REGULATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN COMPUTER SCIENCE (MSc[CompSc])

(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 in Computer Science (MSc[Computer Science]) is a postgraduate degree awarded for the satisfactory completion of a course of study in the Faculty of Engineering. The MSc(Computer Science) course is offered in part-time or full time mode.

MCS 1 Admission requirements

To be eligible for admission to the courses leading to the degree of Master of Science in Computer Science, a candidate

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

MCS 2 Qualifying examination

(a) A qualifying examination may be set to test the candidate's formal academic ability or his 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 has satisfied the examiners in the examination.

MCS 3 Award of degree

(a) To be eligible for the award of the degree of Master of Science in Computer Science a candidate
  (i) shall comply with the General Regulations; and
  (ii) shall complete the curriculum and satisfy the examiners in accordance with the regulations set out below.
(b) A candidate who has not satisfied the examiners for the award of the Degree of M.Sc. in Computer Science but has completed 8 modules may be awarded a Postgraduate Diploma in Science (Computer Science) [PDipSc(CS)], subject to approval of the Faculty Board.

MCS 4 Length of curriculum

For the part-time mode of study, the curriculum shall normally take two academic years of study, and the maximum period of study is three years. For the full-time mode of study, the curriculum shall normally take one academic year of study, and the maximum period of study is two years.

MCS 5 Completion of curriculum

(a) To complete the curriculum a candidate shall, within the prescribed maximum period of study stipulated in Regulation MCS 4 above:
  (i) follow courses of instruction and complete satisfactorily all prescribed written work;
  (ii) shall satisfy the examiners in *either*
    (1) twelve modules at the prescribed written examinations; *or*
    (2) eight modules and a 4-module project report on a subject within an approved field of study; *or*
    (3) ten modules and a 2-module project report on a subject within an approved field of study.

(b) A candidate who fails to fulfil the requirements within the period of study specified in Regulation MCS 4 above shall be recommended for discontinuation under the provisions of General Regulation G 12, except that a candidate, who is unable because of illness or circumstances beyond his control to complete the requirements within the prescribed period of study, may apply for permission to extend his period of studies. Any such application shall be made within two weeks of the first day of the examination paper in question.

MCS 6 Course selection

(a) Selection of study patterns shall be made in consultation with and be subject to the approval of the Head of the Department of Computer Science.

(b) A candidate who is permitted to select the study pattern under section (a)(ii)(1) of Regulation MCS 5 shall select twelve modules.

(c) A candidate who is permitted to select the study pattern under section (a)(ii)(2) of Regulation MCS 5 shall select eight modules.

(d) A candidate who is permitted to select the study pattern under section (a)(ii)(3) of Regulation MCS 5 shall select ten modules.

(e) Subject to the approval of the Head of the Department of Computer Science, a student may be permitted to select at most two modules from the syllabuses for the degrees of MSc(ECom&IComp) and MSc(Eng).

(f) Subject to the approval of the Faculty Higher Degrees Committee on the recommendation of the Head of the Department of Computer Science, a candidate may be permitted to select additional module(s).

MCS 7 Project report or dissertation

(a) A candidate who is permitted to select the study pattern under section (a)(ii)(2) of Regulation MCS 5 is required to submit his 4-module project report by a date specified by the Board of Examiners.

(b) A candidate who is permitted to select the study pattern under section (a)(ii)(3) of Regulation MCS 5 is required to submit his 2-module project report by a date specified by the Board of Examiners.

(c) The candidate shall submit a statement that the project report or dissertation represents his own work (or in the case of conjoint work, a statement countersigned by his co-worker, which shows his share of the work) undertaken after registration as a candidate for the degree.

MCS 8 Examinations

(a) The written examination for each module shall be held after the completion of the prescribed course of study for that module, and not later than January, May or August immediately following the completion of the course of study for that module.

(b) A candidate who has failed to satisfy the examiners in a module or modules may be permitted to present himself either for re-examination in the module or modules of failure or for examination in the same number of new modules when the examination is next held, but a candidate who has twice failed to satisfy the examiners in the module or modules for the same module shall not be permitted to present himself for examination in the same module or modules for a third time. To proceed to the following year of the curriculum, a candidate must satisfy the examiners in a minimum of two modules in each academic year. A candidate who passes in less than two modules in an academic year may be recommended for discontinuation of studies under the provisions of General Regulations G 12.

(c) A candidate who has presented an unsatisfactory project report or dissertation may be required to submit a revised project report or dissertation on the same subject within a specified period.

(d) A candidate who has presented an unsatisfactory project report or dissertation for a second time shall be recommended for discontinuation of studies under the provisions of General Regulation G 12.

(e) A candidate who has failed to submit a satisfactory project report or dissertation within the prescribed maximum period of study, including any extension, shall be recommended for discontinuation of studies under the provisions of General Regulation G 12.

MCS 9 Examination results

At the conclusion of the examination and after presentation of the project reports or dissertations, a pass list shall be published. A candidate who has shown exceptional merit or merit at the whole examination may be awarded a mark of distinction or credit, as appropriate, and this mark shall be recorded on the candidate's degree diploma.

SYLLABUSES FOR THE DEGREE OF MASTER OF SCIENCE IN COMPUTER SCIENCE

The curriculum extends over two to three academic years of part-time or one to two academic years of full-time study.

The following is a list of modules offered by the Department of Computer Science. The list below is not final and some modules may not be offered every year.

Candidates may also in exceptional circumstances select at most 2 modules from the syllabuses for the degree of MSc(Eng) and that for the degree of MSc(ECom&IComp), subject to approval of the Head of the Department or Course Co-ordinator concerned, and in accordance with the provisions of Regulation MCS 6(e).

Candidates who have failed to satisfy the examiners for the Degree of M.Sc.(Computer Science) may on termination of their study be awarded a Postgraduate Diploma in Science (Computer Science), subject to approval of the Faculty Board.

I. Data Engineering

CSIS7101. Advanced database technologies

The goal is to study some contemporary technologies in the database area that have been adopted in real applications, and to survey products and applications that embody these technologies. Selected topics from the following will be covered: Object Oriented and Object Relational Databases; XML/Semi-structured Data Management; Spatial Data Management; Temporal, Spatiotemporal, Time-Series, and Sequence Data Management; Distributed Databases; Information Retrieval Techniques; Advanced Query Optimization; Data Stream Systems; Main Memory Databases; Biological Databases.

CSIS7102. Transaction processing

The goal is to study the fundamentals of database transaction processing, with emphasis on advanced transaction processing techniques. Topics may include serializability theory, concurrency control protocols, database recovery protocols, distributed transaction processing, real-time databases.

CSIS7103. Data mining

Data mining is the automatic discovery of statistically interesting and potentially useful patterns from large amounts of data. The goal of the course is to study the main methods used today for data mining and on-line analytical processing. Topics include Data Mining Architecture; Data Preprocessing; Mining Association Rules; Classification; Clustering; On-Line Analytical Processing (OLAP); Data Mining Systems and Languages; Advanced Data Mining (Web, Spatial, and Temporal data).

II. Software Engineering

CSIS7201. Analysis and design of enterprise applications in UML

This course presents an industrial-strength approach to software development based on the object-oriented modelling of business entities. Topics include overview of object-oriented concepts; Unified Modelling Language (UML); object modelling using use cases and class diagrams; dynamic modelling using sequence, interaction and state diagrams; mapping object models to implementation models such as relational databases; and current trends in object technologies, such as components, design patterns and XML. Emphasis will be given on hands-on exercises with the use of CASE tools.

Prerequisites: A course in object-oriented programming and a course in software engineering or systems analysis and design.

CSIS7202. Software quality assurance

This course presents the current issues and solutions for ensuring the quality of enterprise systems. Topics include software quality concepts; software process improvement; requirements tracking and management; reviews and inspections; software testing; version control and configuration management; formal methods; and software quality metrics and measurement.

Prerequisite: A course in software engineering or systems analysis and design.

III. Computer Systems

CSIS7301. Computer and network security

The aim of the course is to introduce different methods of protecting information and data in computer and information systems from unauthorized disclosure and modification. Topics include introduction to security; cryptographic algorithms; cryptographic infrastructure; internet security; secure applications and electronic commerce.

CSIS7302. Embedded system and pervasive computing

The course offers practical knowledge needed in embedded system development. Industry and research projects will be discussed to show how human life can be benefited from pervasive computing. Topics include wearable computer architecture and applications; sensor networks; real-time embedded operating systems; embedded servers; embedded system networking; address-free routing; smart spaces; dynamic service discovery; mobility and case studies.

CSIS7303. High-performance computing

This module offers an overview of state-of-the-art parallel architectures and programming languages. The students will learn the issues related to the performance of parallel algorithms, and how to design efficient parallel algorithms for parallel machines. Topics include milestones in the history of HPC and its applications; high-performance computing architectures; performance law; modern CPU design; interconnection network and routing techniques; memory hierarchy and cache coherence protocol; parallel algorithm design; parallel programming models and case studies of supercomputers.

CSIS7304. The wireless Internet and mobile computing

This module offers students an opportunity to understand the principles and technologies behind data services in a wireless, mobile environment. It introduces the developing areas of mobile computing technology and applications. Topics include key features of 1G, 2G, and 3G mobile technology; wireless LANs; personal area networks and Bluetooth; ad hoc networks; mobile IP, DHCP, IPv6; TCP over wireless; proxy systems; web surfing and WAP; mobile file systems; privacy, authentication, security; mobility and location-dependent/personalized wireless applications.

CSIS7305. Cluster and grid computing

Clusters are powerful computers built using commodity components in a local-area network environment; grids connect and aggregate geographically distributed resources across the Internet. They both can serve as a cost-effective computing platform for solving large-scale resource-intensive problems in science, commerce, and industry. This module offers an overview of current cluster and grid technologies, and discusses various issues in the design and implementation of cluster and grid systems. Topics include the concept of single system image, low-latency messaging, software distributed shared memory systems, cluster file and I/O system, grid software and tools, resource management and scheduling in grid, grid security, and case studies of cluster and grid systems and applications.

IV. Biocomputing

CSIS7402. Computer technologies for bioinformatics

To give an overview of the existing computer technologies used in bioinformatics. Topics include basic knowledge in biochemistry; introduction to computational problems arising from molecular biology; biological databases; well-known software packages and web resources; concepts behind the computer-based solutions.

CSIS7403. Computational molecular biology

To introduce computational methods for analyzing DNA, RNA and protein sequences. Topics include basics of molecular biology; biological sequence analysis; physical mapping; gene finding; gene rearrangement; secondary structure prediction and phylogeny.

Pre-requisites: CSIS7402, and CSIS7601 *or* CSIS0250 "Design and Analysis of Algorithms"

V. Human-Computer Interaction

CSIS7501. Advanced computer graphics and virtual reality

To study techniques and algorithms in advanced rendering and visualization. Topics include parametric representations for curves and surfaces; shadow generation techniques for photorealistic rendering; volume rendering techniques for 3D data visualization; advanced ray tracing technique; motion control in animation.

CSIS7502. Image processing and computer vision

To study the theory and algorithms in image processing and computer vision. Topics include image representation; image enhancement; image restoration; mathematical morphology; image compression; scene understanding and motion analysis.

CSIS7503. Multimedia technologies

To study selected topics of multimedia technologies in depth. Topics include compression algorithms, storage systems, steganography and watermarking.

CSIS7504. Pattern recognition and applications

To study techniques in pattern recognition. Topics include statistical decision theory; density estimation; dimension reduction; discriminant functions; unsupervised classification and clustering; neural network; hidden Markov model; and selected applications in pattern recognition such as characters and speech recognition.

VI. Foundations of Computer Science

CSIS7601. Algorithms

To provide students a deep understanding of the techniques for algorithm design and analysis. Typical topics include advanced data structures, design techniques like recursion; dynamic programming and greedy algorithms; correctness and analysis of algorithms; NP-completeness; randomized algorithms; online algorithms and algebraic computing.

CSIS7602. Topics in theoretical computer science

To cover some advanced topics in theoretical computer science. Topics may vary from year to year. Examples are computational complexity; computational geometry; data compression, online algorithms; approximation algorithms; computational learning theory; lower bounds and distributed computing.

VII. Project

CSIS7702. 4-module project

Candidate will be required to carry out independent work on a major project that will culminate in the writing of a dissertation.

CSIS7703. 2-module project

Candidate will be required to undertake a computing project under the supervision of a teacher.

VIII. Others

CSIS7801. Advanced topic in computer science

Advanced topics that are of current interest will be discussed.