REGULATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND INFORMATION SYSTEMS (BSc[CSIS])

(See also General Regulations and Regulations for First Degree Curricula)

CSIS 1 Admission to the Degree

To be eligible for admission to the degree of BSc(CSIS), a candidate shall

(a) comply with the General Regulations;
(b) comply with the Regulations for First Degree Curricula;
(c) satisfy all the requirements of the curriculum in accordance with the regulations that follow and the syllabuses of the degree.

CSIS 2 Length of Study

The curriculum shall normally require six semesters of full-time study, spread over three academic years.

CSIS 3 Curriculum Requirements

To complete the curriculum, all candidates shall

(a) satisfy the Regulations prescribed in UG 3 of the Regulations for the First Degree Curricula;
(b) in addition to the requirements in CSIS 3(a) above, to satisfactorily complete altogether 6 credit-units of courses in English language enhancement; and
(c) pass not less than 180 credit-units of courses, in the manner specified in the syllabuses; candidates are required to pass all core courses as specified in the syllabuses, and will have to satisfactorily complete prerequisite courses in order to enrol in a succeeding course.

CSIS 4 Candidates shall normally select not less than 30 and not more than 36 credit-units of courses in each semester, unless otherwise permitted or required by the Board of the Faculty. Candidates who have overloaded in preceding semesters will be allowed to reduce the load by up to the equivalent number of credit-units they have passed in excess of the normal load in a subsequent semester without having to seek prior approval.

CSIS 5 Candidates with unsatisfactory academic progress may be required by the Board of the Faculty to take a reduced study load.

CSIS 6 Selection of Courses

Candidates shall select their courses in accordance with these regulations and the guidelines specified in the syllabuses before the beginning of each academic year.

CSIS 7 Assessment and Grades

Candidates shall be assessed for each of the courses which they have registered for, and assessment may be conducted in any one or any combination of the following manners: written examinations or tests, continuous assessment, laboratory work, field work, project reports, or in any other manner as specified in the syllabuses. Grades shall be awarded in accordance with UG 5 of the Regulations for the First Degree Curricula.

CSIS 8 Written examinations shall normally be held at the end of each semester unless otherwise specified in the syllabuses.

CSIS 9 A candidate who fails in any course may be required by the Board of the Faculty to repeat the same course or to take a special examination at a time and in a manner specified by the Board. The grades for all attempts made by a candidate will be recorded in his transcript.

CSIS 10 Candidates shall not be permitted to repeat a course for which they have received a grade D or above.

CSIS 11 A candidate will normally be recommended for discontinuation if

(a) his/her yearly average of Semester GPA is unsatisfactory for two consecutive academic years;
(b) he/she has failed in a core course three times; or
(c) he/she has accumulated less than half of the credit-units expected of a normal load for two consecutive years.

CSIS 12 Advanced Standing

Advanced standing may be granted to candidates in recognition of studies completed successfully elsewhere. The amount of advanced credit-units to be granted shall be determined by the Board of the Faculty, in accordance with the following principles:

(a) a minimum of two years of study at this University shall be required before the candidate is considered for the award of the degree; and
(b) a minimum of 120 credit-units shall be gained in this University.

Advanced credit-units granted to a candidate under this clause shall not be included in the calculation of his GPA.

CSIS 13 Degree Classification

The degree of BSc (CSIS) shall be awarded in five divisions:

First Class Honours
Second Class Honours Division One
Second Class Honours Division Two
Third Class Honours
Pass

CSIS 14 The classification of honours shall be determined by the Board of the Faculty at its full discretion by taking the overall performance of candidates and other relevant factors into consideration.

PROGRAMME STRUCTURE AND SYLLABUSES FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND INFORMATION SYSTEMS

PROGRAMME STRUCTURE

1. To graduate, a student needs 180 credit-units, out of which at least 90 are earned from CSIS courses and at least 42 from broadening or complementary courses.

---

2. Also, a student must satisfy at least one of the following requirements regarding specialization.
   - Specialization in CS: at least 36 credit-units in Area I and Area III, with at least 12 from each of the two areas; and a project. [Note: The project requirement does not apply to intake of 2000/2001.
   - Specialization in IS: at least 36 credit-units in Area I and Area II, with at least 12 from each of the two areas; and a project on software systems development and at least l8 credit-units in basic knowledge of business.

---

3. CSIS Courses are divided into two levels. Unless otherwise specified, all courses carry 6 credit-units. CSIS1xxx courses are level 1 courses assigned with a weight of 1, and CSIS0xxx courses are level 2 courses assigned with a weight of 2.

3.1 To complete the curriculum, a student must pass all the following compulsory courses:

Level 1
- Computer programming
- Foundations of computer science
- Introduction to data structures and algorithms
- Machine organization and assembly language programming
- Introduction to information systems

Level 2 [Not applicable to intake of 2000/2001]
- Principles of operating systems
- Computer and communication networks
- Introduction to database management systems
- Year project (12 credit-units, spanning two semesters)

3.2 Advanced level courses are divided into four areas:

AREA	Level 2
I. Computer Systems & Communications	• Principles of operating systems • Computer architecture • Programming methodology and object-oriented programming • Computer and communication networks • System architecture and distributed computing • Internet and the World Wide Web • Fundamentals of system performance modelling • Topics in computer systems • Topics in Web technologies • Real-time and embedded systems • Scientific computing

II. Information Systems Development & Management	• Introduction to software engineering • Introduction to database management systems • Software engineering process II: implementation, testing and maintenance • Information systems management • Advanced database systems • Electronic commerce technology • Object-oriented and formal development methods • Topics in information systems • Software quality and project management • Professionalism and ethics • Topics in software engineering
III. Languages, Compilers & Theory of Computation	• Principles of programming languages • Design and analysis of algorithms • Compiling techniques • Introduction to theory of computation • Applied optimization techniques • Topics in theoretical computer science • Applied algorithms
IV. Applications	• Artificial intelligence • Computer graphics • Computer vision and recognition of patterns and speech • Discrete event simulation • Financial computing • Legal aspects of computing • Multimedia computing and applications • Topics in computer applications • Introduction to computational molecular biology

---

4. Broadening/Complementary Courses
   - First-year Mathematics/Statistics (at least 6 credit-units, selected from courses offered by the Mathematics Department and Statistics Department)
   - English for computer science (3 credit-units)
   - Professional and technical communication for computer science (3 credit-units)
   - Practical Chinese language course for engineering students (3 credit-units)
   - One broadening course in humanities and social sciences studies (3 credit-units)
   - One broadening course in culture and value studies or an area of studies outside this degree curriculum as an elective (3 credit-units)
   - Other courses offered outside this degree curriculum (at least 21 credit-units)

---

5. Basic Knowledge in Business (courses are offered by School of Business and School of Economics & Finance) - at least 18 credit-units for the requirement of specialization in Information Systems.
   - ECON1001 Introduction to economics I (6 credit-units)
   - BUSI1002 Introduction to accounting (6 credit-units)
   - BUSI1005 Organizational behaviour (6 credit-units)
   - BUSI1004 Marketing (6 credit-units)

SYLLABUSES

CSIS COURSES

Level 1

CSIS1117. Computer programming (6 credit-units)

The goal of this course is for students to learn the general principles of programming, including how to design, implement, document, test, and debug programs.

CSIS1118. Foundations of computer science (6 credit-units)

Logic, sets, and functions; mathematical reasoning; counting techniques; relations; graphs; trees; modeling computation.

CSIS1119. Introduction to data structures and algorithms (6 credit-units)

Arrays, linked lists, trees and graphs; stacks and queues; symbol tables; priority queues, balanced trees; sorting algorithms; complexity analysis.

Prerequisite: CSIS1117

CSIS1120. Machine organization and assembly language programming (6 credit-units)

Fundamentals of computer organization and machine architecture; number, character and instruction representations; addressing modes; assembly language programming including stack manipulation and subroutine linkage; basic logic design and integrated devices; the central processing unit and its control; concepts of microprogramming, data flow and control flow; I/O devices and their controllers, interrupts and memory organization; computer arithmetic.

CSIS1127. Introduction to information systems (6 credit-units)

Fundamental principles of Management Information Systems are covered. Topics include: organizational and technical foundations of Information Systems (IS); survey of computer-based IS; management of IS resources; IS requirements analysis and design; database management; telecommunications; end user computing. Special emphasis is paid to the Internet as a foundation for new business models and processes.

Level 2

Area I. Computer Systems & Communications

CSIS0230. Principles of operating systems (6 credit-units)

Operating system structures, process and thread, CPU scheduling, process synchronization, deadlocks, memory management, file systems, I/O systems and device driver, mass-storage structure and disk scheduling, network structure, distributed systems, case studies.

Prerequisites: CSIS1117 and CSIS1120; or CSIS1117 and ELEC1622/ELEC1613

CSIS0231. Computer architecture (6 credit-units)

Introduction to computer design process; performance and cost analysis; instruction set design; data-path and controller design; pipelining; memory system; I/O design; introduction to advanced topics.

Prerequisite: CSIS1120

CSIS0396. Programming methodology and object-oriented programming (6 credit-units)

Abstract data types and classes; object-oriented design and object-oriented programming; program development, generation and analysis tools; scripting and command languages; user interfaces and GUIs; program documentation.

Prerequisites: CSIS1117 or ELEC1501

CSIS0234. Computer and communication networks (6 credit-units)

Network structure and architecture; reference models; stop and wait protocol; sliding window protocols; character and bit oriented protocols; virtual circuits and datagrams; routing; flow control; congestion control; local area networks; issues and principles of network interconnection; transport protocols, and application layer; examples of network protocols.

Prerequisite: CSIS0230

CSIS0402. System architecture and distributed computing (6 credit-units)

This course introduces the architecture of modern systems and the concepts and principles of distributed computing. Topics include: transaction processing, client-server computing, multi-tier architectures, middleware and messaging, component technology, and distributed object computing.

Pre/Co-requisite: CSIS0396 or CSIS1422

CSIS0322. Internet and the World Wide Web (6 credit-units)

Introduction and history; networks, internetworking, and network protocols; TCP/IP and related protocols; client-server model and programming; distributed applications; Domain Name System; Internet applications: TELNET, mail, FTP, etc.; Internet security; intranet and extranet; virtual private networks; World Wide Web; Web addressing; HTTP; HTML, XML, style sheets, etc.; programming the Web: CGI, Java, JavaScript, etc.; Web servers; Web security; Web searching; push technology; other topics of current interest.

CSIS0201. Fundamentals of system performance modelling (6 credit-units)

Concepts of system modelling; review of basic probability; probability models, forecasting models, decision analysis, probabilistic inventory models; queuing systems, simulation modelling; Markovian decision process.

Prerequisite: CSIS1118

CSIS0247. Topics in computer systems (6 credit-units)

Topics in computer hardware and/or software systems that are of current interest.

CSIS0325. Topics in Web technologies (6 credit-units)

This course presents selected topics that are essential in our understanding and appreciation of the latest advances in technologies related to the World Wide Web. Possible topics include XML, RDF and metadata, style languages, Web graphics and synchronized multimedia, privacy, content selection, accessibility, Web server architecture, mobile access, distributed authoring and versioning, and internationalization.

Prerequisite: CSIS0234 or CSIS0322

CSIS0406. Real-time and embedded systems (6 credit-units)

Topics include: specification of real-time software requirements; design, implementation, and evaluation of real-time software; analysis and verification of real-time computing system performance.

Prerequisite: CSIS0230

CSIS0407. Scientific computing (6 credit-units)

This course provides an overview and covers the fundamentals of scientific and numerical computing. Topics include numerical analysis and computation, symbolic computation, scientific visualization, architectures for scientific computing, and applications of scientific computing.

Prerequisites: CSIS1117 and CSIS1118

Area II. Information Systems Development & Management

CSIS0297. Introduction to software engineering (6 credit-units)

This course introduces the fundamental principles and methodologies of software engineering. It covers the software process and methods and tools employed in the development of modern systems. It also examines contemporary issues such as component-based software engineering and web engineering. The use of CASE tools and the UML are emphasized, particularly in the team-based project in which students apply their new knowledge to the problem of practical software construction. This course is not for students studying the BEng(SE) programme.

Prerequisite: CSIS1117 or CSIS0911

CSIS0278. Introduction to database management systems (6 credit-units)

This course studies the principles, design, administration, and implementation of database management systems. Topics include: entity-relationship model, relational model, relational algebra and calculus, database design and normalization, database query languages, indexing schemes, security, integrity, concurrency control, and contemporary topics in database management systems. This course may not be taken with BUSI0052.

Prerequisites: CSIS1117 and CSIS1119; or CSIS0911 and CSIS0912; or ELEC1501

CSIS0403. Software engineering process II: implementation, testing and maintenance (6 credit-units)

This course examines the theory and practice of software implementation, testing and maintenance, and their place in modern software process. Topics in implementation include: detailed design issues and implementation strategies; coding style and standards; the review process; individual software process and metrics; code instrumentation; and reuse. Also examined are the implementation aspects of contemporary approaches such as generic programming, design patterns, and multi-paradigm development. Testing covers unit and component testing; integration testing; system, performance and acceptance testing; and test documentation. Testing techniques for OO software are examined in detail. Topics in maintenance include maintenance techniques, tools and metrics; software rejuvenation; and refactoring.

Pre/Co-requisite: CSIS0396/CSIS1422 and CSIS1401/CSIS0297

CSIS0253. Information systems management (6 credit-units)

Students will learn about the growing importance of information as a corporate resource. Throughout the course, the strategic implications of information technology will be explored. Topics covered include: IS planning; management of IS project; IS audit and control; management of end-user computing; emerging technologies; IS as a strategic business factor; inter-organisational IS.

Co-requisites: CSIS1127 and 12 credit-units of Business Courses

---

CSIS0323. Advanced database systems (6 credit-units)

The course will study some advanced topics and techniques in database systems, with a focus on the system and algorithmic aspects. It will also survey the recent development and progress in selected areas. Topics include: overview of data mining; the KDD process and system architecture; example applications; DSS, data warehouse, data cube, and OLAP; mining binary association rules; mining association rules with quantitative attributes; mining sequential patterns; decision tree classifiers; neural network classifier; cluster analysis; text mining; web mining.

Prerequisite: CSIS0278

CSIS0320. Electronic commerce technology (6 credit-units)

This course aims to help students to understand the technical and managerial challenges they will face as electronic commerce becomes a new locus of economics activities. Topics include information security technologies, Internet security, public-key crypto-systems, public-key infrastructure, Internet-based electronic commerce, consumer-oriented electronic commerce, electronic payment systems, and intraorganizational electronic commerce.

Prerequisite: CSIS1117 and CSIS0230

CSIS0319. Object-oriented and formal development methods (6 credit-units)

To study the theory and practices in object-oriented methods and formal methods in software engineering. Topics include object-oriented analysis and design, formal specification and design, formal approaches to software testing, verification and reliability, integration of formal and informal methods.

Pre/Co-requisite: CSIS0297 or CSIS1401

CSIS0245. Topics in information systems (6 credit-units)

Advanced topics in information systems, which will cover subjects such as, business process reengineering; electronic commerce and electronic data interchange (EDI); financial computing; group support technologies and decision support systems; IT and global supply chain management; digital library and electronic community.

Prerequisite: CSIS0320 or CSIS0322

CSIS0404. Software quality and project management (6 credit-units)

This course covers software quality and project management. Topics in software quality include software quality assurance; software quality metrics; review; inspection and audits. Topics in project management include project planning and scheduling; project control; risk analysis; planning and monitoring; process management and process improvement; configuration management and control; software acquisition; contract briefing, negotiation and management.

Prerequisites: CSIS0401 or CSIS0297; and CSIS0403

CSIS0405. Professionalism and ethics (6 credit-units)

Topics include definitions of software engineering subject areas and professional activities; professional societies and ethics; professional competency and life-long training; uses, misuses and risks of software; information security and privacy; intellectual property and software law; software contract; social responsibilities; and software engineering standards.

CSIS0408. Topics in software engineering (6 credit-units)

Advanced topics in software engineering that are of current interest.

Area III. Languages, Compilers & Theory of Computation

CSIS0259. Principles of programming languages (6 credit-units)

Syntax and semantics specification; data types; data control and memory management; expressions, precedence and associativity of operators; control structures; comparative study of existing programming languages; advanced topics such as polymorphism, programming paradigms, exception handling and concurrency.

Prerequisites: CSIS1118/CSIS1121, CSIS1119 and CSIS1120/ELEC1622/ELEC1613

CSIS0250. Design and analysis of algorithms (6 credit-units)

The course studies various algorithms design techniques, such as divide and conquer, and dynamic programming. These techniques are applied to design highly non-trivial algorithms from various areas of computer science. Topics include: advanced data structures; graph algorithms; searching algorithms; geometric algorithms; overview of NP-complete problems.

Pre/Co-requisites: CSIS1117 and CSIS1119; or CSIS0912/ELEC1501

CSIS0235. Compiling techniques (6 credit-units)

Lexical analysis; symbol table management; parsing techniques; error detection; error recovery; error diagnostics; run-time memory management; optimization; code generation.

Prerequisite: CSIS0259

CSIS0293. Introduction to theory of computation (6 credit-units)

The aim of this course is to study the complexity of computation. Topics include computational models; computable and non-computable problems; classification of problems according to their time and space complexity; real-life problems that are unlikely to be solved using reasonable amount of time; reduction and completeness; approximation algorithms and nonapproximability.

Prerequisites: CSIS1119 and CSIS0250

CSIS0202. Applied optimization techniques (6 credit-units)

Linear, integer and dynamic programming; transportation and assignment problems; network flow and network algorithms; project scheduling; Markov decision process; simulated annealing.

Prerequisite: CSIS0250

CSIS0324. Topics in theoretical computer science (6 credit-units)

Topics of current interest in theoretical computer science not covered by other undergraduate courses. Topics may vary from year to year.

Pre/Co-requisite: CSIS0293 or CSIS0250

CSIS0351. Applied algorithms (6 credit-units)

The aim of this course is to let students appreciate how real world problems are solved with sophisticated algorithms and data structures. It covers problems drawn from the following areas: data compression, cryptography, heuristic searching, pattern matching in biology, indexing and search engines, data mining, graphics, VLSI layout, and online scheduling.

Prerequisite: CSIS0250

Area IV. Applications

CSIS0270. Artificial intelligence (6 credit-units)

AI programming languages; logic; theorem proving; searching; problem solving.

Prerequisite: CSIS1119 or CSIS0912

CSIS0271. Computer graphics (6 credit-units)

Overview of graphics hardware, basic drawing algorithms, 2-D transformations, windowing and clipping, interactive input devices, curves and surfaces, 3-D transformations and viewing, hidden-surface and hidden-line removal, shading and colour models, modelling, illumination models, image synthesis, computer animation.

Prerequisite: CSIS1119

CSIS0317. Computer vision and recognition of patterns and speech (6 credit-units)

Students taking this course will learn how image and speech are represented inside a computer; how their characteristics are extracted, represented and described; and finally, how recognition can be performed.

Prerequisites: CSIS1117 and CSIS1119; or CSIS0912; or ELEC1501

CSIS0218. Discrete event simulation (6 credit-units)

Topics include: monte carlo methods, discrete event simulation, elements of simulation models, data collection and analysis, simulation language for modeling, random number generation, queuing models, and output analysis.

Prerequisite: CSIS1119 or CSIS0912 or ELEC1501

CSIS0321. Financial computing (6 credit-units)

The objective of this course is to introduce to students the pricing of financial derivatives using such fundamental engineering methodologies as probabilistic modeling and analysis. This course discusses basic security valuation theories and portfolio management. Emphasis is placed on fundamental common stock analysis, capital market theory, analysis of portfolio performance, market efficiency, and behavior of stock prices.

Prerequisite: CSIS0297 or CSIS1401

CSIS0311. Legal aspects of computing (6 credit-units)

To introduce students to the laws affecting computing and the legal issues arising from the technology. Contents include: the legal system of Hong Kong; copyright protection for computer programs and databases; intellectual property issues on the Internet; patent protection for computer-related inventions; confidential information in the computing industry; computer contracts and licences; electronic transactions; computer crimes; data protection. This course may not be taken with LLAW3065.

Prerequisite: CSIS1117

CSIS0315. Multimedia computing and applications (6 credit-units)

This course introduces various aspects of the interdisciplinary and multidisciplinary field of multimedia computing. Current developments of technologies and techniques in multimedia will also be covered. Applications of multimedia techniques are also highlighted through a media production course project. Major topics include: what are media, audio, acoustics and psychoacoustics, MIDI, compression techniques such as predictive coding and transform coding, video compression techniques, standards, current multimedia technologies, storage, data placement, and scheduling.

Co-requisite: CSIS0234 or BUSI0073

CSIS0262. Topics in computer applications (6 credit-units)

Some specialized application areas of computers.

CSIS0326. Introduction to computational molecular biology (6 credit-units)

A major problem in Computational Molecular Biology is to determine the structures of a genome which is a set of DNA molecules that encode the entire genetic information of a species. Because of the vast amounts of data involved in sequencing and analysing DNA at various levels, we need novel and special computational techniques to process these data efficiently. This course will cover some of these techniques and show how they are used to solve problems in bioinformatics. Topics include: DNA sequence similarity and alignment; phylogenetic inference; gene recognition; gene analysis; structure prediction.

Prerequisite: CSIS0250

Project

CSIS0801. Year project (12 credit-units)

Students will be required to undertake a computing project which demands substantial work under the supervision of a teacher. This may not be taken with CSIS0802 Software Engineering Project.

BROADENING/COMPLEMENTARY COURSES

ECEN1503. English for computer science (3 credit-units)

The focus is on developing confidence in the use of English in written and oral forms. Topics include: questioning skills, negotiating meaning, making effective grammatical and lexical choices, producing coherent writing and making confident oral presentations. Students engage in a substantial amount of project work.

ECEN1504. Professional and technical communication for computer science (3 credit-units)

The focus is on the understanding and use of spoken and written English for professional and technical communication. Topics include collecting, organizing and understanding information; presenting information in written and oral forms, technical report writing. Students work in groups to design and implement an investigative project related to their professional discipline.

CENG1001. Practical Chinese language course for engineering students (3 credit-units)

The course is designed to introduce practical Chinese writing skills; letter-writing: official, business & personal; office documents: notices, announcements, proposals, minutes and reports; technical writing skills; the language of legal documents: tenders and contracts; characteristics of the written language used in China, Hong Kong, Taiwan and Singapore; the art of public speaking; different scripts of Chinese characters; the engineering profession and Chinese culture.

In addition to the courses prescribed in the syllabuses, students in the Department of Computer Science and Information Systems may apply to take the following additional courses outside their formal curriculum:

CENG1002. Putonghua course for students in the Faculty of Engineering (non-credit-unit bearing)

The course is divided into three parts: i) pronunciation; ii) the pinyin systems; and iii) texts: greetings, numbers, inquiry, time and appointments, asking for direction; shopping; making phone calls; at the bank; in the post office; and food and engineering terminology.

CENG1003. Advanced language studies in Chinese for engineering students (3 credit-units)

The course aims to help students to: (1) enhance their proficiency of the Chinese language and to improve their communication skills; (2) investigate the cultural, social and commercial conditions in Hong Kong, China and neighboring regions as reflected in the language; (3) address their needs in job hunting and career planning; (4) strengthen their language self-learning capacity. Main topics include: language, logical thinking and communication skills; language ability, job-hunting and career planning; design and propagation of Chinese websites in the engineering profession.
Assessment: 100% coursework

Prerequisite: CENG1001