

**FACULTY OF ENGINEERING****Department of Computer Science**

Assessment of each course will be based on a three-hour written examination and in-course assessment in a ratio as indicated below.

**CSIS1117. Computer programming I (6 credits)**

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.

Assessment: 50% coursework; 50% examination

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**CSIS1118. Mathematical foundations of computer science (6 credits)**

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

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**CSIS1119. Introduction to data structures and algorithms (6 credits)**

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

Assessment: 40% coursework; 60% examination

Prerequisite: CSIS1117 *or* ELEC1501

Co-requisite: CSIS1122

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**CSIS1120. Machine organization and assembly language programming (6 credits)**

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.

Co-requisite: CSIS1117 *or* ELEC1501

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**CSIS1122. Computer programming II (6 credits) [for intake of 2006 and after]**

This is the second programming course following the CSIS1117. The goal of this course is to strengthen students' programming skills, in particular, on implementing basic data structures and algorithms. Students will also learn various tools for developing programs in the UNIX/Linux environment.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1117 *or* ELEC1501

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**CSIS0230. Principles of operating systems (6 credits)**

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: CSIS1119; *and* CSIS1120 *or* ELEC1401 *or* ELEC1613

**CSIS0234. Computer and communication networks (6 credits)**

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; and examples of network protocols.

Prerequisite: CSIS1120 *or* ELEC1401 *or* ELEC1613

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**CSIS0250. Design and analysis of algorithms (6 credits)**

The course studies various algorithm 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.

Assessment: 50% coursework; 50% examination

Pre/Co-requisite: CSIS1119 *or* ELEC1501

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**CSIS0259. Principles of programming languages (6 credits) [for intake of 2005]**

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: CSIS1119; *and* CSIS1120 *or* ELEC1401 *or* ELEC1613

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**CSIS0270. Artificial intelligence (6 credits)**

This is an introduction course on the subject of artificial intelligence. Topics include: intelligent agents; search techniques for problem solving; knowledge representation; logical inference; reasoning under uncertainty; statistical models and machine learning. This course may not be taken with BUSI0088.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1119 *or* CSIS1122

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**CSIS0271. Computer graphics (6 credits)**

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.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1119 *or* CSIS1122

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**CSIS0278. Introduction to database management systems (6 credits)**

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, integrity, concurrency control, and query processing. This course may not be taken with BUSI0052.

Assessment: 60% coursework; 40% examination

Prerequisite: CSIS1119 *or* ELEC1501

**CSIS0293. Introduction to theory of computation (6 credits)**

This course focuses on three traditional areas of the theory of computation: automata, computability and complexity. Topics include finite state automata and regular languages; pushdown automata and context free languages; Turing machines and random access machines; time complexity; space complexity; intractable problems; reduction and completeness; relationship among complexity classes; approximation algorithms and nonapproximability.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1119

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**CSIS0297. Introduction to software engineering (6 credits)**

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. The use of CASE tools and the UML are emphasized. The course includes a team-based project in which students apply their new knowledge to a full development lifecycle, including maintenance.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1117 *or* CSIS0396 *or* ELEC1501 (for intake of 2005 or before)

CSIS1122 (for intake of 2006 and after)

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**CSIS0311. Legal aspects of computing (6 credits)**

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; computer-related crime.

This course may not be taken with LLAW3065.

Assessment: 30% coursework; 70% examination

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**CSIS0315. Multimedia computing and applications (6 credits)**

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, basic compression techniques, video compression techniques, standards, and current multimedia technologies. This course may not be taken with BUSI0068.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1119

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**CSIS0317. Computer vision (6 credits)**

This course introduces the principles, mathematical models and applications of computer vision. Topics include: image processing techniques, feature extraction techniques, imaging models and camera calibration techniques, stereo vision, and motion analysis.

Assessment: 50% coursework; 50% examination

Prerequisite: CSIS1119 *or* ELEC1501

**CSIS0320. Electronic commerce technology (6 credits)**

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 Internet and WWW technology, information security technologies, public-key crypto-systems, public-key infrastructure, electronic payment systems, and electronic commerce activities in different sectors.

Assessment: 40% coursework; 60% examination

Prerequisite: CSIS0278

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**CSIS0322. Internet and the World Wide Web (6 credits)**

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. This course may not be taken with BUSI0063.

Assessment: 40% coursework; 60% examination

Prerequisite: CSIS1117 or ELEC1501

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**CSIS0396. Object-oriented programming and Java (6 credits)**

Introduction to object-oriented programming; abstract data types and classes; inheritance and polymorphism; object-oriented program design; Java language and its program development environment; user interfaces and GUI programming; collection class and iteration protocol; program documentation. Assessment: 40% coursework; 60% examination

Pre-requisite: CSIS1117 or ELEC1501

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**CSIS0405. Professionalism and ethics (3 credits)**

This course exposes students to issues of professionalism in computing. Topics included professional societies and ethics, professional competency and life-long learning, methods and tools of analysis, risks and liabilities of computer-based systems, intellectual property and software law, information security and privacy, and the social impacts of computing.

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**CSIS0521. Concepts and tools for software development (6 credit-units)**

This course will introduce the following concepts and techniques for software development: key steps in a software development life cycle; software development methodologies; components of a web-based software tools; installation of servers (e.g. web server, database server etc.); web programming (e.g. PHP, MySQL); key issues in human-user interface; data visualization (e.g. visualization on the web with SVG). Examples will be drawn from practical cases such as bioinformatics software tools development. The emphasis is on how to formulate the computational problem based on the user requirements and the related practical concerns for the development of the software. This course is open to non-Engineering students only.

Assessment: 50% coursework; 50% examination

Pre-requisite: CSIS1117

**CSIS0801. Final year project (12 credits)**

This is a team project, to be taken by students in the final year, which requires substantial contribution from every individual team member. The project will go through the common process of requirements, analysis, design, implementation, testing, etc. Project standards will be enforced.

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**CSIS0803. System integration project (6 credits)**

This is a team project involving development and integration of software components. The objective is to put the concepts and theories covered in the core courses into practice. The output will be a distributed software system based on well-defined requirements. Software tools will be used and system programming is a compulsory part of the project.

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**CSIS1410. Industrial training (3 credits)**

Industrial Training requires students to spend a minimum of six weeks employed, full-time, as IT interns or trainees. During this period, they are engaged in work of direct relevance to their programme of study. CSIS1410 provides students with practical, real-world experience and represents a valuable complement to their academic training.

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**CSIS1411. Workshop training (3 credits)**

This is a compulsory course taken after completing the first year of studies. Workshop Training is structured as a series of modules in which students gain direct, hands-on experience of various industry-standard software tools and technologies. As well as providing an exposure to current "tools of the trade", the course also emphasizes the application of engineering principles to the development and use of software systems.

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**CSIS1421. Engineering mathematics (6 credits)**

Linear algebra, probability and statistics, calculus, and ordinary differential equations.

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**Other CSIS Courses**

Students may apply to enrol in other CSIS courses not listed above, subject to the approval of the Head of the Department of Computer Science.