

**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 (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; modeling 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 CSIS0396 or CSIS0911 or ELEC1501.

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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 Computer programming or ELEC1501 Computer programming and data structures.

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**Semesters III to VI****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 Introduction to data structures and algorithms; and CSIS1120 Machine organization and assembly language programming; or ELEC1401 Computer organization and microprocessors or ELEC1613 Assembly language programming and microprocessors.

**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; examples of network protocols.

Prerequisite: CSIS1120 Machine organization and assembly language programming or ELEC1401 Computer organization and microprocessors or ELEC1613 Assembly language programming and microprocessors.

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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 CSIS0912 or ELEC1501.

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

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

Assessment: 50% coursework; 50% examination.

Prerequisite: CSIS1119 or CSIS0912.

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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 CSIS0912.

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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.

Assessment: 60% coursework; 40% examination.

This course may not be taken with BUSI0052.

Prerequisite: CSIS1119 or CSIS0912 or ELEC1501.

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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.

This course may not be taken with CSIS1401.

Prerequisite: CSIS1117 or CSIS0396 or CSIS0911 or ELEC1501.

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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 contracts and licences; electronic transactions; data protection.

Assessment: 30% coursework; 70% examination.

This course may not be taken with LLAW3065.

Prerequisite: CSIS1117 or CSIS0396 or CSIS0911 or ELEC1501.

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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.

Assessment: 50% coursework; 50% examination.

This course may not be taken with BUSI0068.

Prerequisite: CSIS1119 or CSIS0912.

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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 CSIS0912 or ELEC1501.

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### **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 or CSIS0912.

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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.

Assessment: 40% coursework; 60% examination.

This course may not be taken with BUSI0063.

Prerequisite: CSIS1117 or CSIS0396 or CSIS0911 or ELEC1501.

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### **CSIS0396. Programming methodology and object-oriented programming (6 credits)**

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

Assessment: 50% coursework; 50% examination.

This course may not be taken with CSIS1422.

Co-requisite: CSIS1117 or CSIS0911 or ELEC1501.

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### **CSIS0521. Concepts and tools for software development (6 credits)**

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.

Assessment: 50% coursework; 50% examination.

This course is open to non-Engineering students only.

Pre-requisite: CSIS1117.

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### **CSIS0803. Systems 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 main software engineering courses (such as CSIS0297, CSIS0401, CSIS0402 and CSIS0403) 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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### **CSIS1411. Workshop training (summer) (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, multi-variable calculus, and ordinary differential equations.

**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.