

**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)*

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**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.
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**CSIS 2 Length of Study**

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

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**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, 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.
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**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.

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

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**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.

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**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.

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

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**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.

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

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**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.
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### **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.

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### **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
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**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, the best 180 credit-units as specified in the syllabuses of the BSc(CSIS) programme, and other relevant factors into consideration<sup>1</sup>.

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<sup>1</sup> Regulation CSIS14 is applied to students who graduate in June 2003 and beyond irrespective of their year of intake.

**PROGRAMME STRUCTURE AND SYLLABUSES  
FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND  
INFORMATION SYSTEMS (2008-2009)**

**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.
- 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 18 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
- Mathematical foundations of computer science
- Introduction to data structures and algorithms
- Machine organization and assembly language programming
- Introduction to information systems

Level 2

- Principles of operating systems
- Computer and communication networks
- Introduction to database management systems
- Final 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	<ul style="list-style-type: none"> <li>• Principles of operating systems</li> <li>• Computer architecture</li> <li>• Object-oriented programming and Java</li> <li>• Computer and communication networks</li> <li>• Operating systems laboratory</li> <li>• Open source software development</li> <li>• System architecture and distributed computing</li> <li>• Internet and the World Wide Web</li> <li>• Fundamentals of system performance modelling</li> <li>• Topics in computer systems</li> <li>• Topics in Web technologies</li> <li>• Wireless and mobile computing</li> <li>• Real-time and embedded systems</li> <li>• Scientific computing</li> </ul>

II. Information Systems Development & Management	<ul style="list-style-type: none"> <li>• Introduction to software engineering</li> <li>• Introduction to database management systems</li> <li>• Analysis and design of software systems [last offered in 2006-2007]</li> <li>• Implementation, testing and maintenance of software systems</li> <li>• Advanced database systems</li> <li>• Electronic commerce technology</li> <li>• Computer and network security</li> <li>• Software quality and project management</li> <li>• Professionalism and ethics</li> </ul>
III. Languages, Compilers & Theory of Computation	<ul style="list-style-type: none"> <li>• Principles of programming languages</li> <li>• Design and analysis of algorithms</li> <li>• Compiling techniques</li> <li>• Introduction to theory of computation</li> <li>• Topics in theoretical computer science</li> <li>• Applied algorithms</li> </ul>
IV. Applications	<ul style="list-style-type: none"> <li>• Artificial intelligence</li> <li>• Computer graphics</li> <li>• Computer vision</li> <li>• Discrete event simulation</li> <li>• Legal aspects of computing</li> <li>• Pattern classification and machine learning</li> <li>• Multimedia computing and applications</li> <li>• Advanced multimedia</li> <li>• Topics in computer applications</li> <li>• Computational molecular biology</li> <li>• Computer game design and programming</li> <li>• Research internship</li> </ul>

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#### 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)

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#### 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)

The degree classification shall be based on the best 180 credit-units from:

- (a) All the CSIS compulsory courses;
- (b) CSIS0801 Final Year Project;
- (c) For specialization in CS:
  - 36 credit-units of courses in Area I and Area III, with at least 12 from each of the two areas;
- (d) For specialization in IS:
  - 36 credit-units of courses in Area I and Area II, with at least 12 from each of the two areas;
  - 18 credit-units of courses in basic knowledge of business;
- (e) 42 credit-units of broadening/complementary courses comprising
  - 6 credit-units of First-year Mathematics/Statistics course(s) offered by the Mathematics Department and Statistics Department;
  - 3 credit-units of ECEN1503: English for computer science;
  - 3 credit-units of ECEN1504: Professional and technical communication for computer science;
  - 3 credit-units of CENG1001: Practical Chinese language course for engineering students;
  - 3 credit-units of one broadening course in humanities and social sciences studies;
  - 24 credit-units of courses outside CSIS degree curriculum;
- (f) Best of remaining courses to make up 180 credit units, out of which at least 90 are earned from CSIS courses.

## SYLLABUSES FOR LEVEL 2 COURSES

### CSIS COURSES

#### 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, case studies.

Prerequisites: CSIS1119 (for intake of 2007 and before) or CSIS1122 (for intake of 2008 and thereafter); and CSIS1120 or ELEC1401

#### **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. Object-oriented programming and Java (6 credit-units)**

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.

Pre-requisite: CSIS1117 or ELEC1501 or ENGG1002

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**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; and examples of network protocols.

Prerequisite: CSIS1120 or ELEC1401

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**CSIS0232. Operating systems laboratory (6 credit-units)**

Laboratory-based learning through the implementation of an operating system or some of its essential components supporting such functions as multitasking, process scheduling, multithreading, multiprocessing, memory management, paging, caching, I/O scheduling, filesystems, and device drivers.

Prerequisite: CSIS0230

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**CSIS0233. Open source software development (6 credit-units)**

This course explores open source software (OSS) engineering. Topics include: definition and philosophical foundations of OSS; the OSS engineering process; adoption of open standards; platforms and programming languages for OSS development; usage of collaborative tools; code reading skills; version control and software packaging; testing and maintenance of OSS; management of user feedbacks and contributions; and some licensing and deployment issues.

Pre-requisite: CSIS0230; experience with Unix/Linux systems; C++/Java programming *or*

Co-requisite: CSIS0234 and CSIS0297

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**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.

Prerequisite: CSIS0396

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**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.

This course may not be taken with BUSI0063.

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002

**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: CSIS0230

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

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

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**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

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**CSIS0328. Wireless and mobile computing (6 credit-units)**

This course introduces the basic principles and technologies in various mobile and wireless communication systems. Topics include mobile communication environment; digital modulation; channel coding; medium access technologies; cellular mobile radio systems; wireless LANs; security in wireless systems; internetworking in wireless systems; mobility applications.

Prerequisite: CSIS0234

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**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

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**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 or ELEC1501 or ENGG1002; and CSIS1118 or CSIS1121

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***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. 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.

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

Prerequisite: CSIS1122 (for intake of 2006 and thereafter) or ENGG1002

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

Prerequisite: CSIS1119 or ELEC1501 or ELEC1502

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**CSIS0401. Analysis and design of software systems (6 credit-units) [last offered in 2006-2007]**

This course elaborates on software analysis and design. Topics in analysis include: feasibility analysis and the system proposal; requirements discovery; information modelling and analysis; process modelling and object-oriented analysis. Topics in design include: process design, input and output design, user-interface design and object-oriented design.

Prerequisite: CSIS0297

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**CSIS0403. Implementation, testing and maintenance of software systems (6 credit-units)**

This course examines the theory and practice of software implementation, testing and maintenance. Topics in implementation include: detailed design issues and implementation strategies; coding style and standards; the review process; individual software process and metrics; and reuse. Also examined are the implementation aspects of contemporary approaches such as generic programming, design patterns, and design by contract. 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: CSIS0297 or CSIS0401

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**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: query optimization, spatial-spatiotemporal data management, multimedia and time-series data management, information retrieval and XML, data mining.

Prerequisite: CSIS0278

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

Prerequisite: CSIS0278

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**CSIS0327. Computer and network security (6 credit-units)**

This course introduces the principles, mechanisms and implementation of computer security and data protection. Knowledge about the attack and defend are included. Topics include notion and terms of information security; introduction to encryption: classic and modern encryption technologies include public-key systems; authentication methods; access control methods; system integrity attacks and defences (e.g. viruses); introduction to network/Internet security; analysis and models of secure systems.

Pre-requisites: CSIS0230 and CSIS0234



**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.

This course may not be taken with BUSI0060 or BUSI0061.

Prerequisite: CSIS0297

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**CSIS0405. Professionalism and ethics (3 credit-units)**

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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***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: CSIS1119; and CSIS1120 or ELEC1401

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

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.

Pre/Co-requisite: CSIS1119 or ELEC1501 or ELEC1502

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**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

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

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.

Prerequisite: CSIS1119

**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

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**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

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*Area IV. Applications***CSIS0270. Artificial intelligence (6 credit-units)**

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.

Prerequisite: CSIS1119 or CSIS1122

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**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 or CSIS1122

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**CSIS0317. Computer vision (6 credit-units)**

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.

Prerequisite: CSIS1119 or ELEC1501 or ELEC1502

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**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 modelling, random number generation, queuing models, and output analysis.

Prerequisite: CSIS1119 or CSIS1122 or ELEC1501 or ELEC1502

**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; computer-related crime

This course may not be taken with LLAW3065.

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**CSIS0314. Pattern classification and machine learning (6 credit-units)**

This is an introduction course on the subjects of statistical pattern classification and machine learning. Topics include: introduction to pattern classification problems; performance evaluation; Bayesian decision theory; feature extraction techniques; parametric models; maximum-likelihood parameter estimation; maximum-discriminant decision rules; minimum classification error training; clustering techniques; decision trees and their learning techniques.

Prerequisite: CSIS1119 or ELEC1501 or ELEC1502

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**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, basic compression techniques, video compression techniques, standards, and current multimedia technologies.

This course may not be taken with BUSI0068.

Prerequisite: CSIS1119

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**CSIS0318. Advanced multimedia (6 credit-units)**

This course covers some theoretical foundations that catalyzed the development of multimedia technologies in recent years. These include the understanding in human perception, advanced compression techniques, media streaming technologies, and media modelling techniques. Students will gain practical experience of development of multimedia tools through coursework.

Co-requisite: CSIS0315

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

Some specialized application areas of computers.

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**CSIS0326. Computational molecular biology (6 credit-units)**

The novel and specialised algorithms needed to solve computational problems related to the vast amounts of data generated by modern molecular biology techniques will be examined in detail.

Prerequisites: CSIS0250 or BIOC2808

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**CSIS0329. Computer game design and programming (6 credit-units)**

The course will study practical topics in game design. The focus will be on 3D game design. Topics includes: types and design of game engine, modelling, texture mappings, real-time rendering techniques, lighting, kinematics, dynamics, collision detection, visibility culling, AI, sound and networking.

Pre-requisite: CSIS0271

**CSIS0412. Research internship (6 credit-units)**

The student will participate in a research project under the guidance and supervision of a teacher over a prescribed period of time; the results will be presented in an oral and a written report; the work involved must not overlap with that for the final-year project or any other major project.

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**PROJECT****CSIS0801. Final Year project (12 credit-units)**

Student individuals or groups, during the final year of their studies, undertake full end-to-end development of a substantial project, taking it from initial concept through to final delivery. Topics range from applied software development to assignments on basic research. In case of a team project, significant contribution is required from each member and students are assessed individually, such that each student is given a separate project title. Strict standards of quality will be enforced throughout the project development.

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**BROADENING/COMPLEMENTARY COURSES****ECEN1503. English for computer science (3 credit-units)****ECEN1504. Professional and technical communication for computer science (3 credit-units)****CENG1001. Practical Chinese language course for engineering students (3 credit-units)**

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In addition to the courses prescribed in the syllabuses, students in the Department of Computer Science 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)****CENG1003. Advanced language studies in Chinese for engineering students (3 credit-units)**