

COMPUTER SCIENCE (2014-15)

SYLLABUS

This syllabus applies to students admitted in the academic years 2010/11, 2011/12 and 2012/13 under the three-year curriculum.

The curriculum comprises 180 credits of courses as follows:

- (a) 75-78 credits of core courses [see table for list of courses];
- (b) 30 credits of discipline electives;
- (c) Industrial training (6 credits)
- (d) UG5 requirements (21 credits) [see table for list of courses];
- (e) 6 credits of complementary studies courses [see table for list of courses];
- (f) 39-42 credits of free electives.

To complete the degree requirement, candidates must pass all the courses specified in the curriculum. In addition, candidates must satisfy any other requirements as stipulated by the University and Faculty of Engineering.

Candidates pursuing the BEng(CompSc) degree may pursue a **minor** offered by other departments in the Faculty of Engineering or by other faculties in accordance with the regulations of the University and the syllabus for the degree of BEng.

Candidates may also opt for a **second major** offered by other faculties in accordance with the regulations of the University.

Courses taken for minor or second major may be used to satisfy the requirements of free electives.

	Introductory ^(Note 1)	Advanced ^(Note 1)
Core courses (75-78 credits)	<ul style="list-style-type: none"> • ENGG1003 Mathematics I (6 credits) / ENGG1004 Mathematics IA (3 credits) • One General Engineering course^(Note 2) • ENGG1007 Foundations of computer science • ENGG1002 Computer programming and applications • CSIS1122 Computer programming II (for intakes of 2010 and 2011) / CSIS1123 Programming technologies and tools (for intake of 2012) • CSIS1120 Computer organization • CSIS1119 Introduction to data structures and algorithms (sub-total: 39-42 credits)	<ul style="list-style-type: none"> • CSIS0230 Principles of operating systems • CSIS0234 Computer and communication networks • CSIS0250 Design and analysis of algorithms • CSIS0278 Introduction to database management systems • CSIS0801 Final year project (12 credits) (sub-total: 36 credits)
Discipline Electives (30 credits)	<ul style="list-style-type: none"> • At least 30 credits of electives in computer science, excluding Research internship 	
Training (6 credits)	<ul style="list-style-type: none"> • CSIS1412 Industrial training^(Note 3) 	
UG5 Requirements	<ul style="list-style-type: none"> • CAES1515 Professional and technical oral communication for engineers • CAES1503 English for computer science^(Note 4) 	

(21 credits)	<ul style="list-style-type: none"> • CENG1001 Practical Chinese language course for engineering students ^(Note 5) <p>(sub-total: 9 credits)</p> <ul style="list-style-type: none"> • Two University Common Core Courses (selecting no more than one course from each Area of Inquiry) <p>(sub-total: 12 credits)</p>
Complementary Studies (6 credits)	<ul style="list-style-type: none"> • ELEC2803 Engineering and society • ELEC2802 Engineering organization and management / ELEC2804 Engineering economics and finance / CSIS0311 Legal aspects of computing ^{(Note 6) (Note 7)}
Free Electives (39-42 credits)	

Note 1 Introductory core courses and courses for the UG5 Requirements are normally taken in Year 1, and advanced core courses are normally taken in Year 2/3.

Note 2 One course to be chosen from the following list of General Engineering Courses:

ENGG1006	Engineering for sustainable development
ENGG1009	Industrial management and logistics
ENGG1018	Introduction to mechanical engineering
ENGG1011	Introduction to biomedical engineering
ENGG1015	Introduction to electrical and electronic engineering

Refer to the syllabus for the degree of BEng for details.

Note 3 Students who are selected to participate in the Undergraduate Research Fellowship Programme are required to complete CSIS0412 Research Internship and are not required to complete CSIS1412 Industrial Training.

Note 4 Students pursuing the double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1503.

Note 5 Putonghua-speaking students should take CUND0002 or CUND0003. Students who have not studied Chinese language during their secondary education / who have not attained the requisite level of competence in the Chinese language to take CENG1001 can apply (i) to take credit-bearing Cantonese or Putonghua language courses offered by the School of Chinese especially for international and exchange students; OR (ii) to be exempted from the Chinese language requirement and take an elective course in lieu.

Note 6 When used to fulfill the Complementary Studies requirement, "Legal aspects of computing" (6 credits) can also be used to fulfill 3 credits of free elective.

Note 7 ELEC2802 Engineering organization and management, ELEC2803 Engineering and society, and ELEC2804 Engineering economics and finance will not be offered from 2011/12. To satisfy the Complementary Studies requirement, students are required to complete ELEC2814 Engineering management and society, which is a 6-credit course.

For candidates admitted in 2010/11 and 2011/12, the degree classification shall be based on the best

180 credits according to the curriculum :

- (a) all the core courses (75-78 credits);
- (b) Industrial training (6 credits);
- (c) all the courses in the category of the UG5 Requirements (21 credits);
- (d) Complementary Studies courses (6 credits); and
- (e) the remaining courses with the best results, including at least 30 credits of discipline electives.

For candidates admitted in 2012/13, the degree of Bachelor of Engineering shall be awarded in five divisions in accordance with EN16 of the Regulations for the Degree of Bachelor of Engineering and UG9 of the Regulations for the First Degree Curricula.

Second Major in Computer Science

Computer science is a young but fast growing discipline. Its importance is evident in the profound impact that the use of computers has on our everyday life. Computer science education is now as indispensable as any of the traditional programmes in any established world-renowned university. This Major in Computer Science provides students with a substantial foundation in key computer science subject areas and modern software technologies. On completion of this 2nd Major, students will be well-equipped with both basic and advanced knowledge in computer science, which aims to better prepare students to launch their career in the IT industry and/or to pursue postgraduate studies in Computer Science in the future.

Minimum Entry Requirement:

- 1. Grade E or above in AL Pure Mathematics or Applied Mathematics; or
- 2. Grade D or above in AS Mathematics & Statistics or Applied Mathematics; or
- 3. Grade C or above in HKCEE Additional Mathematics; or
- 4. Grade C or above in HKCEE Mathematics and grade E or above in Additional Mathematics.

Minimum Credit Requirement: 72 credits (36 credits of core courses, 36 credits of electives)*

**no capstone requirement*

Impermissible Combination: Minor in Computer Science

Required courses (72 credits)

		Credits
1. Core courses (36 credits)		
CSIS1117	Computer programming I	6
CSIS1118	Foundations of computer science ^(Note 1)	6
CSIS1122	Computer programming II	6
or		
CSIS1123	Programming technologies and tools	6
CSIS1119	Introduction to data structures and algorithms	6
CSIS1120	Computer organization	6
CSIS0278	Introduction to database management systems	6

2. Electives (36 credits) ^(Note 2)

CSIS0230	Principles of operating systems	6
CSIS0231	Computer architecture	6
CSIS0234	Computer and communication networks	6
CSIS0235	Compiling techniques	6
CSIS0250	Design and analysis of algorithms	6
CSIS0259	Principles of programming languages	6
CSIS0270	Artificial intelligence	6
CSIS0271	Computer graphics	6
CSIS0297	Introduction to software engineering	6
CSIS0311	Legal aspects of computing	6
CSIS0314	Machine learning	6
CSIS0315	Multimedia computing and applications	6
CSIS0317	Computer vision	6
CSIS0320	Electronic commerce technology	6
CSIS0322	Modern technologies on World Wide Web	6
CSIS0323	Advanced database systems	6
CSIS0327	Computer and network security	6
CSIS0328	Wireless and mobile communication	6
CSIS0329	Computer game design and programming	6
CSIS0351	Advanced algorithm analysis	6
CSIS0396	Object-oriented programming and Java	6
CSIS0402	System architecture and distributed computing	6
CSIS0403	Implementation, testing and maintenance of software systems	6
CSIS0404	Software quality and project management	6
CSIS0407	Scientific computing	6
CSIS2258	Functional programming	6
CSIS3330	Interactive mobile application design and programming	6

Note 1 Students whose first major is Mathematics may be granted waiver of CSIS1118, upon application, on the condition that students are required to complete one more elective in Computer Science as replacement. Students who have completed MATH2600 Discrete mathematics are deemed to have completed CSIS1118, they are not permitted to take CSIS1118 and are required to complete one more elective in Computer Science.

Note 2 Course enrollment in elective courses is subject to the approval of the Department of Computer Science, in consideration of class quota and other academic issues.

Minor in Computer Science ^(Note 1)

Introduction

The Department of Computer Science has a long tradition of offering IT courses to students of other departments. To declare a “Minor in Computer Science”, students are required to pass 2 core courses and at least 4 elective courses in computer science. All these courses are of 6 credits. They will be taught in a single semester with 3 hours of lectures per week. Assessment of each course is based on a three-hour written examination and continuous assessment.

Students are also welcome to take any of the following courses as free electives.

Core Courses:

- CSIS1117 Computer programming I ^(Note 2)
- CSIS1122 Computer programming II or
CSIS1123 Programming technologies and tools

Elective Courses: ^(Note 3)

- CSIS1118 Foundations of computer science
- CSIS1119 Introduction to data structures and algorithms
- CSIS1120 Computer organization
- CSIS0230 Principles of operation systems
- CSIS0231 Computer architecture
- CSIS0234 Computer and communication networks
- CSIS0235 Compiling techniques
- CSIS0250 Design and analysis of algorithms
- CSIS0259 Principles of programming languages
- CSIS0270 Artificial intelligence
- CSIS0271 Computer graphics
- CSIS0278 Introduction to database management systems
- CSIS0297 Introduction to software engineering
- CSIS0311 Legal aspects of computing
- CSIS0314 Machine learning
- CSIS0315 Multimedia computing and applications
- CSIS0317 Computer vision
- CSIS0320 Electronic commerce technology
- CSIS0322 Modern technologies on World Wide Web
- CSIS0323 Advanced database systems
- CSIS0327 Computer and network security
- CSIS0328 Wireless and mobile communication
- CSIS0329 Computer game design and programming
- CSIS0351 Advanced algorithm analysis
- CSIS0402 System architecture and distributed computing
- CSIS0403 Implementation, testing and maintenance of software systems
- CSIS0404 Software quality and project management
- CSIS0407 Scientific computing
- CSIS0396 Object-oriented programming and Java
- CSIS2258 Functional programming
- CSIS3330 Interactive mobile application design and programming

Note 1 This minor option is not available for BEng(CE) and BEng(CompSc) students.

Note 2 BEng students who have completed ENGG1002 Computer programming and applications are deemed to have completed CSIS1117 Computer programming I, they are required to complete one more elective in Computer Science as replacement (i.e. a total of 30 credits).

Note 3 Course enrollment in elective courses is subject to the approval of the Department of Computer Science, in consideration of class quota and other academic issues.

COURSE DESCRIPTIONS

ENGG1002. Computer programming and applications (6 credits)

This course covers both the basic and advanced features of the C/C++ programming languages, including syntax, identifiers, data types, control statements, functions, arrays, file access, objects and

classes, class string, structures and pointers. It introduces programming techniques such as recursion, linked lists and dynamic data structures. The concept and skills of program design, implementation and debugging, with emphasis on problem-solving, will also be covered.

Target students are those who wish to complete the programming course in a more intensive mode in 1 semester. Students with some programming knowledge are encouraged to take this course.

Assessment: 50% continuous assessment, 50% examination

ENGG1003. Mathematics I (6 credits)

Linear algebra, advanced calculus, vector analysis, ordinary differential equations, Laplace transforms.

Prerequisite : HKALE Pure Mathematics

Assessment: 10% continuous assessment, 90% examination

ENGG1004. Mathematics IA (3 credits)

Linear algebra, advanced calculus, ordinary differential equations.

Assessment: 10% continuous assessment, 90% examination

ENGG1007. Foundations of computer science (6 credits)

This course provides students a solid background on discrete mathematics and structures pertinent to computer science. Topics include logic; set theory; mathematical reasoning; counting techniques; discrete probability; trees, graphs, and related algorithms; modeling computation.

Assessment: 50% continuous assessment, 50% examination

CAES1503. English for computer science (3 credits)

(course code revised from ECEN1503 from 2010-11)

The course is designed to enable 1st year computer science majors to acquire technical and professional communication skills. The focus is on developing students' understanding and use of language in spoken and written communication. Topics include: using appropriate language in professional writings; conducting effective interviews; making appropriate grammatical and lexical choices; writing effectively with a focus on content, form and language. Students engage in both individual and group work to write a professional resume and business letters, conduct workplace interviews and write a technical proposal.

Assessment: 100% continuous assessment

CAES1515. Professional and technical oral communication for engineers (3 credits)

(course code revised from ECEN1515 from 2010-11)

CENG1001. Practical Chinese language course for engineering students (3 credits)

Refer to the University Language Enhancement Course in the syllabus for the degree of BEng for details.

CSIS1117. Computer programming I (6 credits)

This course covers both the basic and advanced features of the C/C++ programming languages, including syntax, identifiers, data types, control statements, functions, arrays, file access, objects and classes, class string, structures and pointers. It introduces programming techniques such as recursion, linked lists and dynamic data structures. The concept and skills of program design, implementation and debugging, with emphasis on problem-solving, will also be covered.

Assessment: 50% continuous assessment, 50% examination

CSIS1118. Foundations of computer science (6 credits)

(renamed from Mathematical foundations of computer science from 2009-10)

OR

CSIS1121. Discrete mathematics (6 credits)

This course provides students a solid background on discrete mathematics and structures pertinent to computer science. Topics include logic; set theory; mathematical reasoning; counting techniques; discrete probability; trees, graphs, and related algorithms; modeling computation.

Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Pre-/Co-requisite: CSIS1122 or CSIS1123 or COMP2123

Assessment: 40% continuous assessment, 60% examination

CSIS1120. Computer organization (6 credits)

(renamed from Machine organization and assembly language programming from 2010-11)

Introduction to computer organization and architecture; data representations; instruction sets; machine and assembly languages; basic logic design and integrated devices; the central processing unit and its control; memory and caches; I/O and storage systems; computer arithmetic.

Co-requisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Assessment: 50% continuous assessment, 50% examination

CSIS1122. Computer programming II (6 credits) [for intakes of 2010 and 2011, and students admitted to the BBA(IS) programme in 2012 under the 3-year curriculum]

This is the second programming course following ENGG1002/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.

Prerequisite: CSIS1117 or ENGG1002

Assessment: 50% continuous assessment, 50% examination

CSIS1123. Programming technologies and tools (6 credits)
[for intakes of 2012 and thereafter]

This course introduces various technologies and tools that are useful for software development, including Linux, C++ STL, the C language, shell scripts, python and xml. Learning materials will be provided but there will be no lecture. This strengthens the self-learning ability of the students.

Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Assessment: 50% continuous assessment, 50% examination

CSIS1410. Industrial training (3 credits) *[for intakes of 2009 and before]*

OR

CSIS1412. Industrial training (6 credits) *[for intakes of 2010, 2011 and 2012 (3-year curriculum)]*

Industrial Training requires students to spend a minimum of four 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. The training provides students with practical, real-world experience and represents a valuable complement to their academic training.

Assessment: 100% continuous assessment

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, case studies.

Prerequisites: CSIS1122 or CSIS1123 or COMP2123; and CSIS1120 or COMP2120 or ELEC1401 or ELEC2441

Assessment: 50% continuous assessment, 50% examination

CSIS0231. Computer architecture (6 credits)

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 or COMP2120

Assessment: 40% continuous assessment, 60% examination

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 COMP2120 or ELEC1401 or ELEC2441
Assessment: 50% continuous assessment, 50% examination

CSIS0235. Compiling techniques (6 credits)

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

Prerequisite: CSIS1119 or COMP2119; and CSIS1122 or CSIS1123 or COMP2123
Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1119 or COMP2119 or ELEC1502 or ELEC1503 or ELEC2543
Assessment: 50% continuous assessment, 50% examination

CSIS2258. Functional programming (6 credits)

The course teaches the basics of functional programming using the language Haskell. The main goal is introduce students to fundamental programming concepts such as recursion, abstraction, lambda expressions and higher-order functions and data types. The course will also study the mathematical reasoning involved in the design of functional programs and techniques for proving properties about functions so defined. With the adoption of lambda expressions recent versions of Java, C++ or C#, functional programming and related programming techniques are becoming increasingly more relevant even for programmers of languages that are not traditionally viewed as functional. This course is important to introduce students to such techniques.

Prerequisite: CSIS1118 or CSIS1121 or COMP2121
Assessment: 50% continuous assessment, 50% examination

CSIS0259. Principles of programming languages (6 credits)

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 or COMP2119; and CSIS1120 or COMP2120 or ELEC1401 or ELEC2441
Assessment: 40% continuous assessment, 60% examination

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.

Prerequisite: CSIS1119 or COMP2119 or CSIS1122 or CSIS1123 or COMP2123

Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1119 or COMP2119 or CSIS1122 or CSIS1123 or COMP2123

Assessment: 50% continuous assessment, 50% examination

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, database design and normalization, database query languages, indexing schemes, integrity and concurrency control. This course may not be taken with BUSI0052.

Prerequisite: CSIS1119 or COMP2119 or ELEC1502 or ELEC1503 or ELEC2543

Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1122 or CSIS1123 or COMP2123

Assessment: 50% continuous assessment, 50% examination

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; intellectual property issues on the Internet; data privacy; computer-related crimes; codes of professional conduct for computer professionals.

Prerequisite: CSIS1122 or CSIS1123 or COMP2123

Assessment: 40% continuous assessment, 60% examination

CSIS0314. Machine learning (6 credits)

An introduction to algorithms and applications of machine learning. Topics include: decision theory; parametric models; supervised learning (classification and regression); unsupervised learning (clustering, mixture models, principal component analysis); Bayesian methods.

Prerequisite: MATH1853; and CSIS1119 or COMP2119 or ELEC1502 or ELEC1503 or ELEC2543
Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1119 or COMP2119
Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1119 or COMP2119 or ELEC1502 or ELEC1503 or ELEC2543
Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS0278 or COMP3278
Assessment: 30% continuous assessment, 70% examination

CSIS0322. Modern technologies on World Wide Web (6 credits)

Basics on Internet and network protocols (TCP and IP); Internet applications; Domain Name System; World Wide Web; Web addressing; HTTP; HTML, XML, style sheets, etc.; programming the Web: PHP, JavaScript, etc.; other topics of current interest (AJAX, HTML5, web services, cloud computing). This course may not be taken with BUSI0063.

Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112
Assessment: 50% continuous assessment, 50% examination

CSIS0323. Advanced database systems (6 credits)

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 or COMP3278

Assessment: 50% continuous assessment, 50% examination

CSIS0327. Computer and network security (6 credits)

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 or COMP3230 and CSIS0234 or COMP3234

Assessment: 30% continuous assessment, 70% examination

CSIS0328. Wireless and mobile communication (6 credits)

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 or COMP3234 and CSIS0396 or COMP2396

Assessment: 50% continuous assessment, 50% examination

CSIS0329. Computer game design and programming (6 credits)

The course will study practical topics in game design. Topics includes: types of game, game platforms, design of game, 3D model and kinematics, rendering techniques, collision detection, project management, AI, UI, sound effects, and networking.

Pre-requisite: CSIS1119 or COMP2119

Assessment: 50% continuous assessment, 50% examination

CSIS0351. Advanced algorithm analysis (6 credits)

This class introduces advanced mathematical techniques for analyzing the complexity and correctness of algorithms. NP-complete problems are believed to be not solvable in polynomial time and we study how approximation algorithms could give near optimal solutions. In particular, we will see that probability theory gives us a very powerful tool to tackle problems that are otherwise hard to solve.

Prerequisite: CSIS0250 or COMP3250; or basic knowledge in probability and algorithms
Assessment: 50% continuous assessment, 50% examination

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.

Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Assessment: 50% continuous assessment, 50% examination

CSIS0402. System architecture and distributed computing (6 credits)

This course introduces the architecture of modern systems and the concepts and principles of distributed computing. Topics include: client-server computing, multi-tier architectures, data/object persistence, parallel server systems, naming services, transaction processing, middleware and messaging, component technologies, and web services/APIs.

Prerequisite: CSIS0396 or COMP2396

Assessment: 50% continuous assessment, 50% examination

CSIS0403. Implementation, testing and maintenance of software systems (6 credits)

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; quality metrics; pattern implementation and reuse. Testing covers strategies and techniques for unit and component testing; integration testing; system, performance and acceptance testing; test documentation and test management. Topics in maintenance include maintenance techniques, tools and metrics; software rejuvenation; and refactoring.

Pre/Co-requisite: CSIS0396 or COMP2396

Assessment: 50% continuous assessment, 50% examination

CSIS0404. Software quality and project management (6 credits)

Topics in software quality include: software quality models; quality assurance; software quality metrics; quality reviews, inspections and audits. Topics in project management include: project planning, cost estimation and scheduling; project monitoring and control; agile, traditional and extreme process models and their management; risk analysis; configuration management and control; software acquisition; contract management; and process improvement. This course may not be taken with BUSI0060 or BUSI0061.

Prerequisite: CSIS0297 or COMP3297

Assessment: 40% continuous assessment, 60% examination

CSIS0407. Scientific computing (6 credits)

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 COMP1117 or ENGG1002 or ENGG1111 or ENGG1112; and CSIS1118 or ENGG1007 or COMP2121

Assessment: 50% continuous assessment, 50% examination

CSIS3330. Interactive mobile application design and programming (6 credits)

This course introduces the Android platform for developing interactive mobile applications. Topics include user interface, parallel computing, graphics, multimedia, sensors, database, and social computing. Students participate in both individual assignments and group projects to practice ideation, reading, writing, coding, and presentation.

Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112 or CSIS0396 or COMP2396

Assessment: Assessment: 50% continuous assessment, 50% examination

CSIS0412. Research internship (6 credits)

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.

Assessment: 100% continuous assessment

CSIS0801. Final year project (12 credits)

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.

Assessment: 100% continuous assessment

ELEC2802. Engineering organization and management (3 credits)

Management concepts, decision making processes, project management, leadership, management control, marketing.

Assessment: 30% continuous assessment, 70% examination

ELEC2803. Engineering and society (3 credits)

Interaction between engineers and society; impact of technologies on society; environmental and safety issues; professional conduct and responsibility; contract law; law of tort; professional negligence and intellectual property law.

Assessment: 100% continuous assessment

ELEC2804. Engineering economics and finance (3 credits)

Principles of Economics, Macroeconomics; Microeconomics, Introduction to Financial Management; Accounting concepts and financial statements; cost and profit.

Assessment: 30% continuous assessment, 70% examination

ELEC2814. Engineering management and society (6 credits)

Professional conduct and social responsibility, sustainability and safety issues, technology and environment, ethics at work; Engineering organization and project, management functions and managerial skills, decision making processes, contingency and crisis management, leadership, corporate culture and philanthropy. Contract, intellectual property, tort, professional negligence and related law issues.

Assessment: 30% continuous assessment, 70% examination

Candidates may take up to two MSc(CompSc) courses as electives, subject to the approval of the Head of Department. An MSc(CompSc) course is equivalent to a 3 credit-unit level-2 course.