledge of chemical regulations and safety. This course also enables students to apply scientific principles, data analysis, and other transferrable skills in real-world scenarios.

Prerequisite: CTHM8101 Research and Development Seminars

Assessment: Course work (100%)