REGULATIONS FOR THE DEGREE OF BACHELOR OF ENGINEERING (BEng)[1]

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

EN 1 Admission to the Degree

To be eligible for admission to the degree of BEng, 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.

EN 2 Length of Study

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

EN 3 Curriculum Requirements

To complete the curriculum, a candidate shall

(a) satisfy the requirements prescribed in UG 3 of the Regulations for the First Degree Curricula;
(b) in addition to the requirements in EN 3(a) above, satisfactorily complete altogether 6 credit-units of courses in English language enhancement;
(c) complete not less than 180 credit-units of courses, in the manner specified in the syllabuses; candidates are also required to pass all core courses as specified in the syllabuses and satisfactorily complete prerequisite courses in order to enrol in a succeeding course;
(d) satisfy all the requirements prescribed for the minor programme option, if he/she pursues the minor programme; and
(e) satisfy all the requirements prescribed for the double-degree programme option, if he/she pursues the double-degree programme.

EN 4 Candidates shall normally select not less than 30 and not more than 39 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.

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

EN 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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[1] These Regulations apply to students admitted to the first year of study for the degree of B.Eng. in the academic year 1998-99 and thereafter.

EN 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.

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

EN 9 Candidates who fail 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 candidates will be recorded in their transcripts.

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

EN 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.

EN 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 shall not be included in the calculation of the cumulative GPA.

EN 13 Degree Classification

The degree of Bachelor of Engineering shall be awarded in five divisions:

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

EN 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 respective programmes, and other relevant factors into consideration[2].

PROGRAMME STRUCTURES AND SYLLABUSES FOR THE DEGREE OF BACHELOR OF ENGINEERING

The syllabuses below are subject to University's approval.

General Engineering courses (applicable to candidates admitted in the academic year 2008-2009 and thereafter)

General Engineering courses include

ENGG1002	Computer programming and applications (6 credit units)
ENGG1003	Mathematics I (6 credit units)
ENGG1004	Mathematics IA (3 credit units)
ENGG1005	Mathematics IB (3 credit units)
ENGG1006	Engineering for sustainable development (6 credit units)
ENGG1007	Foundations of computer science (6 credit units)
ENGG1008	Electric circuits and digital logic (6 credit-units)
ENGG1009	Industrial management and logistics (6 credit-units)
ENGG1010	Foundations of engineering mechanics (6 credit units)
ENGG1011	Introduction to biomedical engineering (6 credit units)

Upon graduation, candidates are required to complete General Engineering courses as specified in the syllabus of the programme concerned.

The course descriptions of the General Engineering courses are as follows :

ENGG1002. Computer programming and applications (6 credit units)

Introduction of computer hardware and software; programming in C/C++ (including how to design, implement, document, test, and debug programmes); fundamentals of numerical computing.

ENGG1003. Mathematics I (6 credit units)

Linear algebra, advanced calculus, vector analysis, ordinary differential equations, Laplace transforms. Prerequisite : HKALE Pure Mathematics

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ENGG1004. Mathematics IA (3 credit units)

Linear algebra, advanced calculus, ordinary differential equations.

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[2] Regulation EN14 is applied to students who graduate in June 2003 and beyond irrespective of their year of intake.

ENGG1005. Mathematics IB (3 credit units)

Vector spaces, vector analysis, Laplace transforms.

ENGG1006. Engineering for sustainable development (6 credit units)

Natural and human-made environment; urban resource consumption and environmental pollution; past and present civil engineering wonders; modern engineering systems; role of civil engineers in a changing world; sustainable cities and the future.

ENGG1007. Foundations of computer science (6 credit units)

This course introduces a number of real-world computational problems taken from different computer science areas. Through these problems, students are exposed to the mathematics, data structures and algorithms that serve as foundations of computer science.

ENGG1008. Electric circuits and digital logic (6 credit-units)

Introduction to electrical and electronic engineering technologies; Kirchhoff's laws, Thevenin and Norton theorems, superposition, mesh and nodal analysis; operational amplifiers; transistor circuits, d.c. circuit analysis; a.c. circuit analysis; application examples of analogue circuits.

Logic circuits, combinational logic elements and design; sequential circuits; sequential network analysis and design; application examples of digital circuits.

ENGG1009. Industrial management and logistics (6 credit-units)

The fundamental role of logistics and supply chain management in the economy and organisation; contribution of logistics and supply chain management to value creation; introduction to logistics industry in Hong Kong; contemporary topics in logistics and supply chain management.

Essential management and business skills for engineers; introduction to project management; global manufacturing; applications of industrial engineering principles in different sectors and industries; quality functions; performance improvement; basics of problem solving and decision making.

ENGG1010. Foundations of engineering mechanics (6 credit units)

Force systems and equilibrium; first and second moments of mass and area; introduction to stress and strain; torsion of circular shafts; introduction to mechanisms and kinematics; rigid body dynamics; hydrostatics; fluid in motion.

ENGG1011. Introduction to biomedical engineering (6 credit units)

This course is an overview of the essential areas in biomedical engineering including technologies and application in life sciences and medicine. The course is broadly divided into 4 areas: biomechanics and biomaterial; cell and tissue engineering; biomedical instrumentations and sensors; and medical imaging. The global development and other issues such as safety, ethics and industry will also be addressed. The course has a laboratory component to provide the students with some hands-on experience in the subject.

ENGG1012. Enhancement mathematics (Non-credit bearing)

Determinants, complex numbers, limits and continuity, differential calculus, integral calculus.

Common Language Enhancement Courses
(Applicable to students admitted in 2008-09 and thereafter)

All the students admitted to the common core curriculum of the Bachelor of Engineering programme are required to take the following two common language enhancement courses in their first year of study:

ECEN1515. Professional and technical oral communication for engineers
CENG1001. Practical Chinese language course for engineering students

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SYLLABUSES

ECEN1515. Professional and technical oral communication for engineers (3 credit units)

This course focuses on students developing technical and professional spoken English skills. Throughout the course, the students will give a series of presentations which will help them to improve skills such as accessing, abstracting, analyzing, organizing and summarizing information; asking questions and negotiating meanings; making effective grammatical and lexical choices and using visual aids to ensure meaning is clear. The presentations give the students an opportunity to develop the skills to talk about general issues in Engineering in the Hong Kong context, engineering theories and their practical applications and also requires them to present a detailed exploration of one aspect of engineering related to their chosen major. Assessment is wholly by coursework.

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

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

Minor Option (applicable to candidates admitted in the academic year 2005-2006 and thereafter)

Candidates are given an option to overload by no more than 9 credit-units in a semester to pursue a minor in a discipline outside their own degree curriculum, subject to approval of the Head of Department concerned. Candidates who wish to have their minor recorded on the transcript must take and pass all the required courses in the selected minor as specified by the offering Department/Faculty in addition to the graduation requirements of their own degree curriculum. For the descriptions of the course under minor options, candidates should refer to the syllabuses of the relevant degree.

Courses taken to fulfil the Minor Option requirements may also be considered as equivalent courses that satisfy the complementary studies and elective requirements of the BEng programme, subject to the approval of the Board of the Faculty of Engineering.

Double-Degree BEng/BBA Option (applicable to candidates admitted in the academic year 2007-2008 and thereafter)

Candidates are given an option to pursue the double-degree BEng/BBA, subject to the approval of the Boards of the Faculty of Engineering and Faculty of Business and Economics upon their meeting the prescribed admission requirements as laid down by both the Faculty of Engineering and the Faculty of Business and Economics.

Courses taken to fulfil the double-degree programme requirements may also be considered as equivalent courses that satisfy the complementary studies and elective requirements of the BEng programme, subject to the approval of the Board of the Faculty of Engineering.

Candidates who have satisfied all the requirements of the BEng curriculum will be awarded the degree of Bachelor of Engineering. To be eligible for proceeding to the BBA programme in the 4th year, candidates must (1) fulfil the requirements of the BEng curriculum; and (2) pass the 57 credit-units of courses, as listed below, as required by the Faculty of Business and Economics during their study for BEng:

Course	Credits
Introduction to accounting	6
Introduction to management information systems	6
Marketing	6
Principles of management	6
Introduction to economics I	6
Corporate finance	6
Management accounting I	6
Business communication	3
Electives (Any 2 courses in Finance, HRM or Marketing major)	12
Total	*57*

Subject to approval of the Board of the Faculty of Engineering, candidates who have completed the requirements of BEng and decide not to proceed to the study for BBA may be awarded with a minor as specified by the Faculty of Business and Economics, if they have completed not less than 36 credit-units of courses in compliance with the syllabuses for the minor programme.

To obtain the degree of BBA, candidates must satisfactorily complete 117 credit units of courses, 57 of which shall be completed during the study for BEng and 60 of which shall be completed during the 4th year in accordance with the Regulations and Syllabuses for the Degree of BBA in Conjunction with the Degree of BEng.

Note: Further details about the length and content of the courses listed may be obtained on application to the department concerned.

CIVIL ENGINEERING

PROGRAMME STRUCTURE

Curriculum

The curriculum comprises 186 credit-units of courses as follows:

(a) General Engineering Courses

Students are normally required to successfully complete 24 credit-units of general engineering courses.

(b) Core Courses

Students are normally required to successfully complete ALL core courses (90 credit-units).

(c) Compulsory Depth Courses

Students are normally required to take ALL compulsory depth courses (33 credit-units).

(d) Elective Civil Engineering Courses

Students are normally required to take 12 credit-units of elective civil engineering courses offered by the Department of Civil Engineering.[*]

(e) Elective Course(s)

Students are normally required to take 6 credit-units of elective course(s) offered by either the Department of Civil Engineering or other department(s).

(f) Broadening Courses

1. Students are required to successfully complete two English language courses which should be spaced out in the first year of study to accumulate up to a maximum of 6 credit-units.

2. Students are required to successfully complete one Chinese language course (3 credit-units) in either semester in the first year of study.

3. Students are required to successfully complete a total of 9 credit-units of broadening courses with at least 3 credit-units in Humanities and Social Sciences Studies, and at least 3 credit-units in Culture and Value Studies or an area of studies outside this degree curriculum as an elective.

(g) Industrial Training

Students are required to successfully complete Industrial Training (3 credit-units). The training normally takes place after their second year of study.

To complete the curriculum, a candidate is normally required to gain not less than 180 credit-units from the above listed courses.

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[*] For double degree BEng/BBA, students are normally required to take 6 credit-units of elective civil engineering courses offered by the Department of Civil Engineering.

Degree Classification

The best 180 credit-units including the courses below shall be taken into account:

(a) At least 24 credit-units from General Engineering Courses, including

(i) ENGG1002. Computer programming and applications; AND
(ii) ENGG100. Mathematics I or both ENGG1004. Mathematics IA and ENGG1005. Mathematics IB; AND
(iii) ENGG1006. Engineering for sustainable development; AND
(iv) ENGG1010. Foundations of engineering mechanics

(b) All core courses;

(c) At least 39 credit-units from

(i) compulsory depth courses;
(ii) elective civil engineering courses; AND
(iii) elective courses;

(d) Broadening courses related to language study, i.e. ECEN1505 Professional and technical written communication for engineers, ECEN1515 Professional and technical oral communication for engineers and CENG1001 Practical Chinese language course for engineering students.

An example of the programme structure is as follows:

(a) First Year

Computer programming and applications	6
Engineering drawing	6
Mathematics I or Mathematics IA and Mathematics IB	6
Environmental engineering and fluid mechanics	6
Engineering mechanics and materials	6
Theory and design of structures I	6
Engineering for sustainable development	6
Foundations of engineering mechanics	6
Practical Chinese language course for engineering students	3
Professional and technical oral communication for engineers	3
Professional and technical written communication for engineers	3
Broadening course	3
Total credit-units	60

(b) Second Year

Engineering design and communication	6
Engineering geology and rock mechanics	6
Engineering mathematics II	6
Hydraulics and hydrology	6
Principles of civil engineering management	6
Soil mechanics	6
Surveying	6

Theory and design of structures II	6
Transportation engineering	6
Broadening course(s)	6
Total credit-units	60

(c) Third Year

Construction project management	6
Engineering hydraulics	6
Foundation engineering	6
Inter-disciplinary design project	6
Management and communication skills for engineers	3
Theory and design of structures III	6
Elective civil engineering course(s)	12
Elective course(s)	6
Industrial Training	3
Project	12
Total credit-units	66

SYLLABUSES

Level One

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered in every semester.

General Engineering Courses

ENGG1002. Computer programming and applications (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1003. Mathematics I (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1004. Mathematics IA (3 credit-units)

Please refer to the General Engineering courses for details.

ENGG1005. Mathematics IB (3 credit- units)

Please refer to the General Engineering courses for details.

ENGG1006. Engineering for sustainable development (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1010. Foundations of engineering mechanics (6 credit-units)

Please refer to the General Engineering courses for details.

Core Courses

CIVL1003. Engineering drawing (6 credit-units)

Engineering drawing; fundamental geometrical projections; general civil engineering drawings; detailing for reinforced concrete and steel structures.

CIVL1009. Surveying (6 credit-units)

Basic principles of plane surveying; differential and trigonometrical levelling; distance and angle measurements; tachometry; horizontal control; traverse; triangulation and trilateration; theory of errors; network adjustment. Fieldwork.

CIVL1010. Theory and design of structures I (6 credit-units)

Statically determinate structures; beams and frames; trusses; elementary arch and cable analysis; masonry structures; influence lines; deflection of simple structures.

Structural forms and concepts; philosophy of design; loading; codes of practice; design of simple sections and members.

CIVL1011. Transportation engineering (6 credit-units)

Transportation and its context; basic characteristics of different transportation modes; urban transportation planning and land use/transportation studies; highway alignment and geometric design; transportation surveys.

CIVL1012. Environmental engineering and fluid mechanics (6 credit-units)

Man and the environment; water quality, resources and treatment; wastewater characteristics and treatment; solid waste, air and noise pollution control; environmental impact assessment; flow measurements; dimensional analysis and scale models; flow of an ideal fluid; flow in pipes.

CIVL1013. Engineering mechanics and materials (6 credit-units)

Engineering Mechanics: Bending moment, shear and axial force diagrams; Beam theory for bending and shear; shear centre; deflections of beams; analysis of stress and strain; energy methods.

Materials: Major applications and required properties of construction materials; structural steel; concrete pulverized fuel ash; fibre-reinforced cementitious materials; brickwork and masonry; timber; bituminous materials. Crystalline structure; elastic and plastic deformations; phase diagrams; alloying; material forming and heat treatment; corrosion.

Broadening Courses

ECEN1505. Professional and technical written communication for engineers (3 credit-units)

The focus of this course is the function and importance of professional and technical communication in English and specifically understanding and using written English. Topics include accessing, abstracting, analysing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

ECEN1515. Professional and technical oral communication for engineers (3 credit units)

Please refer to the Common Language Enhancement Courses for details.

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

Please refer to the Common Language Enhancement Courses for details.

Broadening course(s)

9 credit-units of broadening courses with at least 3 credit-units in Humanities & Social Sciences Studies, and at least 3 credit-units in Culture and Value Studies or an area of studies outside this degree curriculum as an elective.

Level Two

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered in every semester.

Core Courses

CIVL2001. Engineering design and communication (6 credit-units)

Planning and design of civil engineering projects; open-ended schematic design of multi-disciplinary projects; project appraisal and feasibility study; environmental impact assessment; project implementation.

Communication and presentation of information related to project work.

CIVL2002. Engineering geology and rock mechanics (6 credit-units)

Minerals and rocks; introduction to stratigraphy; structural geology; earthquakes; surface processes; groundwater; geological maps; geology of Hong Kong; stereonets; rock slopes; behaviour and properties of rocks as an engineering material; rock discontinuities; rock stresses; failure of rock and strength theory; tunnels and underground excavations in rocks; rock foundation; rock testing techniques; applications of rock mechanics in engineering practice; fieldwork and case studies.

CIVL2003. Engineering mathematics II (6 credit-units)

Complex variables; Linear algebra; Fourier analysis & partial differential equations.

Prerequisite: ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB

CIVL2004. Hydraulics and hydrology (6 credit-units)

Governing equations of motion; laminar and turbulent flow; boundary layer theory; flow in open channels; hydraulic machinery; basic concepts of the hydrological cycle; precipitation; evaporation and evapo-transpiration; infiltration; methods of estimating runoff; probability concepts in hydrology.

Prerequisite: CIVL1012 Environmental engineering and fluid mechanics

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CIVL2006. Soil mechanics (6 credit-units)

Basic characteristics of soils; soil classification; seepage; effective stress; soil compaction; soil testing techniques; consolidation theory and settlement analysis; shear strength and failure criteria; applications of soil mechanics in engineering practice: lateral pressures and retaining structures, bearing capacity of foundations, slopes and embankments.

CIVL2007. Theory and design of structures II (6 credit-units)

Method of consistent deformation, slope-deflection method, energy method and moment distribution method for indeterminate structures.

Reinforced concrete (RC) flanged beams, RC slabs, RC short columns, bending moment envelopes, reinforcement curtailment and pad foundations. Steel flexural members (lateral torsional buckling capacity), tension members and compression members.

Prerequisite: CIVL1010 Theory and design of structures I

CIVL2008. Principles of civil engineering management (6 credit-units)

Engineers in society; organization of firm and site; engineering economics; site planning; estimating; human resources management; project management; basic legal systems and contracts; dispute resolution techniques; quality management; safety management; general planning and control systems.

Industrial Training

CIVL2005. Industrial training (3 credit-units)

To complete a period of training in industry not less than a total of eight weeks in the summer vacations immediately after the Second and/or the First Year, subject to satisfactory performance in training and the submission of a satisfactory training report.

Level Three

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered in every semester.

Core Courses

CIVL3013. Project (12 credit-units)

A dissertation or report on a topic consisting of design, experimental or analytical investigation.

Compulsory Depth Courses

CIVL3003. Construction project management (6 credit-units)

Construction planning and programming methods; critical paths and resource scheduling; work study and productivity; financial planning and control; cash flow management; civil engineering contracts and contract administration; managing design and other consultancy services; value management; ethics and professionalism.

CIVL3006. Engineering hydraulics (6 credit-units)

Non-uniform open channel flow; gradually & rapidly varied flow, applications to hydraulic structures & storm water drainage design; hydraulics of alluvial channels; turbulent mixing and transport.

Prerequisite: CIVL2004 Hydraulics and hydrology

CIVL3008. Foundation engineering (6 credit-units)

Site investigation; shallow and deep foundations, soil-structure interaction and settlement analysis; foundation design and construction in difficult grounds; case studies; foundation design and construction in reclamation and saprolite; karst problems.

Prerequisite: CIVL2006 Soil mechanics

CIVL3010. Management and communication skills for engineers (3 credit-units)

Leadership; team building; problem solving and decision making; verbal communication; business development skills; interviews and business writing.

CIVL3018. Theory and design of structures III (6 credit-units)

Matrix method; differential settlements; temperature; shrinkage and other effects; torsion structures; stability.

Design of reinforced concrete structures: building frames, shearwalls and water retaining structures.

Prerequisite: CIVL2007 Theory and design of structures II

CIVL3023. Inter-disciplinary design project (6 credit-units)

Planning and design of an urban development project of multi-disciplinary nature; inter-disciplinary collaboration to optimise the value of building tectonics, engineering technology, architectural design and common-sense ideas; lateral thinking along with self-motivation to discover unforeseen solutions; conversion of innovative and sustainable ideas to detailed design fruition from cross-disciplinary inputs.

Elective Civil Engineering Courses

CIVL3001. Advanced engineering mechanics (6 credit-units)

Three-dimensional analysis of stress and strain; examples in two- and three-dimensional problems; equilibrium and principle of virtual work; linear system and matrix methods; finite element procedure and formulation; plane stress/strain triangular elements; triangular element for heat conduction and steady state field problems; plate elements.

CIVL3005. Earthwork engineering (6 credit-units)

Ground modification techniques; deep compaction and vibro-compaction, vertical drains and electro-osmosis; grouting; soil and rock anchors; soil reinforcement; embankments; deep excavation and dewatering; retaining and diaphragm walls; control of underground water; environmental geotechnics (including landfill problems).

Prerequisite: CIVL2006 Soil mechanics

CIVL3007. Environmental impact assessment of civil engineering projects (6 credit-units)

Environmental protection legislation; environmental impact assessment process; environmental impact prediction and evaluation during construction and operation of projects; mitigation measures; modelling; environmental monitoring and auditing; environmental management issues; case studies.

Prerequisite: CIVL1012 Environmental engineering and fluid mechanics

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CIVL3011. Municipal and industrial wastewater treatment (6 credit-units)

Municipal wastewater flows and characteristics; sewerage systems; municipal wastewater treatment; industrial wastewater characteristics; physical, chemical and biological treatment of industrial wastewater.

CIVL3012. Prestressed concrete structures (6 credit-units)

Fundamental principles of prestressing; materials and systems for prestressed concrete; loss of prestress; design of simple and composite beams; secondary moment; concordant cable; linear transformation; design and construction of concrete bridges.

Prerequisite: CIVL2007 Theory and design of structures II

CIVL3014. Slope engineering (6 credit-units)

Landslide hazards, slope stability analyses; landslide investigation; uncertainties in slope stability analysis; landslip preventive measures; case studies.

Prerequisite: CIVL2006 Soil mechanics

CIVL3015. Solid and hazardous waste management (6 credit-units)

Sources, control, characteristics, collection, transport, recovery, treatment and disposal of solid and hazardous wastes.

CIVL3016. Steel structures (6 credit-units)

Plastic analysis, design of steel structures, design of composite structures.

Prerequisite: CIVL2007 Theory and design of structures II

CIVL3019. Traffic engineering (6 credit-units)

Highway traffic system; characteristics of traffic; theories of traffic flow; traffic surveys; traffic management; intersections and interchanges; design of signal systems.

CIVL3020. Transportation infrastructure engineering (6 credit-units)

This course will serve as an introduction to the theory and practice of transportation infrastructure planning and design. Topics may vary from year to year but will usually include highway engineering, railway engineering and airport engineering.

Prerequisite: CIVL1011 Transportation engineering

CIVL3021. Water resources engineering (6 credit-units)

Sources of water; collection and treatment; transmission and distribution; wastewater collection, treatment and disposal; water related disasters; hydropower; irrigation; case studies.

CIVL3022. Wind engineering (6 credit-units)

Wind characteristics; topographical effects on wind patterns; wind flow around buildings and structures; wind loading.

CIVL3025. Law for civil engineers (6 credit-units)

Introduction to legal system; local & PRC legislation and regulations; contractual rights; obligations and remedies; law of tort; company law; land law; litigation; dispute resolution approaches; evidence; insurance law.

CIVL3026. Engineering practice in Mainland China (6 credit-units)

Engineering code of practice and work procedure; site investigation; foundation design and construction; loading and structural design practice; introduction to seismic design; design of bridges and highway structures; acceptance criteria; site supervision system.

Prerequisite: CENG1001 Practical Chinese language course for engineering students or CENG1004 Practical Chinese language course for civil engineering (law) students or CUND0002 Practical Chinese language and Hong Kong society and CIVL2007 Theory and design of structures II

CIVL3027. Building practice in the built environment (6 credit-units)

Statutory control of building safety, health and environment in Hong Kong; buildings ordinance and regulations; general and structural planning of buildings; professional communication skills, conduct, responsibility, liability, risk and indemnity.

CIVL3028. Structural dynamics and earthquake engineering (6 credit-units)

Earthquake hazard and ground shaking, site (soil) effects, seismic design spectra, earthquake loadings, dynamic earthquake response, design codes, performance-based design, vibration control.

Elective Course

Elective Course (6 credit-units)

The student is normally expected to select a Level Two course or above offered by either the Department of Civil Engineering or other department(s).

CIVIL ENGINEERING (ENVIRONMENTAL ENGINEERING)

PROGRAMME STRUCTURE

Curriculum

The curriculum comprises 187 credit-units of courses as follows:

(a) General Engineering Courses

Students are normally required to successfully complete 24 credit-units of general engineering courses.

(b) Core Courses

Students are normally required to successfully complete ALL of core courses (90 credit-units).

(c) Compulsory Depth Courses

Students are normally required to take ALL compulsory depth courses (33 credit-units).

(d) Elective Civil Engineering (Environmental Engineering) Courses

Students are normally required to take 12 credit-units of elective civil engineering (environmental engineering) courses offered by the Department of Civil Engineering.*

(e) Elective Course (s)

Students are normally required to take 6 credit-units of elective course(s) offered by either the Department of Civil Engineering or other department(s).

(f) Broadening Courses

1. Students are required to successfully complete two English language courses which should be spaced out in the first year of study to accumulate up to a maximum of 6 credit-units.

2. Students are required to successfully complete one Chinese language course (3 credit-units) in either semester in the first year of study.

3. Students are required to successfully complete a total of 9 credit-units of broadening courses with at least 3 credit-units in Humanities and Social Sciences Studies, and at least 3 credit-units in Culture and Value Studies or an area of studies outside this degree curriculum as an elective.

(g) Industrial Training

Students are required to successfully complete Industrial Training (3 credit-units). The training normally takes place after their second year of study.

(h) Guest Lecture Series

Students are required to take and pass Guest Lecture Series (1 credit-unit).

To complete the curriculum, a candidate is normally required to gain not less than 180 credit-units from the above listed courses.

Degree Classification

The best 180 credit-units including the courses below shall be taken into account:

(a) At least 24 credit-units from General Engineering Courses

(i) ENGG1002. Computer programming and applications; AND
(ii) ENGG1003. Mathematics I or both ENGG1004. Mathematics IA and ENGG1005. Mathematics IB; AND
(iii) ENGG1006. Engineering for sustainable development; AND
(iv) ENGG1010. Foundations of engineering mechanics

(b) All core courses;

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* For double degree BEng/BBA, students are normally required to take 6 credit-units of elective civil engineering (environmental engineering) courses offered by the Department of Civil Engineering.

(c) At least 39 credit-units from

(i) compulsory depth courses;
(ii) elective civil engineering (environmental engineering) courses; AND
(iii) elective courses;

(d) Broadening courses related to language study, i.e. ECEN1505 Professional and technical written communication for engineers, ECEN1515 Professional and technical oral communication for engineers and CENG1001 Practical Chinese language course for engineering students.

An example of the programme structure is as follows:

(a) First Year

Computer programming and applications	6
Engineering drawing	6
Mathematics I or	6
Mathematics IA and Mathematics IB	
Environmental engineering and fluid mechanics	6
Engineering mechanics and materials	6
Theory and design of structures I	6
Engineering for sustainable development	6
Foundations of engineering mechanics	6
Practical Chinese language course for engineering students	3
Professional and technical oral communication for engineers	3
Professional and technical written communication for engineers	3
Broadening course	3
Total credit-units	60

(b) Second Year

Engineering design and communication	6
Engineering geology and rock mechanics	6
Engineering mathematics II	6
Hydraulics and hydrology	6
Principles of civil engineering management	6
Soil mechanics	6
Surveying	6
Theory and design of structures II	6
Water and air quality: concepts and measurement	6
Broadening course(s)	6
Total credit-units	60

(c) Third Year

Construction project management	6
Engineering hydraulics	6
Foundation engineering	6
Management and communication skills for engineers	3
Municipal and industrial wastewater treatment	6
Theory and design of structures III	6

Elective civil engineering (environmental engineering) course(s)	12
Elective course(s)	6
Guest lecture series	1
Industrial training	3
Project	12
Total credit-units	67

SYLLABUSES

Level One

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered in every semester.

General Engineering Courses

ENGG1002. Computer programming and applications (6 credit-units)

For course descriptions, please refer to the General Engineering courses for details.

ENGG1003. Mathematics I (6 credit-units)

For course descriptions, please refer to the General Engineering courses for details.

ENGG1004. Mathematics IA (3 credit-units)

For course descriptions, please refer to the General Engineering courses for details.

ENGG1005. Mathematics IB (3 credit-units)

For course descriptions, please refer to the General Engineering courses for details.

ENGG1006. Engineering for sustainable development (6 credit-units)

For course descriptions, please refer to the General Engineering courses for details.

ENGG1010. Foundations of engineering mechanics (6 credit-units)

For course descriptions, please refer to the General Engineering courses for details.

Core Courses

CIVL1003. Engineering drawing (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL1009. Surveying (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL1010. Theory and design of structures I (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL1012. Environmental engineering and fluid mechanics (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL1013. Engineering mechanics and materials (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

Broadening Courses

ECEN1505. Professional and technical written communication for engineers (3 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

ECEN1515. Professional and technical oral communication for engineers (3 credit units)

For course descriptions, please refer to the Common Language Enhancement Courses for details.

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

For course descriptions, Please refer to the Common Language Enhancement Courses for details.

Broadening course(s)

9 credit-units of broadening courses with at least 3 credit-units in Humanities & Social Sciences Studies, and at least 3 credit-units in Culture and Value Studies or an area of studies outside this degree curriculum as an elective.

Level Two

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered in every semester.

Core Courses

CIVL2001. Engineering design and communication (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL2002. Engineering geology and rock mechanics (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL2003. Engineering mathematics II (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL2004. Hydraulics and hydrology (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL2006. Soil mechanics (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL2007. Theory and design of structures II (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL2008. Principles of civil engineering management (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIME2001. Water and air quality: concepts and measurement (6 credit-units)

Water quality and pollution; standard methods of water and wastewater examination; air quality and air pollution control principles; measurement techniques in air pollution.

Prerequisite: CIVL1012 Environmental engineering and fluid mechanics (for students of the Department of Civil Engineering only)

Industrial Training

CIVL2005. Industrial training (3 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

Level Three

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered in every semester.

Core Courses

CIVL3013. Project (12 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

Compulsory Depth Courses

CIVL3003. Construction project management (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3006. Engineering hydraulics (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3008. Foundation engineering (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3010. Management and communication skills for engineers (3 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3011. Municipal and industrial wastewater treatment (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3018. Theory and design of structures III (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

Elective Civil Engineering (Environmental Engineering) Courses

CIVL3007. Environmental impact assessment of civil engineering projects (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3015. Solid and hazardous waste management (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3021. Water resources engineering (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3022. Wind engineering (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3023. Inter-disciplinary design project (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

Elective Course (6 credit-units)

The student is normally expected to select a Level Two course or above offered by either the Department of Civil Engineering or other department(s).

Guest Lecture Series

CIVL3009. Guest lecture series (1 credit-unit)

To attend a series of seminars on environmental engineering practice to be given by professionals in academia, industry and government, and to submit a satisfactory seminar report.

COMPUTER SCIENCE

PROGRAMME STRUCTURE (For intake of 2008 and thereafter)

To complete the curriculum, candidates must pass the following courses:
(a) 90 units of core courses [see table for list of courses];
(b) 18 credit-units of complementary studies courses [see table for list of courses];
(c) 72 credit-units of elective courses, including at least 30 credit-units in computer science, but excluding Research Internship;
(d) Workshop training (3 credit-units); and
(e) Industrial training (3 credit-units).

In addition, candidates must satisfy any other requirements as stipulated in the University and/or Faculty of Engineering regulations.

With reference to the **Minor** Option listed at the beginning of the PROGRAMME STRUCTURES AND SYLLABUSES FOR THE DEGREE OF BACHELOR OF ENGINEERING (BEng), candidates pursuing the BEng(CompSc) degree may complete 36 credit-units of courses to satisfy the requirements for Minor Programmes offered by the following Faculties: Arts, Business and Economics, Science and Social Sciences.

Candidates may also opt for a **Second Major** in one of the following three programmes offered by the Faculty of Science:

- Risk Management
- Mathematics
- Statistics

Each programme requires 72 credit-units of specified courses (details can be found in the Syllabuses for the Degree of Bachelor of Science).

Courses taken for a Minor or Second Major may be used to satisfy the requirements of Complementary Studies and Elective Courses.

	Year 1	Year 2 / Year 3
Core courses (90 credit-units)	• Mathematics IA[(Note 1)] • Professional and technical oral communication for engineers • English for computer science • Practical Chinese language course for engineering students • Two General Engineering courses[(Note 2)] • Computer programming and applications • Computer programming II • Discrete mathematics • Machine organization and assembly language programming (sub-total: 48 credit-units)	• Introduction to data structures and algorithms • Principles of operating systems • Computer and communications networks • Design and analysis of algorithms • Introduction to database management systems • Final year project (12 credit-units) (sub-total: 42 credit-units)
Complementary Studies (18 credit-units)	• Engineering and society • Engineering organization and management / Engineering economics and finance / Legal aspects of computing[(Note 3)] • one 3 credit-unit course in Humanities and social sciences studies • one 3 credit-unit course in Culture and value studies or an area of studies outside this degree curriculum; and • 6 credit-units of other courses offered outside this degree curriculum	
Elective Courses (72 credit-units)	At least 30 credit-units in computer science[(Note 4)]	
Training (6 credit-units)	Not applicable	• Workshop training • Industrial training

Note 1 Students who have completed Mathematics I, instead of Mathematics IA, are deemed to have completed Mathematics IA.

Note 2 Two courses to be chosen from the following list of General Engineering Courses:

ENGG1006. Engineering for sustainable development
ENGG1007. Foundations of computer science
ENGG1008. Electric circuits and digital logic
ENGG1009. Industrial management and logistics
ENGG1010. Foundations of engineering mechanics
ENGG1011. Introduction to biomedical engineering

Refer to the PROGRAMME STRUCTURES AND SYLLABUSES FOR THE DEGREE OF BACHELOR OF ENGINEERING (BEng) for details.

Note 3 When used to fulfill the Complementary Studies requirement, “Legal aspects of computing” (6 credit-units) cannot be double-counted as an elective.

Note 4 Candidates who have passed “Foundations of computer science” (a General Engineering course)are only required to complete at least 24 credit-units in computer science.

CSIS1xxx courses are level 1 courses, and CSIS0xxx courses are of level 2.

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

(a) All core courses including the final year project (90 credit-units);

(b) All compulsory complementary studies courses (18 credit-units); and

(c) The best 72 credit-units of remaining courses, including at least 30 credit-units in computer science (or at least 24 credit-units in computer science for candidates who have passed "Foundations of computer science"), but excluding Workshop Training, Industrial Training and Research Internship.

SYLLABUSES

Core Courses

ENGG1004. Mathematics IA (3 credit units)

Linear algebra, advanced calculus, ordinary differential equations.

ECEN1515. Professional and Technical Oral Communication for Engineers (3 credit units)

Refer to the COMMON LANGUAGE ENHANCEMENT COURSES for details.

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

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: producing and asking questions to elicit information; conducting effective interviews; making appropriate grammatical and lexical choices; conducting effective oral presentations; writing effectively with a focus on content, form and language. Students engage in both individual and group work to conduct workplace interviews, oral presentations, and write proposals.

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

Refer to the COMMON LANGUAGE ENHANCEMENT COURSES for details.

ENGG1002. Computer programming and applications (6 credit units)

Introduction of computer hardware and software; programming in C/C++ (including how to design, implement, document, test, and debug programmes); fundamentals of numerical computing.

CSIS1122. Computer programming II (6 credit-units) [for intake of 2006 and thereafter]

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 ELEC1501 or ENGG1002

CSIS1121. Discrete mathematics (6 credit-units)
(renamed from CSIS1118 Mathematical foundations of computer science (6 credit-units) from 2008-09)

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

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

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

Co-requisite: CSIS1117 or ELEC1501 or ENGG1002

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

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

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002
Pre/Co-requisite: CSIS1122

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

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

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

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

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.

Complementary Studies

ELEC2802. Engineering organization and management (3 credit-units)

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

ELEC2803. Engineering and society (3 credit-units)

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.

ELEC2804. Engineering economics and finance (3 credit-units)

Macroeconomics; financial instruments; accounting concepts and financial statements; cost and profit; economic evaluation.

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.

Elective Courses

Candidates may take up to two MSc(CS) courses as electives, subject to the approval of the Head of Department. An MSc(CS) course is equivalent to 3 credit-units.

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

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

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

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

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.

Prerequisite: CSIS0230; experience with Unix/Linux systems; C++/Java programming *or*
Co-requisite: CSIS0234 and CSIS0297

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

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

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

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

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

Some specialized application areas of computers.

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

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

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

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

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.

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

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

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

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

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

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

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

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

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

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

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.

Prerequisites: CSIS0230 and CSIS0234

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

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.

Prerequisite: CSIS0271

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

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.

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002

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

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

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.

Prerequisites: CSIS0297

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

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

Prerequisite: CSIS0230

CSIS0407. Scientific computing (6 credit-units)

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

Prerequisites: CSIS1117 or ELEC1501 or ENGG1002; and CSIS1118 or CSIS1121

CSIS0409. Model-based design of interactive systems (6 credit-units)

This course presents the principles and practices of model-based design for interactive systems. Topics include: model-based approaches; task elicitation and use-case modelling; object modelling and design; dynamic modelling; activity modelling; architectural models and design; design patterns and frameworks; user-interface design; device-independent modelling; formal modelling and design.
This course replaces CSIS0401. It may not be taken with CSIS0401.

Prerequisite: CSIS0297

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.

CSIS0803. System integration project (6 credit-units)

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.

Training

CSIS1411. Workshop training (3 credit-units)

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.

CSIS1410. Industrial training (3 credit-units)

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.

COMPUTER SCIENCE

PROGRAMME STRUCTURE (For intakes of 2007 and before)

To complete the curriculum, candidates must pass all the courses listed below:
(a) Twelve core courses in computer science (72 credit-units) [see table for list of courses]
(b) Complementary studies courses comprising (39 credit-units) [see table for list of courses]
(c) System integration project (6 credit-units)
(d) Final year project (12 credit-units)
(e) 51 credit-units of elective courses, including at least 24 credit-units in computer science, but excluding Research Internship
(f) Workshop training (3 credit-units)
(g) Industrial training (3 credit-units)

In addition, candidates must satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

With reference to the Minor Option listed at the beginning of the Programme Structures and Syllabuses for the Degree of Bachelor of Engineering, candidates pursuing the BEng(CompSc) degree may select courses to satisfy minor programmes offered by the following faculties:

- Arts
- Business and Economics
- Science
- Social Sciences

These courses may also be used to satisfy the requirements of complementary studies and elective courses.

For intake of 2005:

	Year 1	**Year 2 / 3**
Core (72 credit-units)	• Computer programming (renamed as Computer programming I from 2006-07)	• Principles of operating systems • Computer and communications networks

	• Mathematical foundations of computer science (renamed as Discrete mathematics from 2008-09) • Introduction to data structures and algorithms • Machine organization and assembly language programming • Engineering mathematics • Programming methodology and object-oriented programming (renamed as Object-oriented programming and Java from 2006-07) (sub-total: 36 credit-units)	• Design and analysis of algorithms • Principles of programming languages • Introduction to database management systems • Introduction to software engineering (sub-total: 36 credit-units)
Complementary Studies (39 credit-units)	• English for computer science • Professional and technical communication for computer science • Practical Chinese language course for engineering students (sub-total: 9 credit-units)	• Engineering organization and management • Engineering and society • Engineering economics and finance • Professionalism and ethics (sub-total: 12 credit-units)
	Broadening courses* (18 credit-units)	
Project (18 credit-units)		• System integration project • Final year project (sub-total: 18 credit-units)
Elective Courses (51 credit-units)	• Elective courses (sub-total: 6 credit-units)	• Elective courses (sub-total: 45 credit-units)
	Including at least 24 credit-units in computer science	
Training (6 credit-units)		• Workshop training • Industrial training (sub-total: 6 credit-units)

For intakes of 2006 and 2007:

	Year 1	**Year 2 / 3**
Core (72 credit-units)	• Computer programming I • Computer Programming II • Mathematical foundations of computer science (renamed as Discrete mathematics from 2008-09) • Introduction to data structures and algorithms • Machine organization and assembly language programming • Engineering mathematics (sub-total: 36 credit-units)	• Principles of operating systems • Computer and communications networks • Design and analysis of algorithms • Introduction to database management systems • Introduction to software engineering • Object-oriented programming and Java (sub-total: 36 credit-units)

Complementary Studies (39 credit-units)	• English for computer science • Professional and technical communication for computer science • Practical Chinese language course for engineering students (sub-total: 9 credit-units)	• Engineering and society • Engineering organization and management / Engineering economics and finance / Legal aspects of computing[†] / Professionalism and ethics[†] (only for 2006 intake) (sub-total: 6 credit-units)
	Broadening courses* (24 credit-units)	
Project (18 credit-units)		• System integration project • Final year project (sub-total: 18 credit-units)
Elective Courses (51 credit-units)	• Elective courses (sub-total: 6 credit-units)	• Elective courses (sub-total: 45 credit-units)
	Including at least 24 credit-units in computer science	
Training (6 credit-units)		• Workshop training • Industrial training (sub-total: 6 credit-units)

* including one 3 credit-unit course in Humanities and Social Sciences Studies; one 3 credit-unit course in Culture and Value studies or an area of studies outside this degree curriculum; and 12 credit-units of other courses offered outside this degree curriculum

CSIS1xxx courses are level 1 courses, and CSIS0xxx courses are of level 2.

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

(a) All core courses in computer science (72 credit-units);

(b) All compulsory complementary studies courses (39 credit-units);

(c) The system integration (6 credit-units) and final year projects (12 credit-units); and

(d) The best 51 credit-units of remaining courses, including at least 24 credit-units in computer science, but excluding Workshop Training, Industrial Training and Research Internship.

SYLLABUSES

Core Courses

CSIS1117. Computer programming I (6 credit-units)

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

[†] Legal aspects of computing (6 credit-units) and Professionalism and ethics (3 credit-units) cannot be double-counted as an elective if being used to fulfil the complementary studies requirements.

CSIS1121 Discrete mathematics (6 credit-units)
(renamed from CSIS1118 Mathematical foundations of computer science (6 credit-units) from 2008-09)

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

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

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

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002
Pre/Co-requisite: CSIS1122

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

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

Co-requisite: CSIS1117 or ELEC1501 or ENGG1002

CSIS1122. Computer programming II (6 credit-units) [for intake of 2006 and thereafter]

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 ELEC1501 or ENGG1002

CSIS1421. Engineering mathematics (6 credit-units)

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

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

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

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

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

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

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

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.

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002

Complementary Studies

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

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: producing and asking questions to elicit information; conducting effective interviews; making appropriate grammatical and lexical choices; conducting effective oral presentations; writing effectively with a focus on content, form and language. Students engage in both individual and group work to conduct workplace interviews, oral presentations, and write proposals.

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

The course is designed to enable computer science majors to acquire professional and technical communication skills. The focus is on understanding and using professional and technical language. Topics include: producing and asking questions to elicit information; conducting effective interviews; organising and analysing information; writing effective technical reports with a focus on coherence and cohesion; and increasing technical vocabulary. Students are required to design and conduct authentic oral interviews and, produce written technical reports and vocabulary journals.

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

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

ELEC2802. Engineering organization and management (3 credit-units)

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

ELEC2803. Engineering and society (3 credit-units)

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.

ELEC2804. Engineering economics and finance (3 credit-units)

Macroeconomics; financial instruments; accounting concepts and financial statements; cost and profit; economic evaluation.

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.

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.

Project

CSIS0803. System integration project (6 credit-units)

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.

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.

Elective Courses

Candidates may take up to two MSc(CS) courses as electives, subject to the approval of the Head of Department. An MSc(CS) course is equivalent to 3 credit-units.

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

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

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

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

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.

Prerequisite: CSIS0230; experience with Unix/Linux systems; C++/Java programming *or*
Co-requisite: CSIS0234 and CSIS0297

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

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

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

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

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

Some specialized application areas of computers.

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

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

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

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.

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

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

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

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

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

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

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

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

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

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.

Prerequisite: CSIS0250 or BIOC2808

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.

Prerequisites: CSIS0230 and CSIS0234

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

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.

Prerequisite: CSIS0271

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

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

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

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

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.

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

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

Prerequisite: CSIS0230

CSIS0407. Scientific computing (6 credit-units)

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

Prerequisites: CSIS1117 or ELEC1501 or ENGG1002; and CSIS1118 or CSIS1121

CSIS0409. Model-based design of interactive systems (6 credit-units)

This course presents the principles and practices of model-based design for interactive systems. Topics include: model-based approaches; task elicitation and use-case modelling; object modelling and design; dynamic modelling; activity modelling; architectural models and design; design patterns and frameworks; user-interface design; device-independent modelling; formal modelling and design.
This course replaces CSIS0401. It may not be taken with CSIS0401.

Prerequisite: CSIS0297

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.

Training

CSIS1411. Workshop training (3 credit-units)

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.

CSIS1410. Industrial training (3 credit-units)

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.

COMPUTER ENGINEERING

PROGRAMME STRUCTURE

Definitions and Terminology:

The Level of a course shall be 1, 2 or 3. Each course shall be assigned a Level.

All courses are grouped into the following 8 Subject Groups:

A. Hardware and digital technology
B. Computer architecture and systems
C. System software and programming
D. Computer applications
E. Mathematics
F. General engineering
G. Complementary studies
H. Others

A *Core Course* is a compulsory course which a candidate must pass in the manner provided for in the Regulations. A *Breadth Course* is a level 1 or level 2 course that is offered in one of the subject groups as an optional course for the curriculum. A *Depth Course* is a level 3 course offered in one of the subject groups as an optional course for the curriculum.

Complementary Studies shall include, in addition to those courses listed under group G, all broadening courses as defined by the University but not directly related to the subject area of the programme.

Subject Electives refer to any **technical** (i.e., non-complementary studies) course offered by the Department of Electrical and Electronic Engineering and the Department of Computer Science, provided that it does not overlap significantly with other courses that the student has already enrolled. Thus a Subject Elective course can be a **technical** course within or outside the list of courses in the Computer Engineering subject groups below. Courses offered by other Departments *will not* be accepted as subject electives unless special prior approval from the Department of Electrical and Electronic Engineering has been obtained before enrolment. Courses listed in Group F *will not* be accepted as subject electives.

The Curriculum

The curriculum comprises 180 credit-units of courses as follows:

(a) 81 credit-units of Core Courses from Groups A-F
(b) 24 credit-units of Breadth/Depth Courses comprising
    (i) at least 6 credit-units of Depth Course(s) selected from Groups A-D; *and*
    (ii) the remaining are Breadth or Depth Courses selected from Groups A-E
(c) Additional 6 credit-units from Group F
(d) 6 credit-units of Subject Elective course(s)
(e) Complementary Studies courses comprising (Total 36 credit-units):
    (i) Engineering organization and management (3 credit-units)
    (ii) Engineering and society (3 credit-units)
    (iii) Engineering economics and finance (3 credit-units)
    (iv) Professional and technical written communication for engineers (3 credit-units)
    (v) Professional and technical oral communication for engineers (3 credit-units)
    (vi) Practical Chinese language course for engineering students (3 credit-units)
    (vii) Additional 18 credit-units of Complementary Studies courses, including:
        (1) at least 3 credit-units in Humanities and Social Sciences Studies; *and*
        (2) at least 3 credit-units in *either* Culture and Value Studies *or* an area of studies outside this degree curriculum (18 credit-units)
(f) Integrated project -- embedded systems (9 credit-units)
(g) Technical project (12 credit-units)
(h) Workshop training (3 credit-units)
(i) Industrial training (3 credit-units)

To complete the degree requirement, a candidate must pass all the courses specified in the curriculum. In addition, the candidate must pass the **IT Proficiency Test** and any other requirements as stipulated in the University or Faculty of Engineering regulations.

Order of Study

Order of study is dictated by pre-requisite and co-requisite requirements. Generally, level one courses should be taken before level two courses, level two courses should be taken before level 3 courses and core courses should be taken before breadth courses. Course electives in Complementary Studies, including the course in Humanities and Social Sciences/Culture & Value and Language, can be taken in any order.

First Year

The first-year syllabuses shall include the following courses:

Core Courses (Total 45 credit-units)

ENGG1002.	Computer programming and applications
ENGG1008.	Electric circuits and digital logic
CSIS1121.	Discrete mathematics
CSIS1119.	Introduction to data structures and algorithms
CSIS1122.	Computer programming II
ELEC1401.	Computer organization and microprocessors
ELEC1305.	Electronic circuits

Either

ENGG1003.	Mathematics I (6 credit-units)

or

ENGG1004.	Mathematics IA (3 credit-units)
ENGG1005.	Mathematics IB (3 credit-units)

General Engineering Courses (Total 6 credit-units)

Additional 6 credit-units of General Engineering course from Group F

Complementary Studies (Total 9 credit-units)

CENG1001.	Practical Chinese language course for engineering students
ECEN1507.	Professional and technical written communication for engineers
ECEN1515.	Professional and technical oral communication for engineers

Training (3 credit-units)

ELEC1803.	Workshop training

Second Year

The second-year syllabuses shall normally include the following courses:

Core Courses (Total 36 credit-units)

CSIS0230.	Principles of operating systems
CSIS0234.	Computer and communication networks
CSIS0297.	Introduction to software engineering
ELEC1802.	Engineering mathematics II
ELEC2302.	Digital system design
ELEC2401.	Computer architecture

Breadth/Depth Course (Total 3 credit-units)

3 credit-units of Breadth/Depth Course selected according to item (b) of the curriculum.

Complementary Studies (Total 12 credit-units)

ELEC2802.	Engineering organization and management
ELEC2803.	Engineering and society

Additional 6 credit-units of Complementary Studies Course(s)

Project (Total 9 credit-units)

ELEC2806. Integrated project -- embedded systems

Training (3 credit-units)

ELEC1804. Industrial training

Third Year

The third-year syllabuses shall normally include the following courses:

Breadth/Depth Courses (Total 21 credit-units)

21 credit-units of Breadth/Depth Courses selected according to item (b) of the curriculum.

Subject Elective (Total 6 credit-units)

6 credit-units of Subject Elective

Complementary Studies: (Total 15 credit-units)

ELEC2804. Engineering economics and finance
Additional 12 credit-units of Complementary Studies Courses

Project (Total 12 credit-units)

ELEC3802. Technical project

List of Courses by Subject Groups

Note:

(1) Courses with similar contents are flagged as "mutually exclusive". For each set of mutually exclusive courses, students are not allowed to take more than one course.
(2) Besides undergraduate courses, some MSc courses may also be taken as *Subject Electives*. Each MSc course is counted as 3 credits. The list of permissible MSc courses is available from the Department.

Group A: Hardware and Digital Technology

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1304	Electronic devices	3	-	-
1	ELEC1305	Electronic circuits (core)	3	-	-
2	ELEC2201	Signals and linear systems	6	-	-
2	ELEC2202	Communications engineering	6	-	ELEC2201
2	ELEC2204	Digital signal processing	6	ELEC2201	-
2	ELEC2205	Control and instrumentation	6	-	ELEC2201
2	ELEC2302	Digital system design (core)	6	ELEC1611 or ENGG1008	-

2	ELEC2303	Design of digital integrated circuits	6	-	-
2	ELEC2304	Electronic materials and devices	3	ELEC1304 or ELEC1614	-
3	ELEC3201	Communication systems	6	ELEC2202	-
3	ELEC3203	Cellular radio and personal communication systems (mutually exclusive with CSIS0328, ELEC6071)	6	ELEC2202	-
3	ELEC3204	Information theory and coding	3	-	-
3	ELEC3220	Speech processing	3	ELEC2201	-
3	ELEC3505	Image and video processing	6	ELEC2201	-
3	ELEC3612	VLSI design principles	6	-	-

Group B: Computer Architecture and Systems

Level	Code	Course title	Credit-units	Prerequisite	Co-requisite
1	ELEC1401	Computer organization & microprocessors (core)	6	-	-
2	CSIS0234	Computer and communication networks (core)	6	CSIS1120 or ELEC1401	-
2	ELEC2401	Computer architecture (core)	6	ELEC1401	-
3	CSIS0328	Wireless and mobile computing (mutually exclusive with ELEC3203, ELEC6071)	6	CSIS0234	
3	ELEC3401	Advanced internet technologies	6	CSIS0234 or ELEC2701	-
3	ELEC3621	Introduction to parallel programming	3	ELEC2401 or ELEC1623	-
3	ELEC3622	Distributed computing systems	3	(ELEC2501 or CSIS0230) & (ELEC2402 or CSIS0234)	-
3	ELEC3626	Computer network security (mutually exclusive with ELEC6070)	3	ELEC2402 or CSIS0234	-

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Group C: System Software & Programming

Level	Code	Course title	Credit-units	Prerequisite	Co-requisite
1	CSIS1119	Introduction to data structures and algorithms (core)	6	CSIS1117 or ELEC1501 or ENGG1002	CSIS1122 (Computer Programming II) (Pre- or Co-requisites)
1	CSIS1122	Computer programming II (core)	6	CSIS1117 or ELEC1501 or ENGG1002	-

1	ENGG1002	Computer programming and applications (core)	6	-	-
2	CSIS0230	Principles of operating systems (core)	6	CSIS1119 & (CSIS1120 or ELEC1401)	-
2	CSIS0259	Principles of programming languages	6	CSIS1119 & (CSIS1120 or ELEC1401)	-
2	CSIS0278	Introduction to database management systems	6	CSIS1119 or ELEC1501 or ELEC1502	-
2	CSIS0297	Introduction to software engineering (core)	6	CSIS1122 or ENGG1002	-
2	CSIS0396	Object-oriented programming and Java (mutually exclusive with ELEC2602)	6	CSIS1117 or ELEC1501 or ENGG1002	-
2	ELEC2601	Human computer interaction	6	-	-
2	ELEC2603	Systems and network programming (mutually exclusive with ELEC2602, ELEC3628 or CSIS0402)	6	ELEC1501 or ELEC1502 or (CSIS1119 & CSIS 0396)	-
3	CSIS0218	Discrete event simulation	6	CSIS1119 or CSIS1122 or ELEC1501 or ELEC1502	-
3	CSIS0232	Operating systems laboratory	6	CSIS0230	-
3	CSIS0233	Open source software development	6	Prerequisite: CSIS0230; or Co-requisite: CSIS0234 and CSIS0297	
3	CSIS0235	Compiling techniques	6	CSIS0259	-
3	CSIS0250	Design and analysis of algorithms	6	CSIS1119 or ELEC1501 or ELEC1502 (Pre- or Co-requisites)	
3	CSIS0323	Advanced database systems	6	CSIS0278	-
3	CSIS0403	Implementation, testing and maintenance of software systems	6	CSIS0297 or CSIS0401 (Pre- or Co-requisite)	

Group D: Computer Applications

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
3	CSIS0270	Artificial intelligence	6	CSIS1119 or CSIS1122	-
3	CSIS0271	Computer graphics	6	CSIS1119 or CSIS1122	-
3	CSIS0314	Pattern classification and machine learning	6	CSIS1119 or ELEC1501 or ELEC1502	-
3	CSIS0315	Multimedia computing and applications	6	CSIS1119	-

3	CSIS0317	Computer vision (mutually exclusive with ELEC3504 & ELEC3505)	6	CSIS1119 or ELEC1501 or ELEC1502	-
3	CSIS0318	Advanced multimedia	6	-	CSIS0315
3	CSIS0320	Electronic commerce technology	6	CSIS0278	-
3	CSIS0322	Internet and the World Wide Web (mutually exclusive with CSIS0325)	6	CSIS1117 or ELEC1501 or ENGG1002	-
3	CSIS0325	Topics in Web technologies (mutually exclusive with CSIS0322)	6	CSIS0322 or CSIS0234	-
3	CSIS0326	Computational molecular biology	6	CSIS0250; or BIOC2808	-
3	CSIS0329	Computer game design and programming	6	CSIS0271	-
3	ELEC3216	Robotics	3	ELEC2205	-
3	ELEC3503	Fuzzy systems and neural networks	6	-	-

Group E: Mathematics

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	CSIS1121	Discrete mathematics (core)	6	-	-
1	ELEC1802	Engineering mathematics II (core)	6	-	-
1	ENGG1003	Mathematics I (core)	6	-	-
1	ENGG1004	Mathematics IA (core) (mutually exclusive with ENGG1003)	3	-	-
1	ENGG1005	Mathematics IB (core) (mutually exclusive with ENGG1003)	3	-	-
2	ELEC2808	Differential equations	3	-	-
2	ELEC2809	Numerical methods	3	-	-
2	ELEC2810	Optimization methods	3	-	-
2	ELEC2811	Probability and statistics	3	-	-
3	ELEC3703	Queuing theory	3	-	-
3	ELEC3704	System modeling and performance analysis	3	ELEC3703	-

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Group F: General Engineering Courses

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1006	Engineering for sustainable development	6	-	-
1	ENGG1007	Foundations of computer science	6	-	-
1	ENGG1008	Electric circuits and digital logic (core)	6	-	-
1	ENGG1009	Industrial management and logistics	6	-	-
1	ENGG1010	Foundations of engineering mechanics	6	-	-
1	ENGG1011	Introduction to biomedical engineering	6	-	-

Group G: Complementary Studies

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	CENG1001	Practical Chinese language course for engineering students	3	-	-
1	CENG1002	Putonghua course for engineering students (restricted enrolment)	0	-	CENG1001
1	CENG1003	Advanced language studies in Chinese for engineering students	3	CENG1001	-
1	ECEN1507	Professional & technical written communication for engineers	3	-	-
1	ECEN1515	Professional & technical oral communication for engineers	3	-	-
2	ELEC2802	Engineering organization and management	3	-	-
2	ELEC2803	Engineering and society	3	-	-
2	ELEC2804	Engineering economics and finance	3	-	-

Group H: Others

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1803	Workshop training	3	-	-
1	ELEC1804	Industrial training	3	-	-
2	ELEC2806	Integrated project -- embedded systems	9	-	-
3	ELEC3802	Technical project	12	-	-

Descriptions of each course are available at the end of programme structure of INFORMATION ENGINEERING

ELECTRICAL ENGINEERING

PROGRAMME STRUCTURE

Definitions and Terminology:

The Level of a course shall be 1, 2 or 3. Each course shall be assigned a Level.

All courses are grouped into the following 9 Subject Groups:

A. Electrical Energy
B. Signals, Communications & Systems
C. Circuits & Electronics
D. Computer Systems
E. Software & IT Applications

F. Mathematics
G. General Engineering
H. Complementary Studies
I. Others

A Core course is a compulsory course which a candidate must pass in the manner provided for in the Regulations. A Breadth course is a level 1 or level 2 course which is offered in one of the subject groups as an optional course for the curriculum. A Depth course is a level 3 course offered in one of the subject groups as an optional course for the curriculum.

Complementary Studies shall include, in addition to those courses listed under Group H, all broadening courses as defined by the University but not directly related to the subject area of the programme.

Subject Electives refer to any **technical** (i.e., non-complementary studies) course offered by the Department of Electrical and Electronic Engineering, provided that it does not overlap significantly with other courses that the student has already enrolled. Thus a Subject Elective course can be a **technical** course within or outside the list of courses in the Electrical Engineering subject groups below. Courses offered by other Departments *will not* be accepted as Subject Electives unless special prior approval from the Department of Electrical and Electronic Engineering has been obtained before enrolment. Courses listed in Group G *will not* be accepted as Subject Electives.

The Curriculum

The curriculum comprises 180 credit-units of courses as follows:

(a) 66 credit-units of Core Courses of the curriculum from Groups A-G
(b) 39 credit-units of Breadth/Depth Courses comprising:
  (i) 21 credit-units of Breadth Courses from Groups B-F, of which 15 credit-units are chosen from Groups B-E and 6 credit-units from Group F
  (ii) 18 credit-units of Depth Courses from Groups A-E, of which at least 12 credit-units are chosen from Group A
(c) Additional 6 credit-units from Group G
(d) 6 credit-units in Subject Electives
(e) 36 credit-units of Complementary Studies courses comprising:
  (i) Engineering organization and management (3 credit-units)
  (ii) Engineering and society (3 credit-units)
  (iii) Engineering economics and finance (3 credit-units)
  (iv) Professional and technical written communication for engineers (3 credit-units)
  (v) Professional and technical oral communication for engineers (3 credit-units)
  (vi) Practical Chinese language course for engineering students (3 credit-units)
  (vii) Additional 18 credit-units of Complementary Studies courses, including:
    (1) at least 3 credit-units in Humanities and Social Sciences Studies; *and*
    (2) at least 3 credit-units in *either* Culture and Value Studies *or* an area of studies outside this degree curriculum (18 credit-units)
(f) First year project (3 credit-units)
(g) Integrated project (6 credit-units)
(h) Technical project (12 credit-units)
(i) Workshop training (3 credit-units)
(j) Industrial training (3 credit-units)

To complete the degree requirement, a candidate must pass all the courses specified in the curriculum. In addition, a candidate must pass the **IT Proficiency Test** and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Order of Study

Order of study is dictated by pre-requisite and co-requisite requirements. Generally, Level 1 courses should be taken before Level 2 courses, Level 2 courses should be taken before Level 3 courses and core courses should be taken before breadth courses. Course electives in Complementary Studies can be taken in any order.

First Year

The first-year curriculum shall normally include the following courses:

Core Courses (Total 42 credit-units)

ENGG1002. Computer programming and applications (6)
ENGG1008. Electric circuits and digital logic (6)
ELEC1103. Electrical technology (3)
ELEC1104. Electrical energy supply (3)
ELEC1106. Electric power source (3)
ELEC1401. Computer organization and microprocessors (6)
ELEC1802. Engineering mathematics II (6)
ELEC1305. Electronic circuits (3)
Either
ENGG1003. Mathematics I (6)
or
ENGG1004. Mathematics IA (3)
ENGG1005. Mathematics IB (3)

General Engineering Courses (Total 6 credit-units)

Additional 6 credit-units of General Engineering course from Group G

Complementary Studies (Total 9 credit-units)

CENG1001. Practical Chinese language course for engineering students (3)
ECEN1507. Professional and technical written communication for engineers (3)
ECEN1515. Professional and technical oral communication for engineers (3)

Project (Total 3 credit-units)

ELEC1808. First year project (3)

Training (3 credit-units)

ELEC1803. Workshop training (3)

Second Year

The second-year curriculum shall normally include the following courses:

Core Courses (Total 24 credit-units)

ELEC2101. Power transmission and distribution (6)
ELEC2102. Electric energy conversion (6)
ELEC2103. Power electronics (6)
ELEC2201. Signals and linear systems (6)

Breadth Courses (Total 18 credit-units)

12 credit-units of Breadth Courses from Groups B-E
6 credit-units of Breadth Courses from Group F

Complementary Studies (Total 12 credit-units)

ELEC2802. Engineering organization and management (3)
ELEC2803. Engineering and society (3)
Additional 6 credit-units of Complementary Studies courses

Project (Total 6 credit-units)

ELEC2805. Integrated project (EE) (6)

Training (3 credit-units)

ELEC1804. Industrial training (3)

Third Year

The third-year curriculum shall normally include the following courses:

Breadth Courses (Total 3 credit-units)

3 credit-units of Breadth Courses from Groups B-E

Depth Courses (Total 18 credit-units)

18 credit-units of Depth Courses from Groups A-E, with at least 12 credit-units from Group A

Subject Electives (Total 6 credit-units)

6 credit-units of Subject Electives

Complementary Studies (Total 15 credit-units)

ELEC2804. Engineering economics and finance (3)
Additional 12 credit-units of Complementary Studies courses

Project (Total 12 credit-units)

ELEC3801. Technical project (12)

List of Courses by Subject Groups

Note:

(1) Courses with similar contents are flagged as “mutually exclusive”. For each set of mutually exclusive courses, students are not allowed to take more than one course.
(2) Besides undergraduate courses, some MSc courses may also be taken as *Subject Electives*. Each MSc course is counted as 3 credits. The list of permissible MSc courses is available from the Department.

Group A Electrical Energy

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1103	Electrical technology (core)	3	-	-
1	ELEC1104	Electrical energy supply (core)	3	-	-
1	ELEC1106	Electric power source (core) (mutually exclusive with ELEC1105 Electric power plant)	3	-	-
2	ELEC2101	Power transmission and distribution (core)	6	-	ELEC1104 (or ELEC1101)
2	ELEC2102	Electric energy conversion (core)	6	-	ELEC1103 (or ELEC1101)
2	ELEC2103	Power electronics (core)	6	-	-
3	ELEC3104	Electric vehicle technology	6	-	-
3	ELEC3105	Building services - electrical services	6	-	-
3	ELEC3106	Building services - electrical installations	6	-	-
3	ELEC3107	Power system analysis and control	6	ELEC2101	-
3	ELEC3108	Power system protection	3	ELEC2101	-
3	ELEC3109	Electric drives	3	ELEC1103 (or ELEC1101)	-
3	ELEC3110	Electric traction	3	ELEC1103 (or ELEC1101)	-

Group B Signals, Communications and Systems

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1201	Fundamental electromagnetic theory	3	-	-
2	ELEC2201	Signals and linear systems (core)	6	-	-
2	ELEC2202	Communications engineering	6	-	ELEC2201
2	ELEC2204	Digital signal processing	6	ELEC2201	-
2	ELEC2205	Control and instrumentation	6	-	ELEC2201
2	ELEC2206	Electromagnetic waves	3	ELEC1201	-
3	ELEC3201	Communication systems	6	ELEC2202	-
3	ELEC3203	Cellular radio and personal communication systems	6	ELEC2202	-
3	ELEC3204	Information theory and coding	3	-	-
3	ELEC3206	Control systems	6	ELEC2205	-
3	ELEC3216	Robotics	3	ELEC2205	-
3	ELEC3217	Mechatronics	3	-	-
3	ELEC3218	Communication signal processing	3	ELEC2201	-
3	ELEC3220	Speech processing	3	ELEC2201	-
3	ELEC3505	Image and video processing	6	ELEC2201	-

Group C Circuits and Electronics

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1304	Electronic devices	3	-	-
1	ELEC1305	Electronic circuits (core)	3	-	-
2	ELEC2301	Analogue electronics	6	ELEC1305 or ELEC1614	-
2	ELEC2302	Digital system design	6	ENGG1008 or ELEC1611	-
2	ELEC2303	Design of digital integrated circuits	6	-	-
2	ELEC2304	Electronic materials and devices	3	ELEC1304 or ELEC1614	-

Group D Computer Systems

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1401	Computer organization and Microprocessors (core)	6	-	-
2	ELEC2401	Computer architecture (mutually exclusive with ELEC1623)	6	ELEC1401	-
2	ELEC2402	Computer communications	6	-	-
2	ELEC2701	Internet technologies and applications	6	ELEC2402	-
3	ELEC3401	Advanced internet technologies	6	CSIS0234 or ELEC2701	-

Group E Software and Information Technology Applications

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1002	Computer programming and applications (core)	6	-	-
1	ELEC1502	Object oriented programming and data structures (mutually exclusive with CSIS1119 and CSIS0396)	3	-	-
2	CSIS0278	Introduction to database management systems	6	CSIS1119 or ELEC1501 or ELEC1502	-
2	ELEC2501	Software engineering and operating systems	6	-	-
2	ELEC2603	Systems and network programming (mutually exclusive with ELEC2602, ELEC3628 or CSIS0402)	6	ELEC1501 or ELEC1502 or (CSIS1119 & CSIS 0396)	-
3	ELEC3503	Fuzzy systems and neural networks	6	-	-

Group F Mathematics

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1003	Mathematics I (core)	6	-	-
1	ENGG1004	Mathematics IA (core) (mutually exclusive with ENGG1003)	3	-	-
1	ENGG1005	Mathematics IB (core) (mutually exclusive with ENGG1003)	3	-	-
1	ELEC1802	Engineering mathematics II (core)	6	-	-
1	ELEC1807	Discrete mathematics	3	-	-
2	ELEC2808	Differential equations	3	-	-
2	ELEC2809	Numerical methods	3	-	-
2	ELEC2810	Optimization methods	3	-	-
2	ELEC2811	Probability and statistics	3	-	-

Group G General Engineering

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1006	Engineering for sustainable development	6	-	-
1	ENGG1007	Foundations of computer science	6	-	-
1	ENGG1008	Electric circuits and digital logic (core)	6	-	-
1	ENGG1009	Industrial management and logistics	6	-	-
1	ENGG1010	Foundations of engineering mechanics	6	-	-
1	ENGG1011	Introduction to biomedical engineering	6	-	-

Group H Complementary Studies

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	CENG1001	Practical Chinese language course for engineering students	3	-	-
1	ECEN1507	Professional & technical written communication for engineers	3	-	-
1	ECEN1515	Professional and technical oral communication for engineers	3	-	-
2	ELEC2802	Engineering organization and management	3	-	-
2	ELEC2803	Engineering and society	3	-	-
2	ELEC2804	Engineering economics and finance	3	-	-

Group I Others

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1803	Workshop training	3	-	-
1	ELEC1804	Industrial training	3	-	-
1	ELEC1808	First year project	3	-	-
2	ELEC2805	Integrated project (EE)	6	-	-
3	ELEC3801	Technical project	12	-	-

Descriptions of each course are available at the end of programme structure of INFORMATION ENGINEERING

ELECTRONIC AND COMMUNICATIONS ENGINEERING[3]/ ELECTRICAL AND ELECTRONIC ENGINEERING[4]

PROGRAMME STRUCTURE

Definitions and Terminology

The Level of a course shall be 1, 2 or 3. Each course shall be assigned a Level.

All courses are grouped into the following 7 Subject Groups:

A. Electronics and Communications
B. Signal Processing and Systems
C. Computer Systems, Software & IT Applications
D. Mathematics
E. General Engineering
F. Complementary Studies
G. Others

A Core course is a compulsory course which a candidate must pass in the manner provided for in the Regulations. A Breadth course is a level 1 or level 2 course which is offered in one of the subject groups as an optional course for the curriculum. A Depth course is a level 3 course offered in one of the subject groups as an optional course for the curriculum.

Complementary Studies shall include, in addition to those courses listed under Group F, all broadening courses as defined by the University but not directly related to the subject area of the programme.

Subject Electives refer to any **technical** (i.e., non-complimentary studies) course offered by the Department of Electrical and Electronic Engineering, provided that it does not overlap significantly with other courses that the student has already enrolled. Thus a Subject Elective course can be a **technical** course within or outside the list of courses in the Electronic and Communications Engineering subject groups below. Courses offered by other Departments *will not* be accepted as Subject Electives unless special prior approval from the Department of Electrical and Electronic Engineering has been obtained before enrolment. Courses listed in Group E *will not* be accepted as Subject Electives.

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[3] For student intake in/after 2000-2001.
[4] For student intake in/before 1999-2000.

The Curriculum

The curriculum comprises 180 credit-units of courses as follows:

(a) 60 credit-units of Core Courses from Groups A-E
(b) 45 credit-units of Breadth and Depth Courses comprising:
  (i) 15 credit-units of Breadth Courses selected from Groups A-C
  (ii) 6 credit-units of Breadth Courses from Group D
  (iii) 18 credit-units of Depth Courses selected from Groups A-C with at least 12 credit-units selected from Group A and/or Group B
  (iv) further 6 credit-units of Breadth or Depth Course(s) selected from Groups A-C
(c) 36 credit-units of complementary studies courses comprising:
  (i) Engineering organization and management (3 credit-units)
  (ii) Engineering and society (3 credit-units)
  (iii) Engineering economics and finance (3 credit-units)
  (iv) Professional and technical written communication for engineers (3 credit-units)
  (v) Professional and technical oral communication for engineers (3 credit-units)
  (vi) Practical Chinese language course for engineering students (3 credit-units)
  (vii) Additional 18 credit-units of Complementary Studies courses, including:
    (1) at least 3 credit-units in Humanities and Social Sciences Studies; *and*
    (2) at least 3 credit-units in *either* Culture and Value Studies *or* an area of studies outside this degree curriculum (18 credit-units)
(d) Additional 6 credit-units from Group E
(e) 6 credit-units in Subject Electives (6 credit-units)
(f) First year project (3 credit-units)
(g) Integrated project (6 credit-units)
(h) Technical project (12 credit-units)
(i) Workshop training (3 credit-units)
(j) Industrial training (3 credit-units)

To complete the degree requirement, a candidate must pass all the courses specified in the curriculum. In addition, the candidate must pass the **IT Proficiency Test** and any other requirements as stipulated in the University or Faculty of Engineering regulations.

Order of Study

Order of study is dictated by pre-requisite and co-requisite requirements. Generally, level 1 courses should be taken before level two courses, level 2 courses should be taken before level 3 courses and core courses should be taken before breadth courses. Course electives in Complementary Studies can be taken in any order.

First Year

The first-year syllabuses shall include the following courses:

Core Courses (Total 48 credit-units)

ENGG1008. Electric Circuits & digital logic (6)
ELEC1201. Fundamental electromagnetic theory (3)
ELEC1401. Computer organization and microprocessors (6)
ELEC1502. Object oriented programming and data structures (3)
ENGG1002. Computer programming and applications (6)

ELEC1305. Electronic circuits (3)
ELEC1304. Electronic devices (3)
ELEC1802. Engineering mathematics II (6)
Additional 6 credit-units of General Engineering Course from Group E
either
ENGG1003. Mathematics I (6)
or
ENGG1004. Mathematics IA (3)
ENGG1005. Mathematics IB (3)

Complementary Studies (Total 9 credit-units)

ECEN1515. Professional and technical oral communication for engineers (3)
CENG1001. Practical Chinese language course for engineering students (3)
ECEN1507. Professional and technical written communication for engineers (3)

Project (Total 3 credit-units)

ELEC1808. First year project (3)

Training (3 credit-units)

ELEC1803. Workshop training (3)

Second Year

The second-year syllabuses shall normally include the following courses:

Core Courses (Total 18 credit-units)

ELEC2201. Signals and linear systems (6)
ELEC2202. Communications engineering (6)
ELEC2501. Software engineering and operating systems (6)

Breadth/Depth Courses (Total 21 credit-units)

15 credit-units of Breadth Courses from Groups A-C
6 credit-units of Breadth Courses from Group D

Complementary Studies (Total 15 credit-units)

ELEC2802. Engineering organization and management (3)
ELEC2803. Engineering and society (3)
Additional 9 credit-units of Complementary Studies course

Project (Total 6 credit-units)

ELEC2812. Integrated project (EComE) (6)

Training (3 credit-units)

ELEC1804. Industrial training (3)

Third Year

The third-year syllabuses shall normally include the following courses:

Breadth/Depth Courses (Total 24 credit-units)

6 credit-units of Breadth/Depth course in Groups A-C (6 credit-units)
18 credit-units of Depth courses in Groups A-C (18 credit-units)
(with at least 12 credit-units chosen from Group A and/or Group B)

Subject Elective (Total 6 credit-units)

6 credit-units of Subject Electives

Complementary Studies (Total 12 credit-units)

ELEC2804. Engineering economics and finance (3)
Additional 9 credit-units of Complementary Studies courses

Project (Total 12 credit-units)

ELEC3801. Technical project (12)

List of Courses by Subject Groups

Note:

(1) Courses with similar contents are flagged as "mutually exclusive". For each set of mutually exclusive courses, students are not allowed to take more than one course.
(2) Besides undergraduate courses, some MSc courses may also be taken as *Subject Electives*. Each MSc course is counted as 3 credits. The list of permissible MSc courses is available from the Department.

Group A Electronics and Communications

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1201	Fundamental electromagnetic theory (core)	3	-	-
1	ELEC1304	Electronic devices (core)	3	-	-
1	ELEC1305	Electronic circuits (core)	3	-	-
2	ELEC2103	Power Electronics	6	-	-
2	ELEC2202	Communications engineering (core)	6	-	ELEC2201
2	ELEC2206	Electromagnetic waves	3	ELEC1201	-
2	ELEC2301	Analogue electronics	6	ELEC1614 or ELEC1305	-
2	ELEC2302	Digital system design	6	ENGG1008 or ELEC1611	-
2	ELEC2303	Design of digital integrated circuits	6	-	-

2	ELEC2304	Electronic materials and devices	3	ELEC1304 or ELEC1614	-
3	ELEC3201	Communication systems	6	ELEC2202	-
3	ELEC3203	Cellular radio and personal communication systems	6	ELEC2202	-
3	ELEC3204	Information theory and coding	3	-	-
3	ELEC3214	Microwave engineering	3	ELEC2203 or ELEC2206	-
3	ELEC3215	Fibre optics	3	ELEC2203 or ELEC2206	-
3	ELEC3612	VLSI design principles	6	-	-

Group B Signal Processing and Systems

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
2	ELEC2201	Signals and linear systems (core)	6	-	-
2	ELEC2204	Digital signal processing	6	ELEC2201	-
2	ELEC2205	Control and instrumentation	6	-	ELEC2201
3	ELEC3206	Control systems	6	ELEC2205	-
3	ELEC3216	Robotics	3	ELEC2205	-
3	ELEC3217	Mechatronics		-	-
3	ELEC3218	Communication signal processing	3	ELEC2201	-
3	ELEC3220	Speech processing	3	ELEC2201	-
3	ELEC3505	Image and video processing	6	ELEC2201	-

Group C Computer Systems, Software and IT applications

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1401	Computer organization and microprocessors (core)	6	-	-
1	ELEC1502	Object oriented programming and data structures (mutually exclusive with CSIS1119 and CSIS0396) (core)	3	-	-
1	ENGG1002	Computer programming and applications (core)	6	-	-
2	CSIS0278	Introduction to database management systems	6	CSIS1119 or ELEC1501 or ELEC1502	-
2	ELEC2401	Computer architecture (mutually exclusive with ELEC1623)	6	ELEC1401	-
2	ELEC2402	Computer communications	6	-	-

2	ELEC2501	Software engineering and operating systems (core)	6	-	-
2	ELEC2603	Systems and network programming (mutually exclusive with ELEC2602, ELEC3628 or CSIS0402)	6	ELEC1501 or ELEC1502 or (CSIS1119 & CSIS 0396)	-
2	ELEC2701	Internet technologies and applications	6	ELEC2402	-
3	ELEC3401	Advanced internet technologies	6	CSIS0234 or ELEC2701	-
3	ELEC3503	Fuzzy systems and neural networks	6	-	-

Group D Mathematics

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1003	Mathematics I (core)	6	-	-
1	ENGG1004	Mathematics IA (core) (mutually exclusive with ENGG1003)	3	-	-
1	ENGG1005	Mathematics IB (core) (mutually exclusive with ENGG1003)	3	-	-
1	ELEC1802	Engineering mathematics II (core)	6	-	-
1	ELEC1807	Discrete mathematics	3	-	-
2	ELEC2808	Differential equations	3	-	-
2	ELEC2809	Numerical methods	3	-	-
2	ELEC2810	Optimization methods	3	-	-
2	ELEC2811	Probability and statistics	3	-	-

Group E General Engineering

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1006	Engineering for sustainable development	6	-	-
1	ENGG1007	Foundation of computer science	6	-	-
1	ENGG1008	Electric circuits and digital logic (core)	6	-	-
1	ENGG1009	Industrial management and logistics	6	-	-
1	ENGG1010	Foundations of engineering mechanics	6	-	-
1	ENGG1011	Introduction to biomedical engineering	6	-	-

Group F Complementary studies

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	CENG1001	Practical Chinese language course for engineering students	3	-	-
1	ECEN1507	Professional & technical written communication for engineers	3	-	-
1	ECEN1515	Professional & technical oral communication for engineers	3	-	-
2	ELEC2802	Engineering organization and management	3	-	-
2	ELEC2803	Engineering and society	3	-	-
2	ELEC2804	Engineering economics and finance	3	-	-

Group G Others

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1103	Electrical technology	3	-	-
1	ELEC1104	Electrical energy supply	3	-	-
1	ELEC1106	Electric power source (mutually exclusive with ELEC1105 Electric power plant)	3	-	-
1	ELEC1803	Workshop training	3	-	-
1	ELEC1804	Industrial training	3	-	-
1	ELEC1808	First year project	3	-	-
2	ELEC2812	Integrated project (EComE)	6	-	-
3	ELEC3801	Technical project	12	-	-

Descriptions of each course are available at the end of programme structure of INFORMATION ENGINEERING

INFORMATION ENGINEERING

PROGRAMME STRUCTURE

Definitions and Terminology:

The Level of a course shall be 1, 2 or 3. Each course shall be assigned a Level.

All subject-related courses are grouped into the following 9 Subject Groups:

A. Communications Systems
B. Signal Processing and Systems
C. Circuits & Electronics

D. Computer Systems, Software & IT Applications
E. Business and Management in IT Industry
F. Mathematics
G. General Engineering
H. Complementary Studies
I. Others

A Core course is a compulsory course that a candidate must pass in the manner provided for in the Regulations. A Breadth course is a level 1 or level 2 course which is offered in one of the subject groups as an optional course for the curriculum. A Depth course is a level 3 course offered in one of the subject groups as an optional course for the curriculum.

Complementary Studies shall include, in addition to those courses listed under Group H, all broadening courses as defined by the University but not directly related to the subject area of the programme.

Subject Electives refer to any **technical** (i.e., non-complimentary studies) course offered by the Department of Electrical and Electronic Engineering, provided that it does not overlap significantly with other courses that the student has already enrolled. Thus a Subject Elective course can be a **technical** course within or outside the list of courses in the Information Engineering subject groups below. Courses offered by other Departments *will not* be accepted as Subject Electives unless special prior approval from the Department of Electrical and Electronic Engineering has been obtained before enrolment. Courses listed in Group G *will not* be accepted as Subject Electives.

The Curriculum

The curriculum comprises of 180 credit-units of courses as follows:

(a) 81 credit-units of Core Courses from Groups A-G
(b) Additional 6 credit-units from Group E
(c) Additional 6 credit-units from Group G
(d) 6 credit-units in Subject Electives
(e) 30 credit-units of Breadth and Depth Courses comprising:
    (i) 15 credit-units of Depth Courses from Groups A-D; *and*
    (ii) 15 credit-units of Breadth or Depth Courses from Groups A-F, of which no more than 6 credit-units from *either* Group E *or* Group F.
(f) 24 credit-units of complementary studies courses comprising:
    (i) Engineering and society (3 credit-units)
    (ii) Professional and technical written communication for engineers (3 credit-units)
    (iii) Professional and technical oral communication for engineers (3 credit-units)
    (iv) Practical Chinese language course for engineering students (3 credit-units)
    (v) Additional 12 credit-units of Complementary Studies courses, including
        (1) at least 3 credit-units in Humanities & Social Sciences Studies; *and*
        (2) at least 3 credit-units in *either* Culture and Value Studies *or* an area of studies outside this degree curriculum as an elective (12 credit-units)
(g) First year project (3 credit-units)
(h) Integrated project (6 credit-units)
(i) Technical project (12 credit-units)
(j) Workshop training (3 credit-units)
(k) Industrial training (3 credit-units)

To complete the degree requirement, a candidate must pass all the courses specified in the curriculum. In addition, the candidate must pass the **IT Proficiency Test** and any other requirements as stipulated in the University or Faculty of Engineering regulations.

Order of Study

Order of study is dictated by pre-requisite and co-requisite requirements. Generally, level 1 courses should be taken before level two courses, level 2 courses should be taken before level 3 courses and core courses should be taken before breadth courses. Course electives in Complementary Studies can be taken in any order.

First Year

The first-year syllabuses shall include the following courses:

Core Courses (Total 45 credit-units)

ENGG1008. Electric circuits and digital logic (6)
ENGG1002. Computer programming and applications (6)
ELEC1304. Electronic devices (3)
ELEC1305. Electronic circuits (3)
ELEC1401. Computer organization and microprocessors (6)
ELEC1502. Object oriented programming and data structures (3)
ELEC1802. Engineering mathematics II (6)
BUSI1007. Principles of management (6)
either
ENGG1003. Mathematics I (6)
or
ENGG1004. Mathematics IA (3)
ENGG1005. Mathematics IB (3)

General Engineering Courses (Total 6 credit-units)

Additional 6 credit-units of General Engineering course from Group G

Complementary Studies (Total 6 credit-units)

CENG1001. Practical Chinese language course for engineering students (3)
ECEN1515. Professional and technical oral communication for engineers (3)

Project (Total 3 credit-units)

ELEC1808. First year project (3)

Training (3 credit-units)

ELEC1803. Workshop training (3)

Second Year

The second-year syllabuses shall normally include the following courses:

Core Courses (Total 36 credit-units)

ELEC2201. Signals and linear systems (6)
ELEC2202. Communications engineering (6)
ELEC2402. Computer communications (6)

ELEC2501. Software engineering and operating systems (6)
ELEC2701. Internet technologies and applications (6)
ELEC2811. Probability and statistics (3)

Choose one out of the following:

ELEC1807. Discrete mathematics (3)
ELEC2808. Differential equations (3)
ELEC2809. Numerical methods (3)
ELEC2810. Optimization methods (3)

Breadth/Depth Courses (Total 3 credit-units)

3 credit-units of breadth/depth course(s) selected according to item (e) of the curriculum.

Business and Related Studies (Total 6 credit-units)

6 credit-units of course from Group E

Complementary Studies (Total 9 credit-units)

ECEN1507. Professional and technical written communication for engineers (3)
ELEC2803. Engineering and society (3)
Additional 3 credit-units of Complementary Studies course

Project (Total 6 credit-units)

ELEC2807. Integrated project (InfoE) (6)

Training (3 credit-units)

ELEC1804. Industrial training (3)

Third Year

The third-year syllabuses shall normally include the following courses:

Breadth/Depth Courses (Total 27 credit-units)

27 credit-units of breadth/depth courses selected according to item (e) of the curriculum.

Subject Elective (Total 6 credit-units)

6 credit-units in Subject Electives

Complementary Studies (Total 9 credit-units)

Additional 9 credit-units of Complementary Studies courses

Project (Total 12 credit-units)

ELEC3801. Technical project (12)

List of Courses by Subject Groups

Note:

(1) Courses with similar contents are flagged as "mutually exclusive". For each set of mutually exclusive courses, students are not allowed to take more than one course.
(2) Besides undergraduate courses, some MSc courses may also be taken as Subject Electives. Each MSc course is counted as 3 credits. The list of permissible MSc courses is available from the Department.

Group A Communications Systems

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1201	Fundamental electromagnetic theory	3	-	-
2	ELEC2202	Communications engineering (core)	6	-	ELEC2201
3	ELEC3201	Communication systems	6	ELEC2202	-
3	ELEC3203	Cellular radio and personal communication systems	6	ELEC2202	-
3	ELEC3204	Information theory and coding	3	-	-

Group B Signal Processing and Systems

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
2	ELEC2201	Signals and linear systems (core)	6	-	-
2	ELEC2204	Digital signal processing	6	ELEC2201	-
3	ELEC3212	Speech recognition	6	ELEC2204	-
3	ELEC3218	Communication signal processing	3	ELEC2201	-
3	ELEC3220	Speech processing	3	ELEC2201	-
3	ELEC3505	Image and video processing	6	ELEC2201	-

Group C Circuits and Electronics

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1304	Electronic devices (core)	3	-	-
1	ELEC1305	Electronic circuits (core)	3	-	-
2	ELEC2301	Analogue electronics	6	ELEC1614 or ELEC1305	-
2	ELEC2302	Digital system design	6	ELEC1611 or ENGG1008	-

2	ELEC2303	Design of digital integrated circuits	6	-	-
3	ELEC3612	VLSI design principles	6	-	-

Group D Computer Systems, Software and IT Applications

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1401	Computer organization and microprocessor (core)	6	-	-
1	ELEC1502	Object oriented and data structures (core) (mutually exclusive with CSIS1119 and CSIS0396) (core)	3	-	-
1	ENGG1002	Computer programming and applications (core)	6	-	-
2	CSIS0278	Introduction to database management systems	6	CSIS1119 or ELEC1501 or ELEC1502	-
2	ELEC2401	Computer architecture (mutually exclusive with ELEC1623)	6	ELEC1401	-
2	ELEC2402	Computer communications (core)	6	-	-
2	ELEC2501	Software engineering and operating systems (core)	6	-	-
2	ELEC2601	Human computer interaction	6	-	-
2	ELEC2603	Systems and network programming (mutually exclusive with ELEC2602, ELEC3628 or CSIS0402)	6	ELEC1501 or ELEC1502 or (CSIS1119 & CSIS 0396)	-
2	ELEC2701	Internet technologies and applications (core)	6	ELEC2402	-
3	CSIS0250	Design and analysis of algorithms	6	CSIS1119 or ELEC1501 or ELEC1502 (Pre- or Co-requisites)	
3	CSIS0323	Advanced database Systems	6	CSIS0278	-
3	ELEC3401	Advanced internet technologies	6	CSIS0234 or ELEC2701	-
3	ELEC3503	Fuzzy systems and neural networks	6	-	-
3	ELEC3621	Introduction to parallel programming	3	ELEC2401 or ELEC1623	-
3	ELEC3622	Distributed computing systems	3	(ELEC2501 or CSIS0230) & (ELEC2402 or CSIS0234)	-
3	ELEC3626	Computer network security (mutually exclusive with ELEC6070)	3	ELEC2402 or CSIS0234	-

Group E Business and Management in IT-Industry

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	BUSI1006	Principles and practices of modern business	3	-	-
1	BUSI1007	Principles of management (core)	6	-	-
2	FINA1002 (formerly BUSI0016)	Introduction to finance	6	-	-
2	BUSI0023	Operations and quality management	6	-	-
2	BUSI1001	Business law	6	-	-

Group F Mathematics

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1003	Mathematics I (core)	6	-	-
1	ENGG1004	Mathematics IA (core) (mutually exclusive with ENGG1003)	3	-	-
1	ENGG1005	Mathematics IB (core) (mutually exclusive with ENGG1003)	3	-	-
1	ELEC1802	Engineering mathematics II (core)	6	-	-
1	ELEC1807	Discrete mathematics	3	-	-
2	ELEC2808	Differential equations	3	-	-
2	ELEC2809	Numerical methods	3	-	-
2	ELEC2810	Optimization methods	3	-	-
2	ELEC2811	Probability and statistics (core)	3	-	-
3	ELEC3703	Queuing theory	3	-	-
3	ELEC3704	System modeling and performance analysis	3	ELEC3703	-

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Group G General Engineering Courses

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ENGG1006	Engineering for sustainable development	6	-	-
1	ENGG1007	Foundations of computer science	6	-	-
1	ENGG1008	Electric circuits and digital logic (core)	6	-	-

1	ENGG1009	Industrial management and logistics	6	-	-
1	ENGG1010	Foundations of engineering mechanics	6	-	-
1	ENGG1011	Introduction to biomedical engineering	6	-	-

Group H Complementary studies

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	CENG1001	Practical Chinese language course for engineering students	3	-	-
1	ECEN1507	Professional & technical written communication for engineers	3	-	-
1	ECEN1515	Professional and technical oral communication for engineers	3	-	-
2	ELEC2803	Engineering and society	3	-	-

Group I Others

Level	Code	Course Title	Credit-units	Prerequisite	Co-requisite
1	ELEC1803	Workshop training	3	-	-
1	ELEC1804	Industrial training	3	-	-
1	ELEC1808	First year project	3	-	-
2	ELEC2807	Integrated project (InfoE)	6	-	-
3	ELEC3801	Technical project	12	-	-

For descriptions of each course, please see below.

Syllabuses for the courses offered by the Department of Electrical and Electronic Engineering for the four programmes: Computer Engineering, Electrical Engineering, Electrical and Electronic Engineering/Electronic and Communications Engineering, and Information Engineering.

Level One

ELEC1101. Fundamentals of electrical engineering (6 credit-units)

Electrostatic and magnetostatic fields, magnetic properties of materials and magnetic circuits, electromagnetic induction, electromagnetic radiation, electrical energy transmission, power transformer, basic electrical instrumentation.

ELEC1103. Electrical technology (3 credit-units)

Single-phase and three-phase systems, transformers, rotating machines, analogue and digital instruments and measurement, application of electrical technology.

ELEC1104. Electrical energy supply (3 credit-units)

Energy perspectives, transmission and distribution of electrical energy, energy management, the local industry.

ELEC1106. Electric power source (3 credit-units)

Thermal power, nuclear power, hydro power, wind power, solar energy, other renewable energy sources, distributed generation.

(mutually exclusive with ELEC1105 Electric power plant)

ELEC1201. Fundamental electromagnetic theory (3 credit-units)

Electrostatic and magnetostatic fields; capacitance and inductance; magnetic and dielectric materials; simple magnetic circuits, introduction of Maxwell's equations.

ELEC1304. Electronic devices (3 credit-units)

Quantum theory; solid-state theory; PN junction theory; bipolar junction transistor; field-effect devices including JFET, MESFET and MOSFET.

ELEC1305. Electronic circuits (3 credit-units)

Electronic circuits: diode circuits; analyses of BJT and FET amplifiers; digital circuits.

ELEC1401. Computer organization and microprocessors (6 credit-units)

Integer and floating point number representations; brief introduction to digital circuits; memory cells and systems; basic computer building blocks; register transfers and phases of instruction execution; micro-computer system organization - bus signals, timing, and address decoding; study of a simple model microprocessor: signals, instruction set and addressing modes; subroutines; reentrancy; context switching; I/O programming; interrupt I/O and DMA; exception handling; assembler, linker and loader.

ELEC1502. Object oriented programming and data structures (3 credit-units)

This course aims to provide students with solid background on Java software development. The course covers basic concepts of object oriented programming including inheritance, polymorphism, exception handling, multithreading, data structures in object oriented system implementations.

(Mutually exclusive with CSIS1119 Introduction to data structures and algorithms or CSIS0396 Object-oriented programming and Java)

ELEC1802. Engineering mathematics II (6 credit-units)

Complex variables, Fourier series and transforms, numerical methods, probability and statistics.

ELEC1803. Workshop training (3 credit-units)

ELEC1804. Industrial training (3 credit-units)

ELEC1807. Discrete mathematics (3 credit-units)

Basic concepts, algorithms, recurrence relations, relations, graphs and trees.

ELEC1808. First year project (3 credit-units)

Application of the theoretical knowledge and the engineering principles learnt in the first semester to the design and the implementation of a small scale engineering product.

Level Two

ELEC2101. Power transmission and distribution (6 credit-units)

Overhead lines and underground cables; transformers; generators and excitation systems; transmission system steady-state operation; control of power and frequency; control of voltage and reactive power; power system faults analysis; fundamentals of power system stability; substations and protection; power system economics and management.

Co-requisite: ELEC1101 Fundamentals of electrical engineering or ELEC1104 Electrical power plants

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ELEC2102. Electric energy conversion (6 credit-units)

Electric machines: synchronous machines; induction machines; dc machines; special machines. Electric heating: resistive heating; induction heating; dielectric heating. Lighting: incandescent lamps; discharge lamps. Electrochemistry: batteries; fuel cells.

Co-requisite: ELEC1101 Fundamentals of electrical engineering or ELEC1103 Electrical technology

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ELEC2103. Power electronics (6 credit-units)

Power Semiconductor Devices, AC to DC conversion, AC to AC conversion, DC to DC conversion, DC to AC conversion, computer simulations, practical converter design.

ELEC2201. Signals and linear systems (6 credit-units)

Linear time-invariant systems; continuous-time signals; convolution; frequency response; time-domain and frequency-domain representation of discrete-time signals and systems; continuous and discrete Fourier transform; *z*-transform; A/D and D/A conversion; sampling and reconstruction; digital filters.

ELEC2202. Communications engineering (6 credit-units)

Communications system models, properties of signals, baseband transmission, analogue signal transmission, digital transmissions of analogue signals, digital and analogue communications systems, transmission line theory.

Co-requisite: ELEC2201 Signals and linear systems

ELEC2204. Digital signal processing (6 credit-units)

Applications of digital signal processing, discrete-time signal and system, design of digital filters, DFT and fast algorithms, digital signal processing using Mathlab, fundamentals of random signals, spectral estimation, adaptive signal processing, digital signal processors.

Prerequisite: ELEC2201 Signals and linear systems

ELEC2205. Control and instrumentation (6 credit-units)

Introduction to control systems; principles of feedback; root-locus method; frequency-response design methods; state-space methods; control system software; digital control; measurement systems; electromagnetic compatibility; data acquisition.

Co-requisite: ELEC2201 Signals and linear systems

ELEC2206. Electromagnetic waves (3 credit-units)

Review of time harmonic vectors and fields; Maxwell's equations; uniform plane waves; reflection and transmission of waves, introduction to waveguides and antennas.

Prerequisite: ELEC1201 Fundamental electromagnetic theory

ELEC2301. Analogue electronics (6 credit-units)

Frequency responses of amplifiers; differential and multistage amplifiers; feedback amplifiers; active filters and tuned amplifiers; oscillators; regulators; A/D and D/A converters; electronic systems design.

Prerequisite: ELEC1303 Electronics or ELEC1614 Electronic devices and circuits

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ELEC2302. Digital system design (6 credit-units)

Digital system concepts and digital components; digital design using discrete and programmable devices; high speed digital system design considerations; Hardware Description Language (HDL); digital system structures; digital logic and memory testing; fault detection analysis and design; Design for Test (DFT) techniques.

Prerequisites: ELEC1611 Circuit theory and digital logic or (ELEC1301 Circuits & ELEC1303 Electronics)

ELEC2303. Design of digital integrated circuits (6 credit-units)

IC processing, MOSFET, NMOS logic, Layout design, Design rules, Extraction of device parameters, Isolation concerns, Design of memory circuits, CMOS processing and problems, SOI, analysis and layout design CMOS circuits, Effects of scaling on circuit performance, Bipolar junction transistor, BiCMOS circuits.

Prerequisite: ELEC1302 Electronic materials and devices or ELEC1614 Electronic devices and circuits.

ELEC2304. Electronic materials and devices (3 credit-units)

Dielectric, optical and magnetic properties of materials; optoelectronics; bipolar junction transistor; field-effect devices : MOS capacitor, and MOSFET.

Prerequisite: ELEC1614 Electronic devices and circuits.

ELEC2401. Computer architecture (6 credit-units)

Design and performance issues of a computer system; RISC vs CISC; design of control unit; design of ALU; instruction pipeline; memory system; input/output system; parallel processors.

Prerequisite: ELEC1401 Computer organization and microprocessors
(Mutually exclusive with ELEC1623 Computer micro-architecture and system software interfacing)

ELEC2402. Computer communications (6 credit-units)

Data communication networks and facilities; network structures; protocols; local area networks; wide area networks; network trends; data security.

ELEC2501. Software engineering and operating systems (6 credit-units)

Fundamentals of Software Engineering: software life cycle and software engineering process; planning and requirements definition; software design concepts; software architectural and detail design methodologies; software testing strategies; software maintenance; software quality and metrics; software documentation.

Fundamentals of operating systems: basic operating system and process concepts; concurrent processes and programming; processor management; primary and secondary memory management; file and database systems.

ELEC2601. Human computer interaction (6 credit-units)

Human factors of interactive systems, design principles of user-interface, user conceptual models and interface metaphors, information and interactivity structures, interaction devices, presentation styles, information visualization. General features and components of window programming toolkits, event handling and layout management. Strategies for effective human-computer interaction, managing design process, evaluation of human-computer interaction.

ELEC2603. Systems and Network Programming (6 credit-units)

This course aims to provide students with solid background on systems programming, in particular, UNIX system programming, and working level network software development using Java or Unix system facilities. The course covers both classical UNIX multiprogramming software development and object oriented system implementations for networked applications.

Prerequisite: ELEC1501 Computer programming and data structures or ELEC1502 Object oriented programming and data structures, or CSIS1119 Introduction to data structures and algorithms and CSIS0396 Object-oriented programming and Java

(Mutually exclusive with ELEC2602 Object oriented and systems programming and ELEC3628 Network programming or CSIS0402 System architecture and distributed computing)

ELEC2701. Internet technologies and applications (6 credit-units)

Internet architecture overview. IP addressing, internetworking concepts, routing in the internet. TCP, UDP and Sockets. Conventional Internet application protocols. Multimedia network applications: data-compression, audio/video streaming, real-time support. Quality-of-service support for the Internet.

Prerequisite: ELEC2402 Computer communications

ELEC2802. Engineering organization and management (3 credit-units)

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

ELEC2803. Engineering and society (3 credit-units)

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.

ELEC2804. Engineering economics and finance (3 credit-units)

Macroeconomics; financial instruments; accounting concepts and financial statements; cost and profit; economic evaluation.

ELEC2805. Integrated project (EE) (6 credit-units)

A group project consisting of guided design and implementation of an engineering product. This project offers students in small teams an opportunity to apply their knowledge in electronics, electrical machines, computer hardware and software as well as project management, following a disciplined engineering process, to achieve the final goal.

ELEC2806. Integrated project -- embedded systems (9 credit-units)

Basic concepts of real-time systems and embedded systems; a group project consisting of guided design and implementation of an engineering product. This project offers students in small teams an opportunity to apply their knowledge in electronics, electrical machines, computer hardware and software as well as project management, following a disciplined engineering process, to achieve the final goal.

ELEC2807. Integrated project (InfoE) (6 credit-units)

A group project consisting of guided design and implementation of an engineering product. This project offers students in small teams an opportunity to apply their knowledge in electronics, electrical machines, computer hardware and software as well as project management, following a disciplined engineering process, to achieve the final goal.

ELEC2808. Differential equations (3 credit-units)

Ordinary differential equations, partial differential equations, and boundary value problems.

Prerequisites: ELEC1801 Engineering mathematics I and ELEC1802 Engineering mathematics II

ELEC2809. Numerical methods (3 credit-units)

Initial value problems, numerical methods in linear algebra.

Prerequisites: ELEC1801 Engineering mathematics I and ELEC1802 Engineering mathematics II

ELEC2810. Optimization methods (3 credit-units)

Unconstrained optimization, Linear programming, Nonlinear constrained optimization.

ELEC2811. Probability and statistics (3 credit-units)

Estimations, Testing hypothesis, Correlation and regression, Curve fitting, Non-parametric methods, Analysis of variance, and Markov process.

ELEC2812. Integrated project (EComE) (6 credit-units)

A group project consisting of guided design and implementation of an engineering product. This project offers students in small teams an opportunity to apply their knowledge in electronics, electrical machines, computer hardware and software as well as project management, following a disciplined engineering process, to achieve the final goal.

Level Three

ELEC3104. Electric vehicle technology (6 credit-units)

Electric Vehicle (EV) development; EV systems; electric propulsion; energy sources; EV auxiliaries; EV infrastructure; impacts.

ELEC3105. Building services - electrical services (6 credit-units)

Design and installation criteria: electricity distribution in buildings; protection against direct and indirect contacts, earthing and bonding; protective devices; cable management; lightning protection; standby power supplies.

ELEC3106. Building services - electrical installations (6 credit-units)

Design and installation criteria: electricity distribution in buildings; protection against direct and indirect contacts, earthing and bonding; protective devices; cable management; lightning protection; standby power supplies.

ELEC3107. Power system analysis and control (6 credit-units)

Load flow analysis, fault analysis, power system components modeling, small and large disturbance synchronous stability, voltage stability, economic operation, HVDC systems.

Prerequisite: ELEC2101 Power transmission and distribution

ELEC3108. Power system protection (3 credit-units)

Protective relays; protection transformers; protection of transmission lines, rotating machines, transformers and busbars.

Prerequisite: ELEC2101 Power transmission and distribution

ELEC3109. Electric drives (3 credit-units)

Introduction to motor drives; dc motor drives; induction motor drives; synchronous motor drives; special motor drives.

Prerequisite: ELEC1101 Fundamentals of electrical engineering or ELEC1103 Electrical technology

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ELEC3110. Electric traction (3 credit-units)

DC/AC electrification systems; control and protection systems; speed control; electromechanical subsystems; magnetic levitation systems.

Prerequisite: ELEC1101 Fundamentals of electrical engineering or ELEC1103 Electrical technology

ELEC3201. Communication systems (6 credit-units)

Spectral analysis; random signal theory; information theory; noise in analogue systems; digital transmission through AWGN channels; digital carrier-modulation schemes; error control coding.

Prerequisite: ELEC2202 Communications engineering

ELEC3203. Cellular radio and personal communications systems (6 credit-units)

Cellular radio and mobile communications systems; FDMA; TDMA; CDMA..

Prerequisite: ELEC2202 Communications engineering

ELEC3204. Information theory and coding (3 credit-units)

Measure of information, source entropy, Shannon's theorems, channel capacity. Noiseless source coding, error control coding, block codes, cyclic codes, BCH codes, Reed-Solomon code, convolution code, coding performance, trellis coded modulation, applications.

ELEC3206. Control systems (6 credit-units)

State-space theory for dynamic systems; linear quadratic optimal control; nonlinear systems; digital systems and computer control; system identification; Kalman filtering; fuzzy control.

Prerequisite: ELEC2205 Control and instrumentation

ELEC3212. Speech recognition (6 credit-units)

An introduction to the technologies of speech recognition (e.g. voice recognition). Theoretical background and real-life practical systems will be introduced. It serves as an entry-level course to those interested in advance studies in the area. Introduction to speech models, introduction to voice recognition, interactive voice response systems.

Prerequisite: ELEC2204 Digital signal processing

ELEC3214. Microwave engineering (3 credit-units)

Guided wave transmission; waveguides; microwave circuits; scattering matrix formulation; passive and active microwave components; atmospheric propagation and microwave antennas.

Prerequisite: ELEC2203 Electromagnetic theory or ELEC2206 Electromagnetic waves

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ELEC3215. Fibre optics (3 credit-units)

Principles of optical fibre waveguides; light sources and detectors; optical transmitters and receivers designs; optical system designs; optical passive devices and sensor technologies.

Prerequisite: ELEC2203 Electromagnetic theory or ELEC2206 Electromagnetic waves

ELEC3216. Robotics (3 credit-units)

Introduction to robot configurations; robot kinematics; robot dynamics and control; robot programming and applications.

Prerequisite: ELEC2205 Control and instrumentation

ELEC3217. Mechatronics (3 credit-units)

Introduction to mechatronics; various types of sensors, actuators and controllers in mechatronic systems.

ELEC3218. Communication signal processing (3 credit-units)

Basic probability and stochastic processes, linear estimation and prediction; adaptive filters : least mean squares and recursive least squares algorithms. Structures of digital transmitters and receivers, channel models, Nyquist channel and pulse shaping; channel coding; equalization techniques; other applications.

Prerequisite: ELEC2201 Signals and linear systems

ELEC3220. Speech processing (3 credit-units)

Models for speech signals, digital representation of speech waveforms, speech processing and analysis methods. Pattern recognition techniques, hidden Markov models, speech recognition systems and applications. Audio and speech coding.

Prerequisite: ELEC2201 Signals and linear systems

ELEC3401. Advanced internet technologies (6 credit-units)

Overview of computer network, fiber optics, broadband integrated networking and ATM, technologies of cell networking, gigabit packet networks, design and performance issues of high-speed networking.

Prerequisite: CSIS0234 Computer and communication networks or ELEC2701 Internet technologies and applications

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ELEC3503. Fuzzy systems and neural networks (6 credit-units)

The mathematics of fuzzy systems; linguistic variables; fuzzy rules; fuzzy inference; fuzzifiers and defuzzifiers; approximation properties of fuzzy systems; design of fuzzy systems; design of fuzzy systems; artificial neural networks; learning procedures of adaptive networks; supervised learning; unsupervised learning; fuzzy-neuro modeling; applications to control problems.

ELEC3505. Image and video processing (6 credit-units)

Image acquisition and imaging systems, 2D continuous-time and discrete-time signals and systems, time and frequency representations, sampling and quantization issues; image filtering and convolution, enhancement and restoration; colorimetry; image quality evaluation; image transform and compression; motion and video compression; deinterlacing and super-resolution; applications and computer implementations.

Prerequisite: ELEC2201 Signals and linear systems

ELEC3612. VLSI design principles (6 credit-units)

Technology issues, custom and semi-custom design, gate array and standard cell approach, programmable logic arrays, hierarchical design methodologies, design verification, automatic circuit/system synthesis, silicon compilation, design for testability.

Prerequisite: ELEC1302 Electronic materials and devices or ELEC1614 Electronic devices and circuits

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ELEC3621. Introduction to parallel programming (3 credit-units)

Overview of parallel architectures; parallel programming paradigms; parallel programming languages and libraries; parallel computing models; parallel algorithms; performance analysis.

Prerequisite: ELEC2401 Computer architecture or ELEC1623 Computer micro-architecture and system software interfacing.

ELEC3622. Distributed computing systems (3 credit-units)

Network architecture based on the ISO reference model; general theory of distributed computing systems; modeling of distributed computing systems; distributed operating systems; distributed database systems.

Prerequisite: (ELEC2501 Software engineering and operating systems or CSIS0230 Principles of operating systems) and (ELEC2402 Computer communications or CSIS0234 Computer and communication networks)

ELEC3626. Computer network security (3 credit-units)

This course focuses on state-of-the-art computer network security technologies, which are crucial to the success of any electronic commerce systems. The course covers fundamental techniques of cryptography, security threats and their possible countermeasures, secure protocols, and other network security schemes (authentication, key management, firewalls, intrusion detection, etc.).

Prerequisite: ELEC2402 Computer communications or CSIS0234 Computer and communication networks

ELEC3701. Telecommunication policy and regulations (6 credit-units)

An introduction to the characteristics and operation of the telecommunication industry worldwide. History of telecommunication, monopolies in telecommunications, competition, general model for telecommunication industry, International standardization organizations (ITU, ISO, ANSI, ETSI), regulatory bodies in various countries (FCC for US, OFTEL for HK), telecom industry in the US, telecom industry in Europe, telecom industry in Japan, telecom industry in HK.

ELEC3703. Queuing theory (3 credit-units)

Basic notation, discrete and continuous time Markov chains, birth-death processes, elementary queuing systems (M/M/m/A/B queuing systems), Erlangian distribution.

ELEC3704. System modeling and performance analysis (3 credit-units)

Queuing networks, M/G/1, G/M/m and G/G/1 queues, priority queuing, time-sharing systems, multi-access systems, event-driven simulation.

Prerequisite: ELEC3703 Queuing theory

ELEC3801. Technical project (12 credit-units)

ELEC3802. Technical project (12 credit-units)

General Engineering Courses

ENGG1002. Computer programming and applications (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1003. Mathematics I (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1004. Mathematics IA (3 credit units)

Please refer to the General Engineering courses for details.

ENGG1005. Mathematics IB (3 credit units)

Please refer to the General Engineering courses for details.

ENGG1006. Engineering for sustainable development (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1007. Foundations of computer science (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1008. Electric circuits and digital logic (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1009. Industrial management and logistics (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1010. Foundations of engineering mechanics (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1011. Introduction to biomedical engineering (6 credit units)

Please refer to the General Engineering courses for details.

Syllabuses for the courses offered by other departments for the programmes: Computer Engineering, Electrical Engineering, Electrical and Electronic Engineering/Electronic and Communications Engineering, and Information Engineering.

FINA1002. Introduction to finance (6 credit-units)

An introduction about the basic aspects of financial management: managing the company's sources and uses of funds as well as a general understanding of the key issues involving the raising and using of long term funds. There will be extensive use of a spreadsheet software (Excel) in lectures and its use is also expected in homework assignments. After finishing the course, students should have a basic knowledge of financial statements and cash flows, an understanding of the major securities used in the financing of companies. They would also be conversant with fundamental financial techniques like compounding, discounting and capital budgeting and be able to apply them for personal financing decisions.

Remarks: (1) It is advisable to take BUSI1002 Introduction to accounting prior to this course.
(2) Not open to students admitted to 1st year of study in the Faculty of Business and Economics in 2006-07 or after (including BEcon, BFin, BEcon&Fin and business students).
(3) Students admitted to 1st year of study in 2006-07 or after majoring or minoring in finance are required to take FINA1003 Corporate Finance. Mutually exclusive course: BUSI0016 Introduction to finance *and* FINA1003 Corporate finance .

BUSI0023. Operations and quality management (6 credit-units)

A general introduction to the basic concepts and principles of management of manufacturing and service operations. Emphasis will be on both the quantitative and qualitative aspects of operations management and the intention is to give students moderate exposure to the major topics in operations management.

BUSI1001. Business law (6 credit-units)

An introduction to the Hong Kong legal system, the fundamentals and general principles of Hong Kong law. Other legal concepts which a manager may be expected to encounter in the business environment.

BUSI1006. Principles and practices of modern business (3 credit-units)

This course is deliberately designed to make students aware of the mechanics and environments in which modern day business operate in global, regional and domestic markets. This course aims to help students to understand modern business operations and development in the knowledge economy. This orientation is organized around the new emerging paradigms of business configuration and the skills required of future business leaders.
Mutually exclusive courses: BUSI0015 and YSOB0001

BUSI1007. Principles of management (6 credit-units)

This introductory course traces back to how the study and practice of management evolved over this past century, with particular focus on the landmark discoveries and lessons learned. Students are also exposed to the essence of managerial work and the changing face of workplace management. The programme's pedagogical design combines the ingredients of theoretical conceptualization and emphasizes interactive discussions, skill-building experiential exercises and students' presentation.

Exclusion: Students having completed BUSI1007 Principles of management (3 credit-units) offered in the academic year 2002-2003 or earlier are not allowed to take this course.

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

Please refer to the Common Language Enhancement Courses for details.

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

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

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

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.

Prerequisite: CSIS0230; experience with Unix/Linux systems; C++/Java programming *or*
Co-requisite: CSIS0234 and CSIS0297

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

Prerequisite: CSIS0271

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.

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002

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

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

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

Prerequisite: CSIS1117 or ELEC1501 or ENGG1002
Pre/Co-requisite: CSIS1122

CSIS1121. Discrete mathematics (6 credit-units)
(renamed from CSIS1118 Mathematical foundations of computer science (6 credit-units) from 2008-09)

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

CSIS1122. Computer programming II (6 credit-units) [for intake of 2006 and thereafter]

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 ELEC1501 or ENGG1002

ECEN1507. Professional and technical written communication for engineers (3 credit-units)

The focus of this course is the function and importance of professional and technical communication in English and specifically understanding and using written English. Topics include accessing, abstracting, analysing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

ECEN1515. Professional and technical oral communication for engineers (3 credit-units)

Please refer to the Common Language Enhancement Courses for details.

INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT

PROGRAMME STRUCTURE

Definitions and Terminology

The Level of a course shall be One, Two or Three. Each course offered by the Department of Industrial and Manufacturing Systems Engineering shall be assigned a Level, which is indicated in the first left-most digit of the 4-digit numeral in the latter half of the course code. As an example, a Level One course shall read < IMSE1xxx >.

A Core course is a course in the curriculum that a candidate must take and pass according to the criteria provided in the Regulations. A Compulsory course is a course in the curriculum that a candidate must take. A Breadth course is a Level One or Level Two course offered as an elective course in the curriculum. A Depth course is a Level Three course offered as an elective course in the curriculum. Elective Courses refer to any optional subjects offered by the Department, provided that it does not overlap significantly with the other courses that the student has already enrolled in.

Complementary Studies shall include language enhancement courses, all the broadening courses offered by the Department and/or by the University. A list of the broadening courses approved for enrollment by the Department will be provided in the beginning of the academic year. Broadening courses are courses that are not directly related to the subject area of the major programme, but are to be taken as part of the general education requirement in university education.

The Curriculum

The curriculum comprises 186 credit-units of courses as follows:

(a) 69 credit-units of Core courses of the curriculum, including:
  (i) Integrative project (6 credit-units)
  (ii) Technical project (12 credit-units)
  (iii) ENGG1002 Computer programming and applications (6 credit units)
  (iv) either (1) ENGG1003 Mathematics I (6 credit units)
  or
  (2) ENGG1004 Mathematics IA (3 credit units) and
  IMSE1018 Mathematics (IMSE) (3 credit units)

(b) 18 credit-units of Compulsory courses of the curriculum

(c) 63 credit-units of Breadth/Depth Elective courses, including 12 credit units of Engineering electives

(d) 30 credit-units of complementary studies courses, comprising:
  (i) Professional and technical written communication for engineers (3 credit-units)
  (ii) Professional and technical oral communication for engineers (3 credit-units)
  (iii) Practical Chinese language course for engineering students (3 credit-units)
  (iv) Additional 21 credit-units of Complementary Studies courses, including at least 3 credit-units in Humanities and Social Sciences Studies, and at least 3 credit-units in either Culture and Value Studies or an area of studies outside this degree curriculum as an elective

(e) Workshop training (3 credit-units)

(f) Industrial training (3 credit-units)

To complete the degree requirement, a candidate must enroll in all the courses specified in the curriculum, and must pass the courses listed under (a) and (d) (i) (ii) (iii), and a combination of other courses totaling to at least 180 credit-units. In addition, the candidate must complete the workshop training (3 credit-units) and industrial training (3 credit-units), as well as satisfy the IT Proficiency Test and any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credit-units will be counted towards degree classification, according to the following:

(a) 9 credit-units of Complementary courses (languages / communications);
(b) 69 credit-units of Core courses;
(c) the best 81 credit-units of Compulsory / Breadth / Depth elective courses / Workshop training and Industrial training;
(d) the best 21 credit-units of Broadening elective courses.

Order of Study

Order of study is dictated by the pre-requisite and the co-requisite requirements. Generally, Level One courses should be taken before Level Two courses, Level Two courses should be taken before Level Three courses and core courses should be taken before breadth courses. Courses under the category of Complementary Studies can be taken in any order.

Level One

Loading

The normal loading is 60 credit-units of courses for the Level One, with 30 credit-units of courses in each semester. Students are allowed to increase the loading by not more than 9 credit-units in each semester. Students are required to do Workshop Training (3 credit-units) in addition to the 60 credit-units of courses.

Courses

Students must take the examination/coursework/continuous assessment in the following courses and pass the courses listed under (a) and (c)(i) and (c)(ii).

(a) Core courses (24 credit-units)
(b) 4 Breadth Elective courses (24 credit-units)
(c) 4 Broadening / Complementary courses (12 credit-units) consisting of
  (i) 2 English Communications courses (6 credit-units)
  (ii) 1 Chinese Language course (3 credit-units)
  (iii) 1 Broadening course on the approved list (3 credit-units)

Core Courses			
Code	Title	Credit-units	Length (Sem)
IMSE1003	Introduction to business and management	6	1
IMSE1009	Fundamentals of engineering design	6	1
ENGG1003	Mathematics I (6 credit units)	6	1
OR			
ENGG1004	Mathematics IA (3 credit units)	3	1
IMSE1018	Mathematics (IMSE) (3 credit units)	3	1
ENGG1002	Computer programming and applications	6	1
Credit-units required: 24			

Breadth Elective / General Engineering Courses			
Code	Title	Credit-units	Length (Sem)
IMSE1012	Engineering technology	6	1
IMSE1013	Introduction to information systems	6	1
IMSE1014	Product development	6	1
IMSE1015	Systems modelling and simulation	6	1
Elect two courses from the above Breadth Elective courses; credit-units required: 12			
ENGG1009	Industrial management and logistics	6	1
ENGG1006	Engineering for sustainable development	6	1
ENGG1007	Foundations of computer science	6	1
ENGG1008	Electric circuits and digital logic	6	1
ENGG1010	Foundations of engineering mechanics	6	1
ENGG1011	Introduction to biomedical engineering	6	1
Elect two courses from the above General Engineering courses; credit-units required: 12			
Credit-units required: 24			

Broadening / Complementary Studies courses			
Code	Title	Credit-units	Length (Sem)
ECEN1509	Professional and technical written communication for engineers	3	1
ECEN1515	Professional and technical oral communication for engineers	3	1
CENG1001	Practical Chinese language course for engineering students	3	1
	Broadening elective course	3	1
Credit-units required: 12			

Level Two

Loading

The normal loading for a student is 60 credit-units of courses for the Level Two, with 30 credit-units of courses in each semester. Students are allowed to increase the loading by not more than 9 credit-units in each semester. Students are required to do Industrial Training (3 credit-units) in addition to the 60 credit-units of courses.

Courses

Students must take the examination/coursework/continuous assessment in the following courses and pass the courses listed under (a).

(a) 5 Core courses (27 credit-units)
(b) 1 Compulsory course (6 credit-units)
(c) A combination of Breadth Elective courses totaling to 15 credit-units
(d) 4 Broadening/Complementary Studies courses (12 credit-units) consisting of
    (i) 3 Broadening courses on the approved list (9 credit-units)
    (ii) 1 Humanities Broadening course on the approved list (3 credit-units)

Core Courses			
Code	Title	Credit-units	Length (Sem)
IMSE2005	Managerial accounting and finance	6	1
IMSE2006	Manufacturing technology	6	1
IMSE2008	Operational research techniques	6	1
IMSE2009	Quality management	6	1
IMSE2014	Applied statistics	3	1
Credit-units required: 27			

Compulsory Course			
Code	Title	Credit-units	Length (Sem)
IMSE2010	Integrative studies	6	2
Credit-units required: 6			

Breadth Elective Courses			
Code	Title	Credit-units	Length (Sem)
IMSE0201	Supply chain design and development	6	1
IMSE2003	Industrial automation	6	1
IMSE2012	Maintenance and reliability engineering	3	1
IMSE2013	Manufacturing systems design	6	1
IMSE2015	Man-machine systems	6	1
IMSE2016	Internet technology for e-commerce	6	1
IMSE2017	Management of information and information technology	6	1
IMSE2018	Industrial organisation and management	6	1
IMSE2019	Stochastic decision systems	6	1
IMSE2020	Purchasing and supply management	3	1
Credit-units required: 15			

Broadening / Complementary Studies elective courses			
Code	Title	Credit-units	Length (Sem)
	Broadening elective course (Humanities)	3	1
	Broadening elective course	3	1
	Broadening elective course	3	1
	Broadening elective course	3	1
Credit-units required: 12			

Level Three[5]

Loading

The normal loading for a student is 60 credit-units of courses for the Level Three, with 30 credit-units of courses in each semester. Students are allowed to increase the loading by not more than 9 credit-units in each semester.

Courses

Students must take the examination/coursework/continuous assessment in the following courses and pass the courses listed under (a).

(a) 2 Core courses (18 credit-units), comprising:
  (i) Technical Project - IMSE 3014 Project (12 credit-units)
  (ii) Integrative project - IMSE3015 Industrial systems integration (6 credit-units)

[5] Level Three students may elect Level Two elective courses, upon consulting the Course Tutor.

(b) 2 Compulsory courses (12 credit-units)
(c) A combination of Depth Elective courses totaling to 24 credit-units
(d) 1 Broadening / Complementary Studies course (6 credit-units) elected from the following:
  (i) IMSE3028 Innovation and entrepreneurship (6 credit-units) or
  (ii) Broadening courses on the approved list (6 credit-units)

Core Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3014	Project	12	2
IMSE3015	Industrial systems integration	6	2
Credit-units required: 18			

Compulsory Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3001	Computer integrated manufacturing	6	1
IMSE3016	Operations planning and control	6	1
Credit-units required: 12			

Depth Elective Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3002	Engineering project management	6	1
IMSE3009	Advanced industrial automation	6	1
IMSE3010	Financial engineering	6	1
IMSE3011	Facilities design	6	1
IMSE3017	Advanced electronic manufacturing technology	6	1
IMSE3018	Advanced manufacturing technology	6	1
IMSE3019	Digital enterprises and e-commerce	6	1
IMSE3020	Technology marketing	3	1
IMSE3021	Strategic management of business and technology	3	1
Credit-units required: 24			

Broadening / Complementary elective Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3028	Innovation and entrepreneurship	6	1
	Broadening elective course	6	1
Credit-units required: 6			

Summary of the prerequisite relationship for enrollment of courses of Levels One, Two, and Three

Level One

Code	Title	Prerequisite
Core courses		
IMSE1003	Introduction to business and management	None
IMSE1009	Fundamentals of engineering design	None
ENGG1003	Mathematics I (6 credit units)	None
OR		
ENGG1004	Mathematics IA (3 credit units)	None
IMSE1018	Mathematics (IMSE) (3 credit units)	None
ENGG1002	Computer programming and applications	None

Breadth Elective Courses %		
IMSE1012	Engineering technology	None
IMSE1013	Introduction to information systems	None
IMSE1014	Product development	None
IMSE1015	Systems modelling and simulation	None
ENGG1009	Industrial management and logistics	None
ENGG1006	Engineering for sustainable development	None
ENGG1007	Foundations of computer science	None
ENGG1008	Electric circuits and digital logic	None
ENGG1010	Foundations of engineering mechanics	None
ENGG1011	Introduction to biomedical engineering	None

% Level One students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

Level Two

Code	Title	Prerequisite
Core Courses		
IMSE2005	Managerial accounting and finance	IMSE1003 Introduction to business and management
IMSE2006	Manufacturing technology	None
IMSE2008	Operational research techniques	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2009	Quality management	None
IMSE2014	Applied statistics	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
Compulsory Courses		
IMSE2010	Integrative studies	None
Breadth Elective Courses *		
IMSE0201	Supply chain design and development	IMSE1003 Introduction to business and management
IMSE2003	Industrial automation	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2012	Maintenance and reliability engineering	Co-requisite: IMSE2014 Applied Statistics
IMSE2013	Manufacturing systems design	None
IMSE2015	Man-machine systems	None
IMSE2016	Internet technology for e-commerce	None
IMSE2017	Management of information and information technology	IMSE1013 Introduction to information systems
IMSE2018	Industrial organisation and management	IMSE1003 Introduction to business and management

IMSE2019	Stochastic decision systems	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2020	Purchasing and supply management	None

* Level Two students may elect Level One Breath Elective courses or Level Three Depth Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE1xxx or IMSE3xxx courses.

Level Three

Code	Title	Prerequisite
Core Courses		
IMSE3014	Project	None
IMSE3015	Industrial systems integration	None
Compulsory courses		
IMSE3001	Computer integrated manufacturing	IMSE1009 Fundamentals of engineering design
IMSE3016	Operations planning and control	IMSE2008 Operational research techniques
Depth Elective Courses ^		
IMSE3002	Engineering project management	Co-requisite: IMSE2008 Operational research techniques
IMSE3009	Advanced industrial automation	IMSE2003 Industrial automation
IMSE3010	Financial engineering	IMSE2005 Managerial accounting and finance
IMSE3011	Facilities design	IMSE2008 Operational research techniques
IMSE3017	Advanced electronic manufacturing technology	None
IMSE3018	Advanced manufacturing technology	IMSE2006 Manufacturing technology
IMSE3019	Digital enterprises and e-commerce	IMSE2016 Internet technology for e-commerce or IMSE1013 Introduction to information systems or IMSE1008 Computer applications for engineers or ENGG1002 Computer programming and applications
IMSE3020	Technology marketing	IMSE1003 Introduction to business and management
IMSE3021	Strategic management of business and technology	IMSE1003 Introduction to business and management

Broadening / Complementary elective Courses		
IMSE3028	Innovation and entrepreneurship	none

^ Level Three students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

SYLLABUSES

Level One

The Level One syllabuses shall be as follows:

A1. Core Courses

IMSE1003. Introduction to business and management (6 credit-units)

Business of production; business environment, globalization, the positions of Hong Kong and China; marketing and distribution; the firm and the customer; the firm and its suppliers; finance and the firm; costs of production; human resource management; introduction to manufacturing systems; management and integration; the engineer in society, professional ethics; development of technology and interaction between societies and technology, intellectual property; the environment and safety.

IMSE1009. Fundamentals of engineering design (6 credit-units)

General principles of engineering drawing practice; computer aided design and drafting; dimensioning and tolerancing; assembly drawing; design of components; general principles of product and tool design.

IMSE1018. Mathematics (IMSE) (3 credit-units)

Optimization of functions of two or more variables. Matrices and transformation. Difference equations. Random variables.

A2. Breadth Elective Courses

- Level One students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

IMSE1012. Engineering technology (6 credit-units)

Laws of motion; conservation of energy; kinematics and dynamics of rigid bodies; applications and simulation of 4-bar mechanisms; gear trains; vibrations; fundamental electric circuit analysis; alternating currents and voltages; A.C. circuits and phasors; three-phase circuits.

IMSE1013. Introduction to information systems (6 credit-units)

Information systems; the strategic role of information technology; data communications and networking; applications of networks and databases; development and implementation of information systems.

IMSE1014. Product development (6 credit-units)

Organisation and management, performance measurement; market research, product design specification, product safety, product and the environment, concept generation and selection, design review and improvements; product appraisal from functional, ergonomic and aesthetic, manufacturing and economical aspects; design theory and methodology, information / literature search.

IMSE1015. Systems modelling and simulation (6 credit-units)

Basic concepts of modelling and simulation; different types of modelling orientations, discrete-event simulation techniques vs. continuous; use of simulation packages; methodology of simulation study; model development for industrial systems, analysis of system configurations; model validation and analysis of simulation output.

B. Complementary Studies Courses – Language enhancement courses

ECEN1509. Professional and technical written communication for engineers (3 credit-units)

The focus of this course is the function and importance of professional and technical communication in English and specifically understanding and using written English. Topics include accessing, abstracting, analysing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

ECEN1515. Professional and technical oral communication for engineers (3 credit-units)

Please refer to the Common Language Enhancement Courses for details.

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

Please refer to the Common Language Enhancement Courses for details.

C. Broadening / Complementary Studies Courses

Broadening Elective Course (3 credit-units)

D. Workshop Training

IMSE1010. Workshop training (3 credit-units)

Metal work, manufacturing practice, practical networking, computing practice, design practice, plastic processing, metrology, CNC programming and CAD/CAM, electronics, work study.

Level Two

The Level Two syllabuses shall be as follows:

A1. Core Courses

IMSE2005. Managerial accounting and finance (6 credit-units)

Cost accounting - procedures; direct costs, absorption costing; marginal costing. Planning and control - budgetary planning systems; standard costing systems; capital expenditure and investment; health, safety and environmental aspects of company activities; contemporary issues in management accounting; financial accounting - accounting rules; basic financial accounts; manufacturing accounts; company account; financial performance - cash flow statements; interpretation of accounting data.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE2006. Manufacturing technology (6 credit-units)

Introduction to manufacturing, safety in manufacturing, manufacturing and the environment; metrology, measuring standards, limits and fits, geometrical tolerances, limit gauging, surface texture; casting processes, pattern and gating, permanent and non-permanent moulds; forming processes, principles of bulk deformation and sheet metal working; joining processes, fastening, liquid and solid states welding, powder metallurgy; machining processes, cutting and grinding operations, non-traditional machining, cutting conditions; plastics materials and processing.

IMSE2008. Operational research techniques (6 credit-units)

Philosophy and methodology of Operational Research: problem analysis, establishing objectives, identifying decision variables, model building, implementation and monitoring solutions; Operational Research techniques and their applications in operations management: linear programming and its extensions, dynamic programming, queuing theory, and replacement models for single components and capital equipment.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2009. Quality management (6 credit-units)

Total quality management; management tools for quality; benchmarking; quality assurance management systems; ISO9000 series; national quality awards; design of industrial experiments; statistical process control; control charts; acceptance sampling; environmental management; ISO14000 series; environmental management systems; business process reengineering; customer services quality.

IMSE2014. Applied statistics (3 credit-units)

Probability and probability laws; binomial, Poisson and normal distributions; estimation and hypothesis testing; Type I and Type II errors; regression analysis, experiments with mixtures, ANOVA; non-parametric methods.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

A2. Compulsory Courses

IMSE2010. Integrative studies (6 credit-units)

To develop students in the areas of technical literature survey, analysis and assimilation of materials, skills of written and oral presentation, composition and implementation of ideas, communication and interactive skills through student and product centred activities, interactive and project-based learning.

A3. Breadth Elective Courses

- Level 2 students may elect Level 1 Breath Elective courses or Level 3 Depth Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE1xxx or IMSE3xxx courses.

IMSE0201. Supply chain design and development (6 credit-units)

Supply chain overview; operating objectives; barriers to internal integration; supply chain performance cycles; logistics positioning; supply chain environmental assessment; time-based supply chains; information flow; alternative supply chain strategies; supply chain integration theory; logistics location structure; warehouse location patterns; transportation economies; inventory economies; least total cost design; formulating supply chain strategy; planning and design supply chain methodology; supply chain administration and dimensions of change management.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE2003. Industrial automation (6 credit-units)

Conditions and justification for automation; basic components of industrial automation; numerical control technology; pneumatic/hydraulic actuators, programmable logic controllers, electro-pneumatic systems design. Open-loop and closed-loop control; system stability; analogue and digital control.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2012. Maintenance and reliability engineering (3 credit-units)

Survivor Function; hazard function; system reliability, reliability testing, accelerated life testing; maintenance policy; reliability improvement.

Co-requisite: IMSE2014 Applied statistics

IMSE2013. Manufacturing systems design (6 credit-units)

Types of manufacturing systems; modelling and analysis of manufacturing systems, material flow analysis, assembly line balancing, discrete-event simulation; stochastic modelling: Markov chains, central server model, network of queues; factory physics, effects of variability on performance; competitive manufacturing: just-in-time production, quick-response manufacturing; advanced manufacturing systems, group technology, flexible manufacturing systems, holonic manufacturing.

IMSE2015. Man-machine systems (6 credit-units)

Ergonomics and systems, people in systems, health and safety at work place; the man-machine interface; anthropometry and biomechanics; physical work and workplace design; information processing; input and output; models of the sensory-motor system; skills and learning; environmental design, illumination, noise, thermal; applications, job design, inspection; shift work.

IMSE2016. Internet technology for e-commerce (6 credit-units)

Overview of E-Business and E-Commerce: Electronic Business Solutions (EBS), 3-tiered architecture, EBS technologies; Business Models: Their new dimensions and impacts, types and choice; Design and development: Development procedure, User needs and system requirements, System planning and design, Client-side vs server-side scripting, XML; EBS Adoption / Implementation: EBS adoption procedure, Buy, Rent or Build? Operational and economic considerations; RFID; Problem-Based Learning (PBL) case studies and Mini-Project.

IMSE2017. Management of information and information technology (6 credit-units)

Database management; knowledge management; management information systems; decision support systems; approaches to information systems development; system development life cycle; database design; user interface design; distributed systems.

Prerequisite: IMSE1013 Introduction to information systems

IMSE2018. Industrial organisation and management (6 credit-units)

Managing and managers; evolution of management theory; planning - decision making; strategic management; strategy implementation, strategic management; organising - organisational design and structure; power and the distribution of authority; managing organisational change and innovation; leading – motivation, leadership, teams and teamwork; controlling, principles of effective control, operations control.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE2019. Stochastic decision systems (6 credit-units)

Decision analysis: decision making under uncertainty, axioms of decision analysis, methodology of decision analysis, analytical hierarchy approach, quantification of judgemental uncertainties, assessing utilities, and group decision problems; game theory and gaming: extensive and normal forms, zero-sum two-person games, two-persons nonzero-sum games, n-persons games, teaching and training and operational gaming; stochastic processes: random walks, recurrent events, Markov chains, and renewal-processes.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2020. Purchasing and supply management (3 credit-units)

Introduction of purchasing function; quality management tools; supplier selection techniques; make or buy decisions; two-envelop bidding system; negotiation strategies; capital life cycle; outsourcing decisions; strategic purchasing; supplier relation management; EPOS; e-procurement.

B. Broadening / Complementary Studies Courses

Broadening Elective (Humanities) (3 credit-units)

Broadening Elective Course (3 credit-units)

Broadening Elective Course (3 credit-units)

Broadening Elective Course (3 credit-units)

C. Industrial Training

IMSE2011. Industrial training (3 credit-units)

A minimum of six week summer internship in the industry.

Level Three

The Level Three syllabuses shall be as follows:

A1. Core Courses

Technical project

IMSE3014. Project (12 credit-units)

A dissertation or report on a topic consisting of design, experimental or analytical investigation in the field of industrial engineering and technology management.

Integrative project

IMSE3015. Industrial systems integration (6 credit-units)

Student-centred learning on system integration and analysis and evaluation of system performance. The module covers the application of techniques as follows:
Business analysis and decision making process; industrial modelling and simulation; layout planning; project management, strategic management; industry analysis; value chain analysis and critical success factors.

A2. Compulsory Courses

IMSE3001. Computer integrated manufacturing (6 credit-units)

CAD/CAM functions and systems; computer graphics, graphics packages and standards; geometric modelling in CAD - principles of surface and solid modelling; CNC applications in CAM; computer aided process planning, automated process planning; rapid prototyping, virtual prototyping; CAD and CAM integration; CIM system design and implementation.

Prerequisite: IMSE1009 Fundamentals of Engineering Design

IMSE3016. Operations planning and control (6 credit-units)

The use of operations planning and control systems in forecasting, scheduling and inventory control; functions and organisation of production and inventory control systems; demand forecasting; deterministic and stochastic inventory control problems; aggregate production planning; master production scheduling; requirements and capacity planning systems; operations scheduling and control of production systems; Just-In-Time techniques; balancing of assembly lines; information reporting and processing; supply chain management.

Prerequisite: IMSE2008 Operational research techniques

A3. Depth Elective Courses

- Level Three students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

IMSE3002. Engineering project management (6 credit-units)

Fundamentals of engineering project management; project environment; project evaluation; risk management process; project selection and proposal preparation; project scheduling and contingency setting and control; control of variation and claims; project management methodologies and techniques, change management; multi-criteria decision making process; analytic hierarchy process; PERT/GANTT techniques for project control and resources allocation; simulation of critical paths; case studies.

Co-requisite: IMSE2008 Operational research techniques

IMSE3009. Advanced industrial automation (6 credit-units)

Mechanised and flexible assembly systems, parts handling and feeding, parts mating theory; real-time control software; network communication in CIM, TCP/IP reference model; fundamentals of industrial robotics; robot motion and control; object and task-based programming; machine vision, techniques and industrial applications; robotic cell design; robots in industry and their social implications.

Prerequisite: IMSE2003 Industrial automation

IMSE3010. Financial engineering (6 credit-units)

Financial markets and financial securities, portfolio management and investment strategies; international finance, foreign exchange markets; project evaluation and financing, present value, cost of capital, cost-benefit ratio and internal rates of return; financial instruments, forwards, futures; swaps, options and hedging strategies; foreign trade and investment in China.

Prerequisite: IMSE2005 Managerial accounting and finance

IMSE3011. Facilities design (6 credit-units)

Plant location problem; advanced techniques in plant layout design, computer-based layout planning, and quantitative approaches; materials handling, storage and warehousing for global manufacturing; lean manufacturing, cellular manufacturing, one-piece flow; workplace design in the information age; digital factory; fire safety and security; study cases drawn from the manufacturing and service industries.

Prerequisite: IMSE2008 Operational research techniques

IMSE3017. Advanced electronic manufacturing technology (6 credit-units)

Semiconductor properties; structures of planar devices; Integrated circuit fabrication processes; Chip-to-module fabrication processes and technology; Electrical properties in high density and high speed digital circuits; Processes for printed circuit board fabrication; hybrid microcircuit technology; and Electronic assembly technology.

IMSE3018. Advanced manufacturing technology (6 credit-units)

Metal cutting and machining, analysis of cutter geometry and materials; mechanics of cutting, tool wear and tool life, cutting optimization, analysis of milling, grinding, EDM, ECM, LBM; analysis of metal forming processes; engineering plasticity, Upper-Bound Theorem, CAD/CAM for mould and dies, rapid prototyping technologies; melt rheology, temperature and pressure effects, viscosity, mixing systems, polymeric materials, analysis of injection, extrusion, mould and die design.

Prerequisite: IMSE2006 Manufacturing technology

IMSE3019. Digital enterprises and e-commerce (6 credit-units)

Enterprise resource management; EDI applications; data mining and warehousing; virtual enterprises; advanced Internet and web applications in product development, industrial applications of virtual reality; electronic product and component cataloguing; cryptographic systems; capability maturity model; social accountability standard; E-commerce business models; technological, business planning and social issues of E-commerce; order taking and processing; electronic payment systems, smart cards.

Prerequisite: IMSE2016 Internet technology for e-commerce, or IMSE1013 Introduction to information systems, or IMSE1008 Computer applications for engineers, or ENGG1002 Computer programming and applications

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IMSE3020. Technology marketing (3 credit-units)

Marketing mix, product life cycle, pricing models, competitive advantages, technology trend, distribution channels, market segmentation, intellectual property.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE3021. Strategic management of business and technology (3 credit-units)

Analysis of the external environment and industry clusters for local industries – threats and opportunities from government policies as well as the legal, economic, social and technological environment; competitive forces from industry rivals, customers and other sources; analysis of internal weaknesses and strengths – resources, competences and success factors; mission and strategic intent; strategic directions and methods – conditions and implications; implementing and evaluating strategic changes; management for technology innovation.

Prerequisite: IMSE1003 Introduction to business and management

B. Broadening / Complementary Studies Courses

IMSE3028. Innovation and entrepreneurship (6 credit-units)

Entrepreneurship in the new world economy, developments in the pacific region and greater China; general characteristics of entrepreneurs; enterprise formation, organizational structure, new economy business models; enterprise resources, business plan, venture capital; technological growth; environmental and contingency factors; case studies. Skill workshops: identifying strengths and improving skills; organising yourself and your time; communication; systematic problem solving; group work; negotiating and assertiveness; coping with pressure; leadership.

Broadening / Complementary Elective Course (6 credit-units)

LOGISTICS ENGINEERING AND SUPPLY CHAIN MANAGEMENT

PROGRAMME STRUCTURE

Definitions and Terminology

The Level of a course shall be One, Two or Three. Each course offered by the Department of Industrial and Manufacturing Systems Engineering shall be assigned a Level, which is indicated in the first left-most digit of the 4-digit numeral in the latter half of the course code. As an example, a Level One course shall read < IMSE1xxx >.

A Core course is a course in the curriculum that a candidate must take and pass according to the criteria provided in the Regulations. A Compulsory course is a course in the curriculum that a candidate must take. A Breadth course is a Level One or Level Two course offered as an elective course in the curriculum. A Depth course is a Level Three course offered as an elective course in the curriculum. Elective Courses refer to any optional subjects offered by the Department, provided that it does not overlap significantly with the other courses that the student has already enrolled in.

Complementary Studies shall include language enhancement courses, all the broadening courses offered by the Department and/or by the University. A list of the broadening courses approved for enrollment by the Department will be provided in the beginning of the academic year. Broadening courses are courses that are not directly related to the subject area of the major programme, but are to be taken as part of the general education requirement in university education.

The Curriculum

The curriculum comprises 186 credit-units of courses as follows:

(a) 75 credit-units of Core courses of the curriculum, including
  (i) Integrative project (6 credit-units)
  (ii) Technical project (12 credit-units)
  (iii) ENGG1002 Computer programming and applications (6 credit units)
  (iv) either (1) ENGG1003 Mathematics I (6 credit units)
  or
  (2) ENGG1004 Mathematics IA (3 credit units) and
  IMSE1018 Mathematics (IMSE) (3 credit units)

(b) 18 credit-units of Compulsory course of the curriculum

(c) 57 credit-units of Breadth/Depth Elective courses, including 12 credit units of Engineering electives

(d) 30 credit-units of complementary studies courses comprising:
  (i) Professional and technical written communication for engineers (3 credit-units)
  (ii) Professional and technical oral communication for engineers (3 credit-units)
  (iii) Practical Chinese language course for engineering students (3 credit-units)
  (iv) Additional 21 credit-units of Complementary Studies courses, including at least 3 credit-units in Humanities and Social Sciences Studies, and at least 3 credit-units in either Culture and Value Studies or an area of studies outside this degree curriculum as an elective
(e) Workshop training (3 credit-units)
(f) Industrial training (3 credit-units)

To complete the degree requirement, a candidate must enroll in all the courses specified in the curriculum and must pass the courses listed under (a) and (d) (i) (ii) (iii), and a combination of other courses totaling to at least 180 credit-units. In addition, the candidate must complete the workshop training (3 credit-units) and industrial training (3 credit-units) as well as satisfy the IT Proficiency Test and any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credit-units will be counted towards degree classification, according to the following:

(a) 9 credit-units of Complementary courses (languages / communications);
(b) 75 credit-units of Core courses;
(c) the best 75 credit-units of Compulsory / Breadth / Depth elective courses / Workshop training and Industrial training;
(d) the best 21 credit-units of Broadening elective courses.

Order of Study

Order of study is dictated by pre-requisite and co-requisite requirements. Generally, Level One courses should be taken before Level Two courses, Level Two courses should be taken before Level Three courses and core courses should be taken before breadth courses. Courses under the category of Complementary Studies can be taken in any order.

Level One

Loading

The normal loading is 60 credit-units of courses for the Level One, with 30 credit-units of courses in each semester. Students are allowed to increase the loading by not more than 9 credit-units in each semester. Students are required to do Workshop Training (3 credit-units) in addition to the 60 credit-units of courses.

Courses

Students must take the examination/coursework/continuous assessment in the following courses and pass the courses listed under (a) and (c)(i) and (c)(ii).

(a) Core courses (30 credit-units)
(b) 3 Breadth Elective courses (18 credit-units)
(c) 4 Broadening / Complementary courses (12 credit-units) consisting of
  (i) 2 English Communications courses (6 credit-units)
  (ii) 1 Chinese Language course (3 credit-units)
  (iii) 1 Broadening course on the approved list (3 credit-units)

Core Courses			
Code	Title	Credit-units	Length (Sem)
IMSE1003	Introduction to business and management	6	1
IMSE1009	Fundamentals of engineering design	6	1
IMSE1016	Fundamentals of business logistics	6	1
ENGG1003	Mathematics I (6 credit units)	6	1
OR			
ENGG1004	Mathematics IA (3 credit units)	3	1
IMSE1018	Mathematics (IMSE) (3 credit units)	3	1
ENGG1002	Computer programming and applications	6	1
Credit-units required: 30			

Breadth Elective / General Engineering Courses			
Code	Title	Credit-units	Length (Sem)
IMSE1012	Engineering technology	6	1
IMSE1013	Introduction to information systems	6	1
IMSE1014	Product development	6	1
IMSE1015	Systems modelling and simulation	6	1
IMSE1017	Engineering systems analysis	6	1
Elect one course from the above Breadth Elective courses; credit-units required: 6			
ENGG1009	Industrial management and logistics	6	1
ENGG1006	Engineering for sustainable development	6	1
ENGG1007	Foundations of computer science	6	1
ENGG1008	Electric circuits and digital logic	6	1
ENGG1010	Foundations of engineering mechanics	6	1
ENGG1011	Introduction to biomedical engineering	6	1
Elect two courses from the above General Engineering courses; credit-units required: 12			
Credit-units required: 18			

Broadening / Complementary Studies Courses			
Code	Title	Credit-units	Length (Sem)
ECEN1509	Professional and technical written communication for engineers	3	1
ECEN1515	Professional and technical oral communication for engineers	3	1
CENG1001	Practical Chinese language course for engineering students	3	1
	Broadening elective course	3	1
Credit-units required: 12			

Level Two

Loading

The normal loading is 60 credit-units of courses for the Level Two, with 30 credit-units of courses in each semester. Students are allowed to increase the loading by not more than 9 credit-units in each semester. Students are required to do Workshop Training (3 credit-units) in addition to the 60 credit-units of courses.

Courses

Students must take the examination/coursework/continuous assessment in the following courses and pass the courses listed under (a) and (c)(i) and (c)(ii).

(a) 5 Core courses (27 credit-units)
(b) A combination of Breadth Elective courses totaling to 21 credit-units
(c) 4 Broadening / Complementary Studies courses (12 credit-units) consisting of
    (i) 3 Broadening courses on the approved list (9 credit-units)
    (ii) 1 Humanities Broadening course on the approved list (3 credit-units)

Core Courses			
Code	Title	Credit-units	Length (Sem)
IMSE0201	Supply chain design and development	6	1
IMSE2005	Managerial accounting and finance	6	1
IMSE2008	Operational research techniques	6	1
IMSE2014	Applied statistics	3	1
IMSE2021	Transportation and distribution planning	6	1
Credit-units required: 27			

Breadth Elective Courses			
Code	Title	Credit-units	Length (Sem)
IMSE2003	Industrial automation	6	1
IMSE2009	Quality management	6	1
IMSE2010	Integrative studies	6	2
IMSE2012	Maintenance and reliability engineering	3	1
IMSE2015	Man-machine systems	6	1
IMSE2016	Internet technology for e-commerce	6	1
IMSE2017	Management of information and information technology	6	1
IMSE2018	Industrial organisation and management	6	1
IMSE2019	Stochastic decision systems	6	1
IMSE2020	Purchasing and supply management	3	1
IMSE2023	Plant layout and materials handling	3	1
Credit-units required: 21			

Broadening / Complementary Studies Elective Courses			
Code	Title	Credit-units	Length (Sem)
	Humanities	3	1
	Broadening elective course	3	1
	Broadening elective course	3	1
	Broadening elective course	3	1
Credit-units required: 12			

Level Three[6]

Loading

The normal loading for a student is 60 credit-units of courses for the Level Three (excluding summer vacation) with 30 credit-units of courses in each semester. Students are allowed to increase the loading by not more than 9 credit-units in each semester.

Courses

Students must take the examination/coursework/continuous assessment in the following courses and pass the courses listed under (a).

[6] Level Three students may elect Level Two elective courses, upon consulting the Course Tutor.

(a) 2 Core courses (18 credit-units) comprising
  (i) Technical Project - IMSE 3024 Project (12 credit-units)
  (ii) Integrative project - IMSE3025 Industrial systems integration (6 credit-units)
(b) 3 compulsory courses (18 credit-units)
(c) A combination of Depth Elective courses totaling to 18 credit-units
(d) 1 Broadening / Complementary Studies course (6 credit-units) elected from the following:
  (i) IMSE3028 Innovation and entrepreneurship (6 credit-units)
  (ii) Broadening courses on the approved list (6 credit-units)

Core Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3024	Project (Logistics engineering related)	12	2
IMSE3025	Logistics systems integration	6	2
Credit-units required: 18			

Compulsory Course			
Code	Title	Credit-units	Length (Sem)
IMSE3016	Operations planning and control	6	1
IMSE3022	Global logistics systems	6	1
IMSE3023	Warehousing and terminal operations	6	1
Credit-units required: 18			

Depth Elective Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3001	Computer integrated manufacturing	6	1
IMSE3002	Engineering project management	6	1
IMSE3010	Financial engineering	6	1
IMSE3011	Facilities Design	6	1
IMSE3019	Digital enterprises and e-commerce	6	1
IMSE3020	Technology marketing	3	1
IMSE3021	Strategic management of business and technology	3	1
IMSE3026	Automated warehousing design	6	1
IMSE3027	Supply chain modelling and simulation	6	1
Credit-units required: 18			

Broadening / Complementary Studies Elective Courses			
Code	Title	Credit-units	Length (Sem)
IMSE3028	Innovation and entrepreneurship	6	1
	Broadening elective course	6	1
Credit-units required: 6			

Summary of the prerequisite relationship between Level One, Two and Three courses

Level One

Code	Title	Prerequisite
Core courses		
IMSE1003	Introduction to business and management	None
IMSE1009	Fundamentals of engineering design	None
IMSE1016	Fundamentals of business logistics	None

ENGG1003	Mathematics I (6 credit units)	None
OR		
ENGG1004 IMSE1018	Mathematics IA (3 credit units) Mathematics (IMSE) (3 credit units)	None None
ENGG1002	Computer programming and applications	None
Breadth Elective Courses 1		
IMSE1012	Engineering technology	None
IMSE1013	Introduction to information systems	None
IMSE1014	Product development	None
IMSE1015	Systems modelling and simulation	None
IMSE1017	Engineering systems analysis	None
ENGG1009	Industrial management and logistics	None
ENGG1006	Engineering for sustainable development	None
ENGG1007	Foundations of computer science	None
ENGG1008	Electric circuits and digital logic	None
ENGG1010	Foundations of engineering mechanics	None
ENGG1011	Introduction to biomedical engineering	None

1 Level One students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

Level Two

Code	Title	Prerequisite
Core Courses		
IMSE0201	Supply chain design and development	IMSE1003 Introduction to business and management
IMSE2005	Managerial accounting and finance	IMSE1003 Introduction to business and management
IMSE2008	Operational research techniques	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2014	Applied statistics	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2021	Transportation and distribution planning	IMSE1016 Fundamentals of business logistics
Breadth Elective Courses 2		
IMSE2003	Industrial automation	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2009	Quality management	None
IMSE2010	Integrative studies	None
IMSE2012	Maintenance and reliability engineering	Co-requisite: IMSE2014 Applied Statistics
IMSE2015	Man-machine systems	None
IMSE2016	Internet technology for e-commerce	None

IMSE2017	Management of information and information technology	IMSE1013 Introduction to information systems
IMSE2018	Industrial organisation and management	IMSE1003 Introduction to business and management
IMSE2019	Stochastic decision systems	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2020	Purchasing and supply management	None
IMSE2023	Plant layout and materials handling	None

2 Level Two students may elect Level One Breath Elective courses or Level Three Depth Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE1xxx or IMSE3xxx courses.

Level Three

Code	Title	Prerequisite
Core Courses		
IMSE3024	Project	None
IMSE3025	Logistics systems integration	None
Compulsory courses		
IMSE3016	Operations planning and control	IMSE2008 Operational research techniques
IMSE3022	Global logistics systems	IMSE1016 Fundamentals of business logistics
IMSE3023	Warehousing and terminal operations	IMSE1016 Fundamentals of business logistics
Depth Elective Courses 3		
IMSE3001	Computer integrated manufacturing	IMSE1009 Fundamentals of engineering design
IMSE3002	Engineering project management	Co-requisite: IMSE2008 Operational research techniques
IMSE3010	Financial engineering	IMSE2005 Managerial accounting and finance
IMSE3011	Facilities design	IMSE2008 Operational research techniques
IMSE3019	Digital enterprises and e-commerce	IMSE2016 Internet technology for e-commerce or IMSE1013 Introduction to information systems or IMSE1008 Computer applications for engineers or ENGG1002 Computer programming and applications
IMSE3020	Technology marketing	IMSE1003 Introduction to business and management

IMSE3021	Strategic management of business and technology	IMSE1003 Introduction to business and management
IMSE3026	Automated warehousing design	IMSE2003 Industrial automation
IMSE3027	Supply chain modelling and simulation	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
Broadening / Complementary elective Courses		
IMSE3028	Innovation and entrepreneurship	none

3 Level Three students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

SYLLABUSES

Level One

The Level One syllabuses shall be as follows:

A1. Core Courses

IMSE1003. Introduction to business and management (6 credit-units)

Business of production; business environment, globalization, the positions of Hong Kong and China; marketing and distribution; the firm and the customer; the firm and its suppliers; finance and the firm; costs of production; human resource management; introduction to manufacturing systems; management and integration; the engineer in society, professional ethics; development of technology and interaction between societies and technology, intellectual property; the environment and safety.

IMSE1009. Fundamentals of engineering design (6 credit-units)

General principles of engineering drawing practice; computer aided design and drafting; dimensioning and tolerancing; assembly drawing; design of components; general principles of product and tool design.

IMSE1018. Mathematics (IMSE) (3 credit-units)

Optimization of functions of two or more variables. Matrices and transformation. Difference equations. Random variables.

IMSE1016. Fundamentals of business logistics (6 credit-units)

Definition, importance and objectives of business logistics; transport fundamentals and transport decisions; storage and handling systems and decisions; inventory policies; forecasting logistics requirements; facility location analysis; network planning process; purchasing scope and objectives; purchasing structure and organisation; purchasing variables – price, time and quality; buying commodities; buying capital goods; buying services; purchasing systems.

A2. Breadth Elective Courses

- Level One students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

IMSE1012. Engineering technology (6 credit-units)

Laws of motion; conservation of energy; kinematics and dynamics of rigid bodies; applications and simulation of 4-bar mechanisms; gear trains; vibrations; fundamental electric circuit analysis; alternating currents and voltages; A.C. circuits and phasors; three-phase circuits.

IMSE1013. Introduction to information systems (6 credit-units)

Information systems; the strategic role of information technology; data communications and networking; applications of networks and databases; development and implementation of information systems.

IMSE1014. Product development (6 credit-units)

Organisation and management, performance measurement; market research, product design specification, product safety, product and the environment, concept generation and selection, design review and improvements; product appraisal from functional, ergonomic and aesthetic, manufacturing and economical aspects; design theory and methodology, information / literature search.

IMSE1015. Systems modelling and simulation (6 credit-units)

Basic concepts of modelling and simulation; different types of modelling orientations, discrete-event simulation techniques vs. continuous; use of simulation packages; methodology of simulation study; model development for industrial systems, analysis of system configurations; model validation and analysis of simulation output.

IMSE1017. Engineering systems analysis (6 credit-units)

Fundamental and elements of engineering system; system analysis and design principles; structured system analysis and design method (SSADM), object-oriented analysis and design (OOAD); artificial intelligence techniques for system analysis and solution generation.

B. Complementary Studies Courses – Language enhancement courses

ECEN1509. Professional and technical written communication for engineers (3 credit-units)

The focus of this course is the function and importance of professional and technical communication in English and specifically understanding and using written English. Topics include accessing, abstracting, analysing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

ECEN1515. Professional and technical oral communication for engineers (3 credit-units)

Please refer to the Common Language Enhancement Courses for details.

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

Please refer to the Common Language Enhancement Courses for details.

C. Broadening / Complementary Studies Courses

Broadening Elective Course (3 credit-units)

D. Workshop Training

IMSE1010. Workshop training (3 credit-units)

Metal work, manufacturing practice, practical networking, computing practice, design practice, plastic processing, metrology, CNC programming and CAD/CAM, electronics, work study.

Level Two

The Level Two syllabuses shall be as follows:

A1. Core Courses

IMSE0201. Supply chain design and development (6 credit-units)

Supply chain overview; operating objectives; barriers to internal integration; supply chain performance cycles; logistics positioning; supply chain environmental assessment; time-based supply chains; information flow; alternative supply chain strategies; supply chain integration theory; logistics location structure; warehouse location patterns; transportation economies; inventory economies; least total cost design; formulating supply chain strategy; planning and design supply chain methodology; supply chain administration and dimensions of change management.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE2005. Managerial accounting and finance (6 credit-units)

Cost accounting - procedures; direct costs, absorption costing; marginal costing. Planning and control - budgetary planning systems; standard costing systems; capital expenditure and investment; health, safety and environmental aspects of company activities; contemporary issues in management accounting; financial accounting - accounting rules; basic financial accounts; manufacturing accounts; company account; financial performance - cash flow statements; interpretation of accounting data.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE2008. Operational research techniques (6 credit-units)

Philosophy and methodology of Operational Research: problem analysis, establishing objectives, identifying decision variables, model building, implementation and monitoring solutions; Operational Research techniques and their applications in operations management: linear programming and its extensions, dynamic programming, queuing theory, and replacement models for single components and capital equipment.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2014. Applied statistics (3 credit-units)

Probability and probability laws; binomial, Poisson and normal distributions; estimation and hypothesis testing; Type I and Type II errors; regression analysis, experiments with mixtures, ANOVA; non-parametric methods.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2021. Transportation and distribution planning (6 credit-units)

The evolution of transportation management; traffic management; transportation alternatives and technologies; transportation infrastructure; transportation performance analysis; total transportation cost analysis; fleet development and management; fleet performance indicators; routing and scheduling; shipment planning; containerisation-alternatives and selection criteria; mode selection criteria; transportation management and information systems requirements; international transportation strategies; implementation organisational issues.

Prerequisite: IMSE1016 Fundamentals of business logistics

A2. Breadth Elective Courses

- Level Two students may elect Level One Breath Elective courses or Level Three Depth Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE1xxx or IMSE2xxx courses.

IMSE2003. Industrial automation (6 credit-units)

Conditions and justification for automation; basic components of industrial automation; numerical control technology; pneumatic/hydraulic actuators, programmable logic controllers, electro-pneumatic systems design. Open-loop and closed-loop control; system stability; analogue and digital control.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2009. Quality management (6 credit-units)

Total quality management; management tools for quality; benchmarking; quality assurance management systems; ISO9000 series; national quality awards; design of industrial experiments; statistical process control; control charts; acceptance sampling; environmental management; ISO14000 series; environmental management systems; business process reengineering; customer services quality.

IMSE2010. Integrative studies (6 credit-units)

To develop students in the areas of technical literature survey, analysis and assimilation of materials, skills of written and oral presentation, composition and implementation of ideas, communication and interactive skills through student and product centred activities, interactive and project-based learning.

IMSE2012. Maintenance and reliability engineering (3 credit-units)

Survivor Function; hazard function; system reliability, reliability testing, accelerated life testing; maintenance policy; reliability improvement.

Co-requisite: IMSE2014 Applied statistics

IMSE2015. Man-machine systems (6 credit-units)

Ergonomics and systems, people in systems, health and safety at work place; the man-machine interface; anthropometry and biomechanics; physical work and workplace design; information processing; input and output; models of the sensory-motor system; skills and learning; environmental design, illumination, noise, thermal; applications, job design, inspection; shift work.

IMSE2016. Internet technology for e-commerce (6 credit-units)

Overview of E-Business and E-Commerce: Electronic Business Solutions (EBS), 3-tiered architecture, EBS technologies; Business Models: Their new dimensions and impacts, types and choice; Design and development: Development procedure, User needs and system requirements, System planning and design, Client-side vs server-side scripting, XML; EBS Adoption / Implementation: EBS adoption procedure, Buy, Rent or Build? Operational and economic considerations; RFID; Problem-Based Learning (PBL) case studies and Mini-Project.

IMSE2017. Management of information and information technology (6 credit-units)

Database management; knowledge management; management information systems; decision support systems; approaches to information systems development; system development life cycle; database design; user interface design; distributed systems.

Prerequisite: IMSE1013 Introduction to information systems

IMSE2018. Industrial organisation and management (6 credit-units)

Managing and managers; evolution of management theory; planning - decision making; strategic management; strategy implementation, industrial marketing strategies; organising - organisational design and structure; power and the distribution of authority; managing organisational change and innovation; leading – motivation, leadership, teams and teamwork; communication and negotiation; controlling, principles of effective control, operations control.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE2019. Stochastic decision systems (6 credit-units)

Decision analysis: decision making under uncertainty, axioms of decision analysis, methodology of decision analysis, analytical hierarchy approach, quantification of judgmental uncertainties, assessing utilities, and group decision problems; game theory and gaming: extensive and normal forms, zero-sum two-person games, two-persons nonzero-sum games, n-persons games, teaching and training and operational gaming; stochastic processes: random walks, recurrent events, Markov chains, and renewal-processes.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

IMSE2020. Purchasing and supply management (3 credit-units)

Introduction of purchasing function; quality management tools; supplier selection techniques; make or buy decisions; two-envelop bidding system; negotiation strategies; capital life cycle; outsourcing decisions; strategic purchasing; supplier relation management; EPOS; e-procurement.

IMSE2023. Plant layout and materials handling (3 credit-units)

Types of production; plant layout design, systematic layout planning, computer-based layout planning, and quantitative approaches; materials handling system design and analysis; storage and warehousing operations; introduction to digital factory.

B. Broadening / Complementary Studies Courses

Broadening Elective Course (Humanities) (3 credit-units)

Broadening Elective Course (3 credit-units)

Broadening Elective Course (3 credit-units)

Broadening Elective Course (3 credit-units)

C. Industrial Training

IMSE2011. Industrial training (3 credit-units)

A minimum of six week summer internship in the industry.

Level Three

The Level Three syllabuses shall be as follows:

A1. Core Courses

Technical project

IMSE3024. Project (12 credit-units)

A dissertation or report on a topic consisting of design, experimental or analytical investigation in the field of logistics engineering and supply chain management.

Integrative project

IMSE3025. Logistics systems integration (6 credit-units)

Student-centred learning on system integration and analysis and evaluation of logistics system performance. The module is based on case studies and covers the application of various techniques as follows:
Facility location analysis; network planning process; warehouse design and management; logistics information management; supply chain performance analysis; alternative supply chain strategies; vehicle routing and scheduling; systems modelling and simulation; customer-supplier relationship; international transportation strategies.

A2. Compulsory Courses

IMSE3016. Operations planning and control (6 credit-units)

The use of operations planning and control systems in forecasting, scheduling and inventory control; functions and organisation of production and inventory control systems; demand forecasting; deterministic and stochastic inventory control problems; aggregate production planning; master production scheduling; requirements and capacity planning systems; operations scheduling and control of production systems; Just-In-Time techniques; balancing of assembly lines; information reporting and processing; supply chain management.

Prerequisite: IMSE2008 Operational research techniques

IMSE3022. Global logistics systems (6 credit-units)

Global operations and logistics strategies, strategic changes required by globalisation, the strategic framework for integrating global operations, the role of logistics in global operations and marketing strategies; global operations and logistics planning, supplier network development, physical distribution, global logistics network design, global supply chain management, foreign exchange risk management in global operations; operations analysis of global supply chains, information management for global logistics, performance measurement and evaluation in global logistics.

Prerequisite: IMSE1016 Fundamentals of business logistics

IMSE3023. Warehousing and terminal operations (6 credit-units)

Introduction to warehousing; material handling technologies, MH principles, container and unitizing equipment, storage and retrieval equipment, AS/RS, material transport equipment, automatic data collection and communication equipment, packaging; warehouse management system, receiving, cycle counting, order processing, picking, replenishment, shipping; warehouse planning and design: simulation model and software; design procedures.
Introduction to container terminal and air cargo terminal, basic operation flow at ship, quay, container yard, gate and CFS, container handling equipment and operation modes organization structure of a terminal and it various functions, container ship structure and generations, terminal management system, terminal planning and design methodology and analysis tools.

Prerequisite: IMSE1016 Fundamentals of business logistics

A3. Depth Elective Courses

- Level Three students may elect Level Two Breath Elective courses, but prior consultation and approval from the Course Tutor must be obtained before enrolling in IMSE2xxx courses.

IMSE3001. Computer integrated manufacturing (6 credit-units)

CAD/CAM functions and systems; computer graphics, graphics packages and standards; geometric modelling in CAD - principles of surface and solid modelling; CNC applications in CAM; computer aided process planning, automated process planning; rapid prototyping, virtual prototyping; CAD and CAM integration; CIM system design and implementation.

Prerequisite: IMSE1009 Fundamentals of Engineering Design

IMSE3002. Engineering project management (6 credit-units)

Fundamentals of engineering project management; project environment; project evaluation; risk management process; project selection and proposal preparation; project scheduling and contingency setting and control; control of variation and claims; project management methodologies and techniques, change management; multi-criteria decision making process; analytic hierarchy process; PERT/GANTT techniques for project control and resources allocation; simulation of critical paths; case studies.

Co-requisite: IMSE2008 Operational research techniques

IMSE3010. Financial engineering (6 credit-units)

Financial markets and financial securities, portfolio management and investment strategies; international finance, foreign exchange markets; project evaluation and financing, present value, cost of capital, cost-benefit ratio and internal rates of return; financial instruments, forwards, futures; swaps, options and hedging strategies; foreign trade and investment in China.

Prerequisite: IMSE2005 Managerial accounting and finance

IMSE3011. Facilities design (6 credit-units)

Plant location problem; advanced techniques in plant layout design, computer-based layout planning, and quantitative approaches; materials handling, storage and warehousing for global manufacturing; lean manufacturing, cellular manufacturing, one-piece flow; workplace design in the information age; digital factory; fire safety and security; study cases drawn from the manufacturing and service industries.

Prerequisite: IMSE2008 Operational research techniques

IMSE3019. Digital enterprises and e-commerce (6 credit-units)

Enterprise resource management; EDI applications; data mining and warehousing; virtual enterprises; advanced Internet and web applications in product development, industrial applications of virtual reality; electronic product and component cataloguing; cryptographic systems; capability maturity model; social accountability standard; E-commerce business models; technological, business planning and social issues of E-commerce; order taking and processing; electronic payment systems, smart cards.

Prerequisite: IMSE2016 Internet technology for e-commerce, or IMSE1013 Introduction to information systems, or IMSE1008 Computer applications for engineers, or ENGG1002 Computer programming and applications

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IMSE3020. Technology marketing (3 credit-units)

Marketing mix, product life cycle, pricing models, competitive advantages, technology trend, distribution channels, market segmentation, intellectual property.

Prerequisite: IMSE1003 Introduction to business and management

IMSE3021. Strategic management of business and technology (3 credit-units)

Analysis of the external environment and industry clusters for local industries – threats and opportunities from government policies as well as the legal, economic, social and technological environment; competitive forces from industry rivals, customers and other sources; analysis of internal weaknesses and strengths – resources, competences and success factors; mission and strategic intent; strategic directions and methods – conditions and implications; implementing and evaluating strategic changes; management for technology innovation.

Prerequisite: IMSE1003 Introduction to business and management

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IMSE3026. Automated warehousing design (6 credit-units)

Evolution of warehousing functions; elements of warehouse management: information system, packaging and identification, auditing warehouse performance, equipment and space utilization; warehouse planning and design; materials handling: warehouse automation techniques, reverse logistics; applications of virtual reality systems in warehouse simulation: optimisation of materials handling, materials and information flow, layout design and redesign.

Prerequisite: IMSE2003 Industrial automation

IMSE3027. Supply chain modelling and simulation (6 credit-units)

Industrial dynamics: exponential lags, finite time delays, oscillatory and chaotic behaviour, feedback control; dynamics and control of supply chains: inventory levels, supply lines, demand estimation, crisp-logic and fuzzy-logic control rules, performance measures; flows of goods, orders, and cash in supply chains; co-operation and competition in supply chains, strategic alliances; simulation of multi-sector supply chains: case studies, including MIT ‘beer game’.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)

B. Broadening / Complementary Studies Courses

IMSE3028. Innovation and entrepreneurship (6 credit-units)

Entrepreneurship in the new world economy, developments in the pacific region and greater China; general characteristics of entrepreneurs; enterprise formation, organizational structure, new economy business models; enterprise resources, business plan, venture capital; technological growth; environmental and contingency factors; case studies. Skill workshops: identifying strengths and improving skills; organising yourself and your time; communication; systematic problem solving; group work; negotiating and assertiveness; coping with pressure; leadership.

Broadening / Complementary Elective Course (6 credit-units)

MECHANICAL ENGINEERING
(with optional Environmental Engineering Stream)

PROGRAMME STRUCTURE

Definitions and Terminology

The Level of a course shall be 1, 2 or 3. Each course offered by the Department shall be assigned a Level, which is indicated by the left-most digit of the number in the course code.

A Compulsory course is a course which a student must study. A Core course is a compulsory course which a student must pass in the manner as stipulated in the Regulations. A Breadth course is a Level 2 or Level 3 course offered as a compulsory or optional course for the curriculum. A Depth course is a Level 3 course offered as a compulsory or optional course for the curriculum. A Complementary Studies course is either a Level 1, Level 2 or Level 3 course offered as a compulsory or optional course for the curriculum by the Department. It also includes broadening courses on a list approved by the Department which would normally be considered as Level 1 courses.

The Curriculum

The curriculum comprises of 186 credit-units of courses as follows:

(a) Eighteen/Nineteen Core courses (96 credit-units)
(b) Seven to Ten Compulsory/Elective Depth/Breadth/Complementary Studies courses (36 credit-units)
(c) Eight Complementary Studies courses (30 credit-units) **
(d) Project (12 credit-units) and Design (6 credit-units)
(e) Engineering training (3 credit-units)
(f) Industrial training (3 credit-units)

There are no course prerequisites but there is a course co-requisite structure so that lower level courses should preferably be taken before higher level courses. To complete the curriculum, a candidate must take all the courses listed under (a) to (f) and obtain at least 180 credit-units including all courses listed under (a), (c)** and (d).

** Students must pass the English and Chinese language courses (9 credit-units), at least a pass in a broadening course (3 credit-units) in Humanities and Social Sciences Studies, and at least a pass in a broadening course (3 credit-units) in Culture and Value Studies or an area of study outside this degree curriculum as an elective.

Degree Classification

The best 180 credit-units including the courses below shall be taken into account:

(a) 9 credit-units of Complementary Studies courses (languages / communications);
(b) best 6 (or up to 12) credit-units of Broadening / other elective courses;
(c) best 165 credit-units (or enough credit-units to make up 180 credit-units) of Core / Compulsory / Breadth / Complementary Studies / Depth elective courses / Engineering training and industrial training / Projects

First Year

Loading

The normal load for a student is 60 credit-units of courses (excluding summer vacation) with 30 credit-units in each semester. Students are allowed to increase the loading by not more than 9 credit-units in a semester. Students are required to take the additional course of "Engineering training" (3 credit-units) in the First Year's summer vacation.

Courses

Students must take the examination/coursework in the following courses and pass the courses listed under (a), (b)(i) and (b)(ii).

(a) 8 (or 9) Core courses (45 credit-units)
(b) 4 Complementary Studies courses (15 credit-units) consisting of
  (i) 2 English Communications courses (6 credit-units)
  (ii) 1 Chinese Language course (3 credit-units)
  (iii) "Engineering for sustainable development" (6 credits) or equivalent course
(c) "Engineering training" (3 credit-units) (Summer semester)

Core Courses		
Code	Title	Credit-units
ENGG1002	Computer programming and applications	6
ENGG1003#	Mathematics I#	6
ENGG1004#	Mathematics IA#	3
ENGG1005#	Mathematics IB#	3
ENGG1010	Foundations of engineering mechanics	6
MECH1004	Drawing and elements of design and manufacture	6
MECH1005	Fundamentals of electrical and electronic engineering	6
MECH1009	Properties of materials I	3
MECH1013	Engineering mechanics	6
MECH1014	Thermofluids	6
Total credit-units		45

Students who had passed A-Level Pure Mathematics would take the course ENGG1003, while those without a Pass in A-Level Pure Mathematics would take courses ENGG1004 and ENGG1005.

Complementary Studies Courses		
Code	Title	Credit-units
CENG1001	Practical Chinese language course for engineering students	3
ECEN1513	Professional and technical written communication for engineers	3
ECEN1515	Professional and technical oral communication for engineers	3
ENGG1006	Engineering for sustainable development	6
Total credit-units		15

Training (Summer semester)		
Code	Title	Credit-units
MECH1011	Engineering training	3
Total credit-units		3

Second Year

Loading

The normal load for a student is 60 credit-units of courses (excluding summer vacation) with 30 credit-units in each semester. Students are allowed to increase the loading by not more than 9 credit-units in a semester or decrease the loading by the equivalent number of credit-units which they have previously taken as additional loading and passed.

Courses

Students must take the examination/coursework in the following courses and pass the courses listed under (a).

(a) 9 core courses (45 credit-units)
(b) 1 or 2 Elective Breadth courses (6 credit-units)
(c) 3 Complementary Studies Courses (9 credit-units)
  (i) 3 Broadening courses on the approved list (9 credit-units)
(d) "Industrial training" (3 credit-units) (Summer semester)

Courses for Main Stream students

Core Courses		
Code	Title	Credit-units
MECH2001	Applied dynamics	3
MECH2002	Engineering thermodynamics	6
MECH2004	Control	3
MECH2005	Design and manufacture	6
MECH2007	Mathematics II	6
MECH2008	Mechanics of fluids	6
MECH2009	Mechanics of solids	6
MECH2010	Properties of materials II	3
MECH2013	Integrated computer and laboratory studies II	6
Total credit-units		45

Elective Breadth courses		
Title		Credit-units
MECH2006	Electrical and electronic engineering	6
MECH2011	Engineering economics	3
MECH2015	Foundation of Aeronautical Engineering	3
Total credit-units		6

Complementary Studies Courses		
Code	Title	Credit-units
YXXXxxxx	Broadening course	3
YXXXxxxx	Broadening course	3
YXXXxxxx	Broadening course	3
Total credit-units		9

Training (Summer semester)		
Code	Title	Credit-units
MECH2012	Industrial training	3
Total credit-units		3

Courses for Environmental Engineering stream students

Core Courses		
Code	Title	Credit-units
MECH2001	Applied dynamics	3
MECH2002	Engineering thermodynamics	6
MECH2004	Control	3
MECH2005	Design and manufacture	6
MECH2007	Mathematics II	6
MECH2008	Mechanics of fluids	6
MECH2009	Mechanics of solids	6
MECH2010	Properties of materials II	3
CIME2001	Water and air quality: concepts and measurement	6
MECH2013	Integrated computer and laboratory studies II	6
Total credit-units		51

Complementary Studies Courses		
Code	Title	Credit-units
YXXXxxxx	Broadening course	3
YXXXxxxx	Broadening course	3
YXXXxxxx	Broadening course	3
Total credit-units		9

Training (Summer semester)		
Code	Title	Credit-units
MECH2012	Industrial training	3
Total credit-units		3

Third Year

Loading

The normal load for a student is 60 credit-units of courses with 30 credit-units in each semester. Students are allowed to increase the loading by up to 9 credit-units in a semester or decrease the loading by the equivalent number of credit-units which they have previously taken as additional loading and passed. Students are required to take the additional course of “Industrial training” (3 credit-units) in the Second Year’s summer vacation.

Courses

Students must take the examination/coursework in the following courses and pass the courses listed under (a).

(a) Design (6 credit-units) and Project (12 credit-units)
(b) 6 to 8 Compulsory/Elective Depth/Breadth/Complementary Studies courses (33 credit-units)
(c) 1 Complementary Studies course “Engineering and technology management” (6 credit-units)

Projects		
Code	Title	Credit-units
MECH3008	Design	6
MECH3022	Project	12
Total credit-units		18

Complementary Studies Course for all students		
Code	Title	Credit-units
MECH3010	Engineering and technology management	6
Total credit-units		6

Courses for Main Stream students

Elective Depth/ Breadth Courses

Students will have to take 6 to 8 Depth/Breadth/Complementary Studies courses (33 credit-units) from the following list including at least one of the Depth courses marked with #.

Code	Title	Credit-units
MECH3001	Acoustics	3
MECH3002	Air pollution control	6
MECH3004	Automatic control	6
MECH3005	Building services	6
MECH3006	Case studies of failure investigations	3
MECH3007	Computer-aided design and manufacture (CAD/CAM) #	6
MECH3009	Energy conversion systems	6
MECH3011	Heat transfer #	6
MECH3012	Product design and development	6
MECH3013	Marine propulsion systems	6
MECH3014	Materials for engineering applications	6
MECH3015	Applied stress and strength analysis #	6
MECH3016	Waves in fluids	3
MECH3017	Mechatronic design methodology	6
MECH3020	Vibration #	6
MECH3021	Viscous flow #	6
BBSE3005	Inter-disciplinary building services design	6
MECH3023	Building energy management and control systems	6
BBSE3007	Project and contract management	3
MECH2006	Electrical and electronic engineering[@]	6
MECH2011	Engineering economics[@]	3
Total credit-units		33

[@] Students have to take one of these two Level 2 Breadth courses which they have not taken before.

Students may also select up to two of the following MSc(Eng) courses as an elective

MECH6024	Applied mathematics for engineers	3
MECH6028	Processing and properties of engineering plastics	3
MECH6040	Foundations of nanotechnology	3

Courses for Environmental Engineering Stream students

Depth & Breadth Courses

Students will have to take the following 3 Compulsory Depth/Breadth courses (15 credit-units)

Compulsory Breadth/Depth Courses		
Code	Title	Credit-units
MECH3002	Air pollution control	6
MECH2006	Electrical and electronic engineering[@]	6
MECH2011	Engineering economics[@]	3
Total credit-units		15

[@] Level 2 Breadth course

In addition, they have to take 4 to 6 Elective Depth/Breadth courses (21 credit-units) from the following list.

Depth/Breadth Courses		
Code	Title	Credit-units
MECH3001	Acoustics	3
MECH3005	Building services	6
MECH3009	Energy conversion systems	6
MECH3011	Heat transfer	6
MECH3012	Product design and development	6
MECH3013	Marine propulsion systems	6
MECH3016	Waves in fluids	3
MECH3021	Viscous flow	6
MECH3006	Case studies of failure investigations	3
MECH3020	Vibration	6
BBSE3005	Inter-disciplinary building services design	6
CIVL3022	Wind engineering	6
CIVL3015	Solid and hazardous waste management	6
CIVL3011	Municipal and industrial wastewater treatment	6
BBSE3007	Project and contract management	3
Total credit-units		21

Students may also select up to two of the following MSc(Eng) courses as an elective

MECH6024	Applied mathematics for engineers	3
MECH6028	Processing and properties of engineering plastics	3
MECH6040	Foundations of nanotechnology	3

SYLLABUSES

Level One

MECH1004. Drawing and elements of design and manufacture (6 credit-units)

Engineering drawing techniques; orthographic and pictorial projections; dimensioning and tolerancing, limits and fits, screw fasteners; cam; gears; computer aided drafting, with 3D CAD modeling; manufacturing processes, process selection, design for manufacturability.

MECH1005. Fundamentals of electrical and electronic engineering (6 credit-units)

Basic circuit principles; steady-state A.C. circuit theory; magnetic circuits; transformers; bipolar junction transistors; field effect transistors; direct-current motors; solid-state controller for D.C. motors; combinational logic circuits.

MECH1009. Properties of materials I (3 credit-units)

Elements of atomic structure and bonding; crystal structure; defect theory; solidification; plastic deformation; recrystallization; phase diagrams; alloy properties; TTT diagrams; heat treatment.

MECH1011. Engineering training (3 credit-units)

Practical work in manufacturing processes; the use of hand and machine tools; joining and fastening of metals; basic electrical engineering training, programmable logic controllers; virtual instrumentation; design; modeling and prototyping, CNC machining and metrology.

MECH1013. Engineering Mechanics (6 credit-units)

Stress and strain; bending of beams; deflection of beams; thin-walled pressure vessels; kinematics of particles with different forms of accelerations; momentum and energy conservation; applications of kinetic principles to particles and vehicles with mass variation; velocity-dependent resistance and the action of central forces; undamped and damped free vibration; simple and epicyclic gear trains.

MECH1014. Thermofluids (6 credit-units)

Concepts and definitions; properties of pure substance; heat and work; first law of thermodynamics; second law of thermodynamics; entropy; basic concepts on fluids and flows; dimensional analysis, similarity and modelling; momentum theorems and pipe flow analysis.

ENGG1002. Computer programming and applications (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1003. Mathematics I (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1004. Mathematics IA (3 credit-units)

Please refer to the General Engineering courses for details.

ENGG1005. Mathematics IB (3 credit- units)

Please refer to the General Engineering courses for details.

ENGG1006. Engineering for sustainable development (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1010. Foundations of engineering mechanics (6 credit-units)

Please refer to the General Engineering courses for details.

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

Please refer to the Common Language Enhancement Courses for details.

ECEN1513. Professional and technical written communication for engineers (3 credit-units)

The focus of this course is the function and importance of professional and technical communication in English and specifically understanding and using written English. Topics include accessing, abstracting, analysing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

ECEN1515. Professional and technical oral communication for engineers (3 credit units)

Please refer to the Common Language Enhancement Courses for details.

YXXXxxxx Broadening course in Humanities and Social Sciences Studies (3 credit-units)

YXXXxxxx Broadening course in Culture & Value Studies or an area of study outside this degree curriculum as an elective (3 credit-units)

YXXXxxxx Broadening course on the approved list (3 credit-units)

Level Two

MECH2001. Applied dynamics (3 credit-units)

Advanced rotational motion; balancing of rotating and reciprocating masses; vibration isolation and control; vibration of multi degree-of-freedom in-line systems; free transverse vibration of beams.

MECH2002. Engineering thermodynamics (6 credit-units)

Steam and gas power plant; refrigeration; jet propulsion and turbomachinery; gas mixture; psychrometry and air-conditioning; introduction to heat transfer.

MECH2004. Control (3 credit-units)

Modelling of physical systems; time response analysis of dynamical systems; feedback control systems; control system design and applications; stability; root locus method; analogue computer programming.

MECH2005. Design and manufacture (6 credit-units)

Materials selection; joining and fastening; mechanism design; tooling system design; power transmission systems design; CNC machining; rapid prototyping.

MECH2006. Electrical and electronic engineering (6 credit-units)

Analog electronics; sequential logic circuits; digital-to-analog and analog-to-digital converters; introduction to microcontrollers; three-phase power systems; induction motors; synchronous motors; step motors; solid-state controllers for A.C. motors.

MECH2007. Mathematics II (6 credit-units)

Complex variables; Fourier series and Fourier transforms; partial differential equations; introduction to probability and statistics; elementary numerical analysis.

MECH2008. Mechanics of fluids (6 credit-units)

Navier-Stokes equations; pipe and channel viscous flows; lubrication; boundary layer flows; two-dimensional potential flows; open-channel flows; fluid machines.

MECH2009. Mechanics of solids (6 credit-units)

Two-dimensional theory of elasticity; thermal stress and rotating disks; energy methods; introduction to the finite element method; experimental methods; bending of circular plate.

MECH2010. Properties of materials II (3 credit-units)

Testing and service behaviour of materials; metallurgy of fatigue; theory of creep resistant alloys; the ductile/brittle transition; corrosion resistance; surface treatment; selection criteria for common alloys; structure of polymers; properties of compounded plastics; service behaviour of plastics.

MECH2011. Engineering economics (3 credit-units)

Time value of money; interest and interest formulas; equivalent analysis; bases for comparison of alternatives; present worth analysis; annual equivalent worth analysis; rate of return analysis; project cash flow analysis; decision making among alternatives; applications to real-world economy.

MECH2012. Industrial training (3 credit-units)

Training in industry for a nominal period of eight weeks during the summer vacation of the Second Year of Study.

MECH2013. Integrated Computer and laboratory studies II (6 credit-units)

Miscellaneous advanced topics in C++, including aspects of object-oriented programming; Windows® programming in C++ with user interface and graphics; group project on the application of computing to the solution of an engineering problem; demonstrations and experiments in various areas of mechanical engineering.

MECH2015. Foundation of Aeronautical Engineering (3 credit-units)

History of aviation; propulsion and aerodynamics of aircraft; airframe structure and construction; flight control systems; operation and maintenance of aircrafts.

CIME2001. Water and air quality: concepts and measurement (6 credit-units)

Water quality and water pollution; standard methods of water and wastewater examination; air quality and air pollution control principles; measurement techniques in air pollution.

Level Three

BBSE3005. Inter-disciplinary building services design (6 credit-units)

Inter-disciplinary building services design; design rationales; conceptual design of air conditioning, plumbing and drainage, fire services, electrical power supply, vertical transportation, and lighting systems; detailed design; requirements for teamwork and integration; tectonics considerations.

BBSE3007. Project and contract management (3 credit-units)

Characteristics of building services projects and contracts; role of architect, consultants, quantity surveyor, builder and subcontractors; statutory requirements; project planning, scheduling and control; contract documentation and contractual arrangement; estimating and tendering; site organization and supervision; measurement and valuation of work; claim management and settlement; alternative dispute resolution.

MECH3001. Acoustics (3 credit-units)

Human hearing; environmental noise measurement and legislation; source mechanisms; duct acoustics; sound reverberation in rooms; noise transmission through walls and windows; active and passive noise control.

MECH3002. Air pollution control (6 credit-units)

Particulate and aerosol abatement technology; gas absorption - plate and packed columns; adsorption for the removal of odours and trace gases; combustion fundamentals and abatement of volatile organic compounds using incineration techniques.

MECH3004. Automatic control (6 credit-units)

Control of mechanical, hydraulic and pneumatic systems; frequency domain analysis, Nyquist stability criterion; linear control system design; computer control systems, state-space analysis of multivariable linear system, controllability and observability, stability analysis; state feedback.

MECH3005. Building services (6 credit-units)

Introduction to the construction industry; electrical supply and lighting system design; lifts and escalators; air conditioning and refrigeration; cold and hot water supply systems; stormwater and sanitary drainage systems; fire safety and protection.

MECH3006. Case studies of failure investigations (3 credit-units)

General introduction to failure investigation procedures, purpose, scope, and limitation; failure mode detected from component examination; cause of failure determination through system case studies; design codes for large structures; fracture mechanics techniques; legislation affecting safety of equipment; roles of a mechanical engineer as an expert witness.

MECH3007. Computer-aided design and manufacture (CAD/CAM) (6 credit-units)

Basic data structure techniques; transformation techniques; mathematical bases for surface modeling; principles of solid modeling and applications; numerical control; computer-aided production technologies; computer-integrated manufacturing.

MECH3008. Design (6 credit-units)

Design methodology; engineering design; design for manufacturability; prototyping; project management; design project.

MECH3009. Energy conversion systems (6 credit-units)

Energy calculations; solar thermal power plant; energy storage; solar photovoltaic systems; wind energy systems; nuclear energy and power plants; nuclear waste management; urban waste.

MECH3010. Engineering and technology management (6 credit-units)

Quantitative methods for engineering and technology management; managing technology through the product life cycle; planning; organizing; staffing; leading; controlling; quantitative methods for analyzing / solving decision making involving engineering and technology management problems; quantitative methods for forecasting; resource allocations subject to constraints; linear programming and simplex method; decision theory with the application of decision trees; inventory control models; queuing theory; transportation and resource allocation for business operations.

MECH3011. Heat transfer (6 credit-units)

Fourier’s law; heat-conduction equation; steady and unsteady conduction; basic convection principles; laminar and turbulent heat transfer in tubes and over plates; Reynolds analogy; log mean temperature difference; effectiveness-NTU method; heat exchanger design; exergy analysis; optimisation of heat transfer process and system.

MECH3012. Product design and development (6 credit-units)

Product design and product development process; methods and tools for design, analysis and testing; prototype making methods and practices; design for tooling; design of electromechanical products.

MECH3013. Marine propulsion systems (6 credit-units)

Marine vehicles and marine prime movers; marine machinery systems; marine propulsors; propeller/engine design integration; waste heat recovery and advanced energy concepts; dynamics and vibrations of marine systems; speed and power control in marine systems.

MECH3014. Materials for engineering applications (6 credit-units)

Materials for high strength/weight ratio; high and low temperature service; resistance to corrosion resistance and protection; residual stresses; composite and ceramic materials; manufacturing properties; problem based learning module; introduction to materials classification.

MECH3015. Applied stress and strength analysis (6 credit-units)

Theory of elasticity, bending of cantilever beams, torsion of non-circular members; finite element methods; analysis of rectangular plates; fracture mechanics; elesto-plastic analysis.

MECH3016. Waves in fluids (3 credit-units)

Small amplitude waves, shallow water waves, wave forces, ship waves, harbour oscillations, mass transport.

MECH3017. Mechatronic design methodology (6 credit-units)

Introduction to mechatronics and robotics; applications of sensors for intelligent control; embedded microprocessor; motion generation and transfer systems, design and control; case studies.

MECH3020. Vibration (6 credit-units)

Vibration measurement; single- and two-plane balancing of rotors in situ, machinery condition monitoring; random vibration; digital signal analysis; matrix analysis of free and forced vibrations of multi-degree-of-freedom systems; classical analysis of beam vibration; energy methods for approximate vibration analysis.

MECH3021. Viscous flow (6 credit-units)

Eulerian and Lagrangian descriptions; Navier-Stokes equations; low-Reynolds-number flows; laminar boundary layers; laminar stability theory; turbulent flows.

MECH3022. Project (12 credit-units)

A dissertation or report on a topic consisting of design, experimental or analytical investigations.

MECH3023. Building energy management and control systems (6 credit-units)

Concepts of distributed computer-based monitoring and control; hardware and software development; communication protocols; application to maintenance, energy management and control; system design and performance evaluation; computer simulation and emulation techniques; analysis of dynamic building services systems.

MECH6024. Applied mathematics for engineers

Statistical and numerical methods in engineering; hypothesis testing; estimation of parameters and confidence intervals; correlation coefficient; direct and iterative methods for systems of equations; numerical analysis; finite difference and finite element schemes; wave propagation and vibration; normal modes.

MECH6028. Processing and properties of engineering plastics

Viscosity of polymer melts; extrusion; injection moulding; blow moulding; joining; plating; yield criteria; environmental stress cracking; UV degradation; flame retardation; biodegradable polymers; viscoelastic behaviour of plastics; dynamic behaviour; design methods for plastics based on creep data.

MECH6040. Foundations of nanotechnology

Characteristic length scales, nanomaterials, nanostructures, physical properties of nanostructures, deposition techniques of nanofabrication, high resolution analysis and characterization, scanning probe methods, nanoindentation, deformation of nanostructures, mechanical behaviours of nanocrystalline solids, ultra-high strength of nanostructures, sensors, actuators, MEMS, NEMS, functional nanomaterials, nano-scale devices, modelling and computer-aided designs, bio-nanotechnolog.

CIVL3022. Wind engineering (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3015. Solid and hazardous waste management (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

CIVL3011. Municipal and industrial wastewater treatment (6 credit-units)

For course descriptions, see the syllabuses of the Civil Engineering programme.

MECHANICAL ENGINEERING (BUILDING SERVICES ENGINEERING)[7] / BUILDING SERVICES ENGINEERING[8]

PROGRAMME STRUCTURE

Definitions and Terminology

The Level of a course shall be 1, 2 or 3. Each course offered by the Department shall be assigned a Level which is indicated by the left-most digit of the number in the course code.

A Compulsory course is a course which a student must study. A Core course is a compulsory course which a student must pass in the manner as stipulated in the Regulations. A Breadth course is a Level 2 or Level 3 course offered as a compulsory or optional course for the curriculum. A Depth course is a Level 3 course offered as a compulsory or optional course for the curriculum. A Complementary Studies course is either a Level 1, Level 2 or Level 3 course offered as a compulsory or optional course for the curriculum by the Department. It also includes broadening courses on a list approved by the Department which would normally be considered as Level 1 courses.

The Curriculum

The curriculum comprises 186 credit-units of courses as follows:

(a) Nineteen/Twenty Core courses (96 credit-units)
(b) Seven to Nine Compulsory/Elective Depth/Breadth courses (36 credit-units)
(c) Eight Complementary Studies courses (30 credit-units) **
(d) Inter-disciplinary building services design (6 credit-units) and Applied research project (12 credit-units)
(e) Engineering training (3 credit-units)
(f) Industrial training (3 credit-units)

There are no course prerequisites but there is a course co-requisite structure so that lower level courses should preferably be taken before higher level courses. To complete the curriculum, a candidate must take all the courses listed under (a) to (f) and obtain at least 180 credit-units including all the courses listed under (a), (c)** and (d).

** Students must pass the English and Chinese language courses (9 credit-units), at least a pass in a broadening course (3 credit-units) in Humanities and Social Sciences Studies, and at least a pass in a broadening course (3 credit-units) in Culture and Value Studies or an area of study outside this degree curriculum as an elective.

Degree Classification

The best 180 credit-units including the courses below shall be taken into account:

(a) 9 credit-units of Complementary Studies courses (languages / communications);
(b) best 6 (or up to 12) credit-units of Broadening / other elective courses;
(c) best 165 credit-units (or enough credit-units to make up 180 credit-units) of Core / Compulsory / Breadth / Complementary Studies / Depth elective courses / Engineering training and industrial training/Projects.

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[7] For students intake in/after 2005-2006.
[8] For students intake in/before 2004-2005.

First Year

Loading

The normal load for a student is 60 credit-units of courses (excluding summer vacation) with 30 credit-units in each semester. Students are allowed to increase the loading by not more than 9 credit-units in a semester. Students are required to take the additional course of "Engineering training" (3 credit-units) in the First Year's summer vacation.

Courses

Students must take the examination/coursework in the following courses and pass the courses listed under (a), (b)(i) and (b)(ii).

(a) 8 (or 9) Core courses (45 credit-units)
(b) 4 Complementary Studies courses (15 credit-units) consisting of
  (i) 2 English Communications courses (6 credit-units)
  (ii) 1 Chinese Language course (3 credit-units)
  (iii) "Engineering for sustainable development" (6 credits) or an equivalent course
(c) "Engineering training" (3 credit-units) (Summer semester)

Core Courses		
Code	Title	Credit-units
ENGG1002	Computer programming and applications	6
ENGG1003#	Mathematics I#	6
ENGG1004#	Mathematics IA#	3
ENGG1005#	Mathematics IB#	3
ENGG1010	Foundations of engineering mechanics	6
MECH1004	Drawing and elements of design and manufacture	6
MECH1005	Fundamentals of electrical and electronic engineering	6
MECH1009	Properties of materials I	3
MECH1013	Engineering mechanics	6
MECH1014	Thermofluids	6
Total credit-units		45

Students who had passed A-Level Pure Mathematics would take the course ENGG1003, while those without a Pass in A-Level Pure Mathematics would take courses ENGG1004 and ENGG1005.

Complementary Studies Courses		
Code	Title	Credit-units
CENG1001	Practical Chinese language course for engineering students	3
ECEN1513	Professional and technical written communication for engineers	3
ECEN1515	Professional and technical oral communication for engineers	3
ENGG1006	Engineering for sustainable development	6
Total credit-units		15

Training (Summer semester)		
Code	Title	Credit-units
BBSE1011	Engineering training	3
Total credit-units		3

Second Year

Loading

The normal load for a student is 60 credit-units of courses (excluding summer vacation) with 30 credit-units in each semester. Students are allowed to increase the loading by not more than 9 credit-units in a semester or decrease the loading by the equivalent number of credit-units which they have previously taken as additional loading and passed. Students are required to take the additional course of "Industrial training" (3 credit-units) in the Second Year's summer vacation.

Courses

Students must take the examination/coursework in the following courses and pass the courses listed under (a).

(a) 11 Core courses (51credit-units)
(b) 3 Complementary Studies Courses (9 credit-units)
    (i) 3 Broadening courses on the approved list (9 credit-units)
(c) "Industrial training" (3 credit-units) (Summer semester)

Core Courses		
Code	Title	Credit-units
MECH2001	Applied dynamics	3
MECH2002	Engineering thermodynamics	6
MECH2004	Control	3
MECH2006	Electrical and electronic engineering	6
MECH2007	Mathematics II	6
MECH2008	Mechanics of fluids	6
MECH2010	Properties of materials II	3
MECH2013	Integrated computer and laboratory studies II	6
BBSE2001	Utility services	6
BBSE2002	Electrical power supply and lighting engineering	3
BBSE2005	Air conditioning and refrigeration I	3
Total credit-units		51

Complementary Studies Courses		
Code	Title	Credit-units
YXXXxxxx	Broadening course	3
YXXXxxxx	Broadening course	3
YXXXxxxx	Broadening course	3
Total credit-units		9

Training (Summer semester)		
Code	Title	Credit-units
BBSE2004	Industrial training	3
Total credit-units		3

Third Year

Loading

The normal load for a student is 60 credit-units of courses with 30 credit-units in each semester. Students are allowed to increase the loading by up to 9 credit-units in a semester or to decrease the loading by the equivalent number of credit-units which they have previously taken as additional loading and passed. Students are required to take the additional course of "Industrial training" (3 credit-units) in the Second Year's summer vacation.

Courses

Students must take the examination/coursework in the following courses and pass the courses listed under (a) and (b).

(a) Inter-disciplinary building services design (6 credit-units) and Applied research project (12 credit-units)
(b) 4 Compulsory courses (18 credit-units)
(c) 3 to 4 Elective Depth/Breadth courses (15 credit-units)
(d) 2 Complementary Studies/Breadth courses "Engineering and technology management" (6 credit-units) and "Engineering economics" (3 credit-units)

Projects		
Code	Title	Credit-units
BBSE3005	Inter-disciplinary building services design	6
BBSE3002	Applied research project	12
Total credit-units		18

Compulsory Courses		
Code	Title	Credit-units
BBSE3003	Fire protection engineering	6
BBSE3006	Air conditioning and refrigeration II	3
BBSE3007	Project and contract management	3
MECH3023	Building energy management and control systems	6
Total credit-units		18

Complementary Studies/Breadth Course for all students		
Code	Title	Credit-units
MECH3010	Engineering and technology management	6
MECH2011	Engineering economics	3
Total credit-units		9

Elective Depth/Breadth Courses		
Code	Title	Credit-units
MECH3001	Acoustics	3
MECH3002	Air pollution control	6
MECH3004	Automatic control	6
MECH3006	Case studies of failure investigations	3
MECH3007	Computer-aided design and manufacture (CAD/CAM)	6
MECH3009	Energy conversion systems	6
MECH3011	Heat transfer	6
MECH3014	Materials for engineering applications	6
MECH3020	Vibration	6
MECH3021	Viscous flow	6
Total credit-units		15

Students may also select up to two of the following MSc(Eng) courses as an elective

MECH6024	Applied mathematics for engineers	3
MECH6028	Processing and properties of engineering plastics	3
MECH6040	Foundations of nanotechnology	3

SYLLABUSES

Level One

BBSE1011. Engineering training (3 credit-units)

Knowledge and use of hand and machine tools; sheet metal work; welding; fixing and jointing of cables and pipes; construction, assembly and appreciation of electrical and mechanical systems; properties of metals and other building materials.

MECH1004. Drawing and elements of design and manufacture (6 credit-units)

Engineering drawing techniques; orthographic and pictorial projections; dimensioning and tolerancing, limits and fits, screw fasteners; cam; gears; computer aided drafting, with 3D CAD modeling; manufacturing processes, process selection, design for manufacturability.

MECH1005. Fundamentals of electrical and electronic engineering (6 credit-units)

Basic circuit principles; steady-state A.C. circuit theory; magnetic circuits; transformers; bipolar junction transistors; field effect transistors; direct-current motors; solid-state controller for D.C. motors; combinational logic circuits.

MECH1009. Properties of materials I (3 credit-units)

Elements of atomic structure and bonding; crystal structure; defect theory; solidification; plastic deformation; recrystallization; phase diagrams; alloy properties; TTT diagrams; heat treatment.

MECH1013. Engineering Mechanics (6 credit-units)

Stress and strain; bending of beams; deflection of beams; thin-walled pressure vessels; kinematics of particles with different forms of accelerations; momentum and energy conservation; applications of kinetic principles to particles and vehicles with mass variation; velocity-dependent resistance and the action of central forces; undamped and damped free vibration; simple and epicyclic gear trains.

MECH1014. Thermofluids (6 credit-units)

Concepts and definitions; properties of pure substance; heat and work; first law of thermodynamics; second law of thermodynamics; entropy; basic concepts on fluids and flows; dimensional analysis, similarity and modelling; momentum theorems and pipe flow analysis.

ENGG1002. Computer programming and applications (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1003. Mathematics I (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1004. Mathematics IA (3 credit-units)

Please refer to the General Engineering courses for details.

ENGG1005. Mathematics IB (3 credit- units)

Please refer to the General Engineering courses for details.

ENGG1006. Engineering for sustainable development (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1010. Foundations of engineering mechanics (6 credit-units)

Please refer to the General Engineering courses for details.

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

Please refer to the Common Language Enhancement Courses for details.

ECEN1513. Professional and technical written communication for engineers (3 credit-units)

The focus of this course is the function and importance of professional and technical communication in English and specifically understanding and using written English. Topics include accessing, abstracting, analysing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

ECEN1515. Professional and technical oral communication for engineers (3 credit units)

Please refer to the Common Language Enhancement Courses for details.

YXXXxxxx Broadening course in Humanities and Social Sciences Studies 3 credit-units)

YXXXxxxx Broadening course in Culture & Value Studies or an area of study outside this degree curriculum as an elective (3 credit-units)

YXXXxxxx Broadening course on the approved list (3 credit-units)

Level Two

BBSE2001. Utility services (6 credit-units)

Characteristics and design of different service installations: cold, hot and flushing water supply systems; steam supply, sanitary and stormwater; drainage systems; vertical transportation system; L.V. electrical system; communication systems; security and alarm systems.

BBSE2002. Electrical power supply and lighting engineering (3 credit-units)

Design of electricity distribution in buildings; earthing and bonding requirements; protective devices; standby generators and power supplies; lightning protection; I.E.E. regulations and codes of practice; light production and measurement; photometry and colorimetry; human perception; artificial lighting and daylighting; lighting design for interior and exterior lighting.

BBSE2004. Industrial training (3 credit-units)

Training in industry for a nominal period of eight weeks during the summer vacation of the Second Year of Study.

BBSE2005. Air conditioning and refrigeration I (3 credit-units)

Air conditioning systems; psychrometry; thermal comfort criteria; fresh air requirement; indoor air quality and pollutants; heating and cooling load estimation; energy consumption estimation; air conditioning processes and systems; refrigerants and refrigeration systems; refrigeration cycles and components.

MECH2001. Applied dynamics (3 credit-units)

Advanced rotational motion; balancing of rotating and reciprocating masses; vibration isolation and control; vibration of multi degree-of-freedom in-line systems; free transverse vibration of beams.

MECH2002. Engineering thermodynamics (6 credit-units)

Steam and gas power plant; refrigeration; jet propulsion and turbomachinery; gas mixture; psychrometry and air-conditioning, introduction to heat transfer.

MECH2004. Control (3 credit-units)

Modelling of physical systems; time response analysis of dynamical systems; feedback control systems; control system design and applications; stability; root locus method; analogue computer programming.

MECH2006. Electrical and electronic engineering (6 credit-units)

Analog electronics; sequential logic circuits; digital-to-analog and analog-to-digital converters; introduction to microcontrollers; three-phase power systems; induction motors; synchronous motors; step motors; solid-state controllers for A.C. motors.

MECH2007. Mathematics II (6 credit-units)

Complex variables; Fourier series and Fourier transforms; partial differential equations; introduction to probability and statistics, elementary numerical analysis.

MECH2008. Mechanics of fluids (6 credit-units)

Navier-Stokes equations; pipe and channel viscous flows; lubrication; boundary layer flows; two-dimensional potential flows; open-channel flows; fluid machines.

MECH2010. Properties of materials II (3 credit-units)

Testing and service behaviour of materials; metallurgy of fatigue; theory of creep resistant alloys; the ductile/brittle transition; corrosion resistance; surface treatment; selection criteria for common alloys;structure of polymers; properties of compounded plastics; service behaviour of plastics.

MECH2011. Engineering economics (3 credit-units)

Time value of money; interest and interest formulas; equivalent analysis; bases for comparison of alternatives; present worth analysis; annual equivalent worth analysis; rate of return analysis; project cash flow analysis; decision making among alternatives; applications to real-world economy.

MECH2013. Integrated computer and laboratory studies II (6 credit-units)

Miscellaneous advanced topics in C++, including aspects of object-oriented programming; Windows® programming in C++ with user interface and graphics; group project on the application of computing to the solution of an engineering problem; demonstration and experiments in various areas of mechanical engineering.

Level Three

BBSE3002. Applied research project (12 credit-units)

The project aims at the application of knowledge acquired during the course of the programme to a research investigation in building services systems targeted at achieving a novel design or an improvement in functionality, performance or cost savings.

BBSE3003. Fire protection engineering (6 credit-units)

Fire behaviour and characteristics; compartment fires; fire hazards; automatic fire detection and alarm systems; automatic fixed water-based and gas-based fire extinguishing systems; special fire extinguishing systems; portable fire extinguishers; smoke production; smoke management and control systems; staircase pressurization systems; building evacuation; LPC/FOC rules; FSD and NFPA codes; prescriptive and performance-based approaches; fire risk management.

BBSE3005. Inter-disciplinary building services design (6 credit-units)

Inter-disciplinary building services design; design rationales; conceptual design of air conditioning, plumbing and drainage, fire services, electrical power supply, vertical transportation, and lighting systems; detailed design; requirements for teamwork and integration; tectonics considerations.

BBSE3006. Air conditioning and refrigeration II (3 credit-units)

Air-side systems; fan design and control; major components and equipment; air duct design; space air diffusion; water-side systems; piping system design; pump design and operation; flow rate measurements; analysis of thermal load and energy consumption; mechanical and natural ventilation; ventilation efficiency; design of refrigeration systems; refrigeration system components and performance.

BBSE3007. Project and contract management (3 credit-units)

Characteristics of building services projects and contracts; role of architect, consultants, quantity surveyor, builder and subcontractors; statutory requirements; project planning, scheduling and control; contract documentation and contractual arrangement; estimating and tendering; site organization and supervision; measurement and valuation of work; claim management and settlement; alternative dispute resolution.

MECH3001. Acoustics (3 credit-units)

Human hearing; environmental noise measurement and legislation; source mechanisms; duct acoustics; sound reverberation in rooms; noise transmission through walls and windows; active and passive noise control.

MECH3002. Air pollution control (6 credit-units)

Particulate and aerosol abatement technology; gas absorption - plate and packed columns; adsorption for the removal of odours and trace gases; combustion fundamentals and abatement of volatile organic compounds using incineration techniques.

MECH3004. Automatic control (6 credit-units)

Control of mechanical, hydraulic and pneumatic systems; frequency domain anaylsis, Nyquist stability criterion; linear control system design; computer control systems, state-space analysis of multivariable linear system, controllability and observability, stability analysis; state feedback.

MECH3006. Case studies of failure investigations (3 credit-units)

General introduction to failure investigation procedures, purpose, scope, and limitation; failure mode detected from component examination; cause of failure determination through system case studies; design codes for large structures; fracture mechanics techniques; legislation affecting safety of equipment; roles of a mechanical engineer as an expert witness.

MECH3007. Computer-aided design and manufacture (CAD/CAM) (6 credit-units)

Basic data structuring techniques; transformation techniques; mathematical bases for surface modeling; principles of solid modeling and applications; numerical control; computer-aided production technologies; computer-integrated manufacturing.

MECH3009. Energy conversion systems (6 credit-units)

Energy calculations; solar thermal power plant; energy storage; solar photovoltaic systems; wind energy systems; nuclear energy and power plants; nuclear waste management; urban waste.

MECH3010. Engineering and technology management (6 credit-units)

Quantitative methods for engineering and technology management; managing technology through the product life cycle; planning; organizing; staffing; leading; controlling, quantitative methods for analyzing / solving decision making involving engineering and technology management problems; quantitative methods for forecasting; resource allocations subject to constraints; linear programming and simplex method; decision theory with the application of decision trees; inventory control models; queuing theory; transportation and resource allocation for business operations.

MECH3011. Heat transfer (6 credit-units)

Fourier’s law; heat-conduction equation; steady and unsteady conduction; basic convection principles; laminar and turbulent heat transfer in tubes and over plates; Reynolds analogy; log mean temperature difference; effectiveness-NTU method; heat exchanger design; exergy analysis; optimisation of heat transfer process and system.

MECH3014. Materials for engineering applications (6 credit-units)

Materials for high strength/weight ratio; high and low temperature service; resistance to corrosion resistance and protection; residual stresses; composite and ceramic materials; manufacturing properties; problem based learning module; introduction to materials classification.

MECH3020. Vibration (6 credit-units)

Vibration measurement; single- and two-plane balancing of rotors in situ, machinery condition monitoring; random vibration; digital signal analysis; matrix analysis of free and forced vibrations of multi-degree-of-freedom systems; classical analysis of beam vibration; energy methods for approximate vibration analysis.

MECH3021. Viscous flow (6 credit-units)

Eulerian and Lagrangian descriptions; Navier-Stokes equations; low-Reynolds-number flows; laminar boundary layers; laminar stability theory; turbulent flows.

MECH3023. Building energy management and control systems (6 credit-units)

Concepts of distributed computer-based monitoring and control; hardware and software development; communication protocols; application to maintenance, energy management and control; system design and performance evaluation; computer simulation and emulation techniques; analysis of dynamic building services systems.

MECH6024. Applied mathematics for engineers

Statistical and numerical methods in engineering; hypothesis testing; estimation of parameters and confidence intervals; correlation coefficient; direct and iterative methods for systems of equations; numerical analysis; finite difference and finite element schemes; wave propagation and vibration; normal modes.

MECH6028. Processing and properties of engineering plastics

Viscosity of polymer melts; extrusion; injection moulding; blow moulding; joining; plating; yield criteria; environmental stress cracking; UV degradation; flame retardation; biodegradable polymers; viscoelastic behaviour of plastics; dynamic behaviour; design methods for plastics based on creep data.

MECH6040. Foundations of nanotechnology

Characteristic length scales, nanomaterials, nanostructures, physical properties of nanostructures, deposition techniques of nanofabrication, high resolution analysis and characterization, scanning probe methods, nanoindentation, deformation of nanostructures, mechanical behaviours of nanocrystalline solids, ultra-high strength of nanostructures, sensors, actuators, MEMS, NEMS, functional nanomaterials, nano-scale devices, modelling and computer-aided designs, bio-nanotechnology.

MEDICAL ENGINEERING

PROGRAMME STRUCTURE

Definitions and Terminology

The Level of a course shall be 1, 2 or 3. Each course shall be assigned a Level.

A *Compulsory course* is a course which a student must study. A *Core course* is a Compulsory course which a student must pass in the manner as stipulated in the Regulations. *Elective courses* refer to any optional course listed in the programme or approved by the Programme Director.

A *Complementary Studies course* is a Level 1, Level 2 or Level 3 course offered as a compulsory or optional course for the curriculum. It also includes *broadening courses* which would normally be considered as Level 1 courses.

Loading

The normal load for a student is 60 credit-units of courses (excluding summer vacation) per academic year with 30 credit-units in each semester. Students are allowed to increase the loading by not more than 9 credit-units in a semester or decrease the loading by the equivalent number of credit-units which they have previously taken as additional loading and passed.

Curriculum Requirement

The curriculum comprises 186 credit-units of courses as follows:

(a) 108 credit-units of Core courses
(b) 9-credit units of Compulsory courses
(c) at least 39 credit-units of elective courses
(d) at least 24 credit-units of Complementary Studies courses comprising:
  (i) Professional and technical communication for medical engineering students (3 credit-units)
  (ii) Professional and technical oral communication for engineers (3 credit-units)
  (iii) Practical Chinese language course for engineering students (3 credit-units)
  (iv) A broadening course (3 credit-units) in Humanities and Social Sciences Studies
  (v) A broadening course (3 credit-units) in Culture and Value Studies or an area of study outside this degree curriculum as an elective course
  (vi) Medical engineers in society (3 credit-units)
  (vii) Engineering organization and management (3 credit-units)
  (viii) Engineering economics and finance (3 credit-units)
  (ix) Additional broadening courses or elective courses in an area of study outside this degree curriculum as approval by the Programme Director
(e) Engineering training (3 credit-units)
(f) Professional training (3 credit-units)

To complete the degree requirement, a student must take all the courses listed under (a) to (f) and obtain at least 180 credit-units including all courses listed under (a) and (d) (i) (ii) (iii) (iv), as well as satisfy the **IT Proficiency Test** as stipulated in the University or B.Eng. Degree Regulations.

Order of Study

Order of study is dictated by pre-requisite and co-requisite requirements. Generally, Level 1 course should be taken before Level 2 courses, Level 2 courses should be taken before Level 3 courses. Elective course can be taken in any order as long as prerequisites are met.

Minor Options (applicable to candidates admitted in the academic year 2005-2006 and thereafter)

Candidates are given an option to overload by no more than 6 credit-units in a semester to pursue a minor in a discipline outside their own degree curriculum, subject to the approval of the Program Director of the Medical Engineering Programme. For the descriptions of the courses under minor options, candidates should refer to the syllabuses of the relevant degree. The three minor options available are listed below:

a) Minor in Business
b) Minor in Economics
c) Minor in Finance

Courses in the selected minor can be taken as Complementary Studies courses in the degree curriculum if such courses are deemed to satisfy the complementary studies course requirement of the degree curriculum.

Degree Classification

The best 180 credit-unit including the courses below shall be taken into account:

(i) 9 credit-units of Complementary courses (languages / communications);
(ii) the best 6 (or up to 12) credit-units of Broadening / other Inter-Faculty elective courses;
(iii) the best 165 credit-units (or enough credit-units to make up 180 credit-units) of Core / Complementary studies / Compulsory / elective courses / Engineering training and Professional training.

FIRST YEAR

The first-year curriculum shall include the following courses:

Core Courses (Total 48 credit-units)
(The number in brackets is the number of credit-units of the particular course)

ENGG1008. Electric circuits & digital logic (6)
ENGG1002. Computer programming and applications (6)
ENGG1011. Introduction to biomedical engineering (6)
MEDE0001. Life science I (Biochemistry) (6)
MEDE0002. Life science II (Cell Biology & Physiology) (6)
ENGG1010. Foundations of engineering mechanics (6)
MEDE1003. Introduction to engineering materials (3)
MEDE1017. Mechanics for medical engineering (3)

either
ENGG1003. Mathematics I (6)

or
ENGG1004. Mathematics IA (3)
ENGG1005. Mathematics IB (3)

General Engineering Elective Courses (Total 6-12 credit-units)

Optionally additional 6-12 credit-units of General Engineering course may be selected from the Faculty General Engineering course list subject to the overloading limit of a maximum of 9 credit-units per semester.

Complementary Studies Courses (Total 12 credit-units)

ECEN1511. Problem solving & communication for medical engineering students (3)
ECEN1515. Professional and technical oral communication for engineers (3)
CENG1001. Practical Chinese language course for engineering students (3)
MEDE1018. Medical engineers in society (3)

SECOND YEAR

The second-year curriculum shall normally include the following courses:

Core courses (Total 48 credit-units)

ELEC1401. Computer organization and microprocessors (6)
or
ELEC1305. Electronic circuits (3)
ELEC1304. Electronic devices (3)
ELEC2201. Signals and linear systems (6)
LIFE2004. Life sciences III (6)
MECH2007. Mathematics II (6)
MEDE2003. Biomechanics (3)
MEDE2004. Biomaterials I (3)
MEDE2005. Thermofluids for medical engineering (6)
MEDE2007. Medical imaging (6)
MEDE2008. Integrated project (6)

Complementary Studies Courses (Total 9 credit-units)

ELEC2802. Engineering organization and management (3)
Additional 6 credit-units of Complementary Studies or Broadening courses in Culture & Values Studies or in an area of study outside this degree curriculum, or from an approved list provided.

Elective Courses (3-21 credit-units)

Students may choose 3-21 credit-units of Elective courses from the recommended electives and additional electives list in the third-year curriculum by overloading not more than 9 credit-units in each semester.

Engineering Training (Total 3 credit-units)

MEDE1010. Engineering training (3)

THIRD YEAR

The third-year curriculum shall normally include the following courses:

Core Course (Total 12 credit-units)

MEDE3002. Medical engineering final year project (12)

Compulsory Courses (Total 9 credit-units)

MEDE3001. Tissue engineering (3)
MEDE3003. Biomaterials II (3)
MEDE3006. Medical devices (3)

Elective Courses (Normally 36 credit-units):

Recommended Elective Courses

Group A: Biomechanics, Biomaterials, Tissue Engineering
MECH2001. Applied dynamics (3)
MECH2008. Mechanics of fluids (6)
MEDE3005. Transport phenomena in biological systems (6)
MECH2004. Control (3) (cannot be taken with ELEC2205)
MECH3024. Mechanics of solids for medical engineers (6)

Group B: Medical Electronics and Biomedical Imaging
CSIS0278. Introduction to database management systems (6)
ELEC2204. Digital signal processing (6)
ELEC2205. Control and instrumentation (6) (cannot be taken with MECH2004)
ELEC2302. Digital system design (6)
ELEC6053. Biomedical electronics and sensor systems (3)

Additional Elective Courses

BIOC1805. Elements of Bioinformatics (6)
BIOC1003. Introduction to Molecular Genetics (6)
BIOC2604. Essential Techniques in Biochemistry & Molecular Biology (6)
BIOC2808. Bioinformatics Methods (6)
CSIS0323. Advanced database systems (6)
ELEC2601. Human computer interaction (6)
ELEC3216. Robotics (3)
ELEC3505. Image and video processing (6)
ELEC6603. Success in industrial entrepreneurship (3)
ELEC6067. Magnetic resonance imaging (MRI) technology & applications (3)
ELEC6079. Biomedical Ultrasound (6)
MECH2005. Design and manufacture (6)
MECH3001. Acoustics (3)
MECH3012. Product design and development (6)
MECH3017. Mechatronics design methodology (6)
MECH6024 Applied mathematics for engineers (3)
MECH6040. Foundations of nanotechnology (3)
MEDE2006. Statistical planning and analysis for biomedical studies (3)
PBSL0923. Advanced exercise physiology (6)

Complementary Studies Course (Total 3 credit-units)

ELEC2804. Engineering economics and finance (3)

Professional Training (Total 3 credit-units)

MEDE2010. Professional training (3)

The list of Elective courses is updated regularly and some courses may not be offered every year. Students are encouraged to consult the Programme Director or other teachers in Medical Engineering for advice on planning their curriculum, especially in the third-year. Due to the interdisciplinary nature of the Medical Engineering Programme, students may be permitted to take courses outside the list of Elective courses subject to the approval of the Programme Director.

SYLLABUSES

Level One

BIOC1003. Introduction to Molecular Genetics (6 credit-units)

This course provides students with basic and updated knowledge of the structure and functions of nucleic acids, a general picture of the molecular control of gene expression, and implications of molecular genetics in the development of recombinant DNA technology.

BIOC1805. Elements of Bioinformatics (6 credit-units)

To introduce the main concepts, software and databases used in Bioinformatics. Students will learn the PERL scripting language to implement basic bioinformatics tasks.

Prerequisite: CSIS1117 or equivalent
Co-requisite: BIOC1003 or equivalent

ELEC1401. Computer organization and microprocessors (6 credit-units)

Integer and floating point number representations; brief introduction to digital circuits; memory cells and systems; basic computer building blocks; register transfers and phases of instruction execution; micro-computer system organization - bus signals, timing, and address decoding; study of a simple model microprocessor: signals, instruction set and addressing modes; subroutines; reentrancy; context switching; I/O programming; interrupt I/O and DMA; exception handling; assembler, linker and loader.

ELEC1305. Electronic circuits (3 credit-units)

Electronic circuits: diode circuits; analyses of BJT and FET amplifiers; digital circuits.

ELEC1304. Electronic devices (3 credit-units)

Quantum theory; solid-state theory; PN junction theory; bipolar junction transistor; field-effect devices including JFET, MESFET and MOSFET.

ENGG1002. Computer programming and applications (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1003. Mathematics I (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1004. Mathematics IA (3 credit units)

Please refer to the General Engineering courses for details.

ENGG1005. Mathematics IB (3 credit units)

Please refer to the General Engineering courses for details.

ENGG1008. Electric circuits and digital logic (6 credit-units)

Please refer to the General Engineering courses for details.

ENGG1010. Foundations of engineering mechanics (6 credit units)

Please refer to the General Engineering courses for details.

ENGG1011. Introduction to biomedical engineering (6 credit units)

Please refer to the General Engineering courses for details.

MEDE1017. Mechanics for medical engineering (3 credit-units)

Stress and strain; bending of beams; deflection of beams; torsion of shafts; kinematics of linkage mechanisms; applications to engineering and biomechanics problems.

MEDE1003. Introduction to engineering materials (3 credit-units)

Elements of atomic structure and bonding; crystal structure; metals, ceramics and polymers; defects; solidification; plastic deformation and fracture; recrystallization; phase diagrams; alloy properties; service behaviour of plastics and metals.

MEDE1010. Engineering training (3 credit-units)

The focus of this course is on practical training. It helps students to appreciate the processes and technologies through demonstrations and hands-on experience. The topics include computer-aided drafting; design; modeling and prototyping; CNC machining principles; metrology equipment; materials processing; strain gauging; virtual instrumentation; microcontroller applications.

MEDE1018. Medical engineers in society (3 credit-units)

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; medical ethics; safety in clinical practice and biomedical research.

MEDE0001. Life science I (Biochemistry) (6 credit-units)

This course presents an overview and an understanding of the basic mechanisms underlying life processes. Topics include chemistry of life – pH, water, etc; fundamental bioenergetics; biomolecules and their functions; intermediary metabolism; enzymes and coenzymes; nucleic acids and genetic information.

MEDE0002. Life Sciences II (Cell Biology and Physiology) (6 credits)

This course introduces cell and tissue functions that impact on physiology of the human body. Topics include chromosome structure and gene expression; plasma membrane and subcellular organelles; cytoskeleton and cell movement; extracellular matrix and cell-matrix interactions; tissue organization; homeostasis involving the cardiovascular, respiratory, musculoskeletal and nervous systems.

ECEN1511. Problem solving and communication for medical engineering students (3 credit-units)

There are two elements in this first-year course:
Part One – Spoken and written academic / professional English skills
Students will present the engineering and medical aspects of a Medical Engineering problem through a poster presentation. This poster presentation will be co assessed by members of the English Centre and the Medical Engineering Team. While doing this task, students will also learn interviewing skills and the skills for holding meetings and writing minutes.
Part Two – Medical terminology word analysis skills
Students will be taught how to break down and understand medical terminology through an analysis of common medical prefixes, roots and suffixes.

ECEN1515. Professional and technical oral communication for engineers (3 credit units)

Please refer to the Common Language Enhancement Courses for details.

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

Please refer to the Common Language Enhancement Courses for details.

Broadening course in Humanities and Social Sciences Studies (3 credit-units)

Broadening course; or an area of study outside this degree curriculum as an elective course subject to the approval by the Programme Director (3 credit-units)

Level Two

BIOC2604. Essential Techniques in Biochemistry & Molecular Biology (6 credit-units)

To give students a general overview of different experimental approaches and model systems, and to provide students with hands-on experience in basic biochemical and molecular techniques. Contents Different experimental approaches - genetic, biochemical and molecular; power and limitation of different prokaryotic and eukaryotic model systems; enzyme assays; purification methods; basic nucleic acid manipulation.

Prerequisites: BIOC1001 or BIOC1003 or BIOL1102 or BIOL1122 or BIOL1106

BIOC2808. Bioinformatics Methods (6 credit-units)

This course will focus on the methods and algorithms for DNA and protein sequence analysis, database searching, structural bioinformatics and phylogenetic analysis. Some knowledge of programming and algorithms is assumed.

Prerequisites: BIOC1003, BIOC1805, CSIS1117 and CSIS1119 or equivalent.

ELEC2201. Signals and linear systems (6 credit-units)

Linear time-invariant systems; continuous-time signals; convolution; frequency response; time-domain and frequency-domain representation of discrete-time signals and systems; continuous and discrete Fourier transform; *z*-transform; A/D and D/A conversion; sampling and reconstruction; digital filters.

ELEC2204. Digital signal processing (6 credit-units)

Applications of digital signal processing, discrete-time signal and system, design of digital filters, DFT and fast algorithms, digital signal processing using Mathlab, fundamentals of random signals, spectral estimation, adaptive signal processing, digital signal processors.

Prerequisite: ELEC2201 Signals and linear systems

ELEC2205. Control and instrumentation (6 credit-units)

Introduction to control systems; principles of feedback; root-locus method; frequency-response design methods; state-space methods; control system software; digital control; measurement systems; electromagnetic compatibility; data acquisition.

Co-requisite: ELEC2201 Signals and linear systems

ELEC2302. Digital system design (6 credit-units)

Digital system concepts and digital components; digital design using discrete and programmable devices; high speed digital system design considerations; Hardware Description Language (HDL); digital system structures; digital logic and memory testing; fault detection analysis and design; Design for Test (DFT) techniques.

Prerequisites: ELEC1611 Circuit theory and digital logic or (ELEC1301 Circuits & ELEC1303 Electronics)

ELEC2601. Human computer interaction (6 credit-units)

Human factors of interactive systems, design principles of user-interface, user conceptual models and interface metaphors, information and interactivity structures, interaction devices, presentation styles, information visualization. General features and components of window programming toolkits, event handling and layout management. Strategies for effective human-computer interaction, managing design process, evaluation of human-computer interaction.

ELEC2802. Engineering organization and management (3 credit-units)

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

ELEC2804. Engineering economics and finance (3 credit-units)

Macroeconomics; financial instruments; accounting concepts and financial statements; costs and profit; economic evaluation.

LIFE2004. Life Sciences III (Physiology) (6 credit-units)

This course focuses on human physiology and pathophysiology. Topics include heart and cardiovascular system and disorders; brain and neurological system and disorders; musculoskeletal system and disorders; respiration and breathing mechanics.

MECH2001. Applied dynamics (3 credit-units)

Advanced rotational motion; balancing of rotating and reciprocating masses; vibration isolation and control; vibration of multi degree-of-freedom in-line systems; free transverse vibration of beams.

MECH2004. Control (3 credit-units)

Modelling of physical systems; time response analysis of dynamical systems; feedback control systems; control system design and applications; stability; root locus method; analogue computer programming.

MECH2005. Design and manufacture (6 credit-units)

Materials selection; joining and fastening; mechanism design; tooling system design; power transmission systems; CNC machining; rapid prototyping.

MECH2007. Mathematics II (6 credit-units)

Complex variables; Fourier series and Fourier transforms; partial differential equations; introduction to probability and statistics; elementary numerical analysis.

MECH2008. Mechanics of fluids (6 credit-units)

Navier-Stokes equations; pipe and channel viscous flows; lubrication; boundary layer flows; two-dimensional potential flows; open-channel flows; fluid machines.

MEDE2003. Biomechanics (3 credit-units)

Human musculoskeletal system; biomechanical analysis of the human musculoskeletal system; selected topics in biomechanics; introduction to finite element analysis; biomechanics of the spine; biomechanical analysis of the human gait and motion.

MEDE2004. Biomaterials I (3 credit-units)

Definitions in biomaterials science and engineering; history of biomaterials science; review of engineering materials; structure and properties of biological materials; processing, structures and properties of biomaterials; tissue engineering; analytical and testing techniques for developing new biomaterials; interaction between human body environment and biomaterials.

MEDE2005. Thermofluids for medical engineering (6 credit-units)

Concepts and definitions; thermodynamic properties; heat and work; first law of thermodynamics; second law of thermodynamics; entropy; basic concepts on fluids and flows; dimension analysis, similarity and modeling; pipe flow analysis; medical and biotechnological applications.

MEDE2006. Statistical planning and analysis for biomedical studies (3 credit-units)

To understand the principles and concepts in statistical methodology commonly used for biomedical investigations; to apply the statistical tools in planning for biomedical studies, managing and analyzing data generated from these studies; to appreciate the principles and concepts for critical appraisal of biomedical literature.

MEDE2007. Medical imaging (6 credit-units)

Provides an introduction to the clinical non-invasive techniques in studying the functional and pathological aspects of the human body. This course will introduce the principles of conventional (x-ray and ultrasound) and modern (Computer Assisted Tomography – CAT; Magnetic Resonance Imaging – MRI; and Positron Emission Tomography – PET) imaging techniques applied to biological tissues and in medical diagnoses and the interpretations of these images. It will also briefly introduce the hospital PACS (picture archiving computer system) and emerging medical imaging technologies.

MEDE2008. Integrated project (6 credit-units)

A group project consisting of guided design and implementation of a medical engineering application. This project offers students in small teams an opportunity to integrate their knowledge in engineering techniques and know-how, as well as project management, following a disciplined engineering process, to achieve the final goal.

MEDE2010. Professional training (3 credit-units)

Broadening course in Culture & Value Studies; or an area of study outside this degree curriculum as an elective course (3 credit-units)

Broadening courses; or an area of study outside this degree curriculum as elective courses subject to the approval by the Programme Director (normally 3 credit-units per course)

Level Three

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, query processing. This course may not be taken with BUSI0052.

Prerequisite: ELEC1501 Computer programming and data structures

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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

ELEC3216. Robotics (3 credit-units)

Introduction to robot configurations; robot kinematics; robot dynamics and control; robot programming and applications.

Prerequisite: ELEC2205 Control and instrumentation

ELEC3505. Image and video processing (6 credit-units)

Image acquisition and imaging systems, 2D continuous-time and discrete-time signals and systems, time and frequency representations, sampling and quantization issues; image filtering and convolution, enhancement and restoration; colorimetry; image quality evaluation; image transform and compression; motion and video compression; deinterlacing and super-resolution; applications and computer implementations.

Prerequisite: ELEC2201 Signals and linear systems

ELEC6053. Biomedical electronics and sensors systems (3 credit-units)

Biomedical technology, sensing, signal processing, control and computation. Physiological and anatomic aspects of medical monitoring and imaging.

ELEC6603. Success in industrial entrepreneurship (3 credit-units)

Framework for entrepreneurship; identifying resources, capabilities, environments, opportunities and strategies; business plan; financing the new venture; risk balancing and staged financing; creating an organization.

ELEC6067. Magnetic resonance imaging (MRI) technology and applications (3 credit-units)

Fundamentals of Nuclear Magnetic Resonance (NMR); introduction to MR imaging system; design principle of permanent and super-conducting magnets; RF antennas (probes), gradient coils, RF transmitter and receivers; signal processing and imaging reconstruction; basic pulse sequence design; advanced fast imaging methods; MR spectroscopy and MR imaging applications, including functional MRI in human brain functional research and clinical applications.

ELEC6079. Biomedical ultrasound (3 credit-units)

Ultrasound physics, imaging modes, data acquisition schemes, transducer modelling; other applications of ultrasound including flow analysis, microscopy, therapy. Previous exposure to medical imaging theory (e.g. MEDE 3004 – Medical Imaging, or equivalent) is highly preferred.

Prerequisite: ELEC2007 Medical imaging

MECH3001. Acoustics (3 credit-units)

Human hearing; noise measurement; legislation; sources and outdoor noise prediction; noise level and reverberation time in rooms; sound transmission through walls and windows; active and passive noise control; occupational noise protection.

MECH3012. Product design and development (6 credit-units)

Product design and product development process; methods and tools for design, analysis and testing; prototype making methods and practices; design for tooling; design of electromechanical products.

MECH3017. Mechatronics design methodology (6 credit-units)

Introduction to mechatronics and robotics; applications of sensors for intelligent control; embedded microprocessor; motion generation and transfer systems, design and control; case studies.

MECH3024. Mechanics of solids for medical engineers (6 credit-units)

Two-dimensional theory of elasticity; measurement of strain; theory of failure and plastic yielding; energy methods; buckling; introduction to mechanics of fracture and fatigue; bone fracture and implant fixation.

MECH6024. Applied mathematics for engineers (3 credit-units)

Statistical and numerical methods in engineering; hypothesis testing; estimation of parameters and confidence intervals; correlation coefficient; direct and iterative methods for systems of equations; numerical analysis; finite difference and finite element schemes; wave propagation and vibration; normal modes.

MECH6040. Foundations of nanotechnology (3 credit-units)

Characteristic length scales, nanomaterials, nanostructures, physical properties of nanostructures, deposition techniques of nanofabrication, high resolution analysis and characterization, scanning probe methods, nanoindentation, deformation of nanostructures, mechanical behaviours of nanocrystalline solids, ultra-high strength of nanostructures, sensors, actuators, MEMS, NEMS, functional nanomaterials, nano-scale devices, modelling and computer-aided designs, bio-nanotechnolog.

MEDE3001. Tissue engineering (3 credit-units)

To understand the basic composition of engineered tissues; appreciate the breadth and depth of the engineering considerations when designing tissue substitutes; introduce the current technological advances enabling the tissue engineering sectors and the future trends; review some real examples of engineered tissue, skin and cartilage as the only marketed products and candidates in R&D stage; outline other key issues such as safety and regulations.

MEDE3002. Medical engineering final year project (12 credit-units)

A dissertation or report on a topic consisting of design, experimental or analytical investigations.

MEDE3003. Biomaterials II (3 credit-units)

Medical devices and tissue replacement; medical device regulations; standards; ethical issues; medical device evaluation; hard tissue replacement; soft tissue replacement; new trends and emerging technologies.

MEDE3005. Transport phenomena in biological systems (6 credit-units)

Navier-Stokes equations; boundary layers and potential flows; blood flows in arteries and the cardiovascular system; conservation of mass and momentum; steady and transient diffusion in reacting systems; dimensional analysis; homogeneous versus heterogeneous reaction systems; biomedical and biotechnological applications.

MEDE3006. Medical devices (3 credit-units)

Provides a practical introduction to various medical devices in modern healthcare industries, including the basic principals and applications of commonly used medical instruments and devices, monitoring and analysis equipment, therapeutic equipment, software systems, and the safety and regulatory issues.

PBSL0923. Advanced exercise physiology (6 credit-units)

On completion of this module students should have a sound understanding of common exercise prescription and testing procedures, and the metabolism of carbohydrates, as well as a sound understanding of common lactate threshold tests and a variety of applied exercise physiology topics.

SOFTWARE ENGINEERING

The Curriculum

The following curriculum applies to students admitted in or after 2003. Other students should consult the curriculum pertaining to their actual year of entry.
The curriculum shall comprise 186 credit-units of courses:

(a) Sixteen compulsory courses in the areas of software engineering and computing fundamentals (93 credit-units)
(b) Complementary studies courses comprising (39 credit-units):
  (i) English for computer science (3 credit-units)
  (ii) Professional and technical communication for computer science (3 credit-units)
  (iii) Practical Chinese language course for engineering students (3 credit-units)
  (iv) Engineering organization and management (3 credit-units)
  (v) Engineering and society (3 credit-units)
  (vi) Engineering economics and finance (3 credit-units)
  (vii) 6 credit-units of broadening courses, including one 3 credit-unit course in Humanities and Social Sciences Studies and one 3 credit-unit course in Culture and Value studies or an area of studies outside this degree curriculum
  (viii) 15 credit-units of other courses offered outside this degree curriculum
(c) System integration project (6 credit-units)
(d) Software engineering project (12 credit-units)
(e) Five elective courses in computer science and related areas (30 credit-units)
(f) Workshop training (3 credit-units)
(g) Industrial training (3 credit-units)

To complete the curriculum, a candidate must pass all the courses listed under (a), (b)(i), (ii), (iii), (vii), (c), (d), (e), (f) and (g), and a combination of other courses totalling at least 180 credit-units. In addition, a candidate must satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

The following is a typical course selection plan. Students are, however, allowed to submit their own course selection plans provided that they satisfy the requirements defined in the regulations, curriculum and syllabuses. CSIS1xxx courses in the syllabuses are level 1 courses assigned a weight of 1, and CSIS0xxx courses are level 2 courses assigned a weight of 2.

	Year 2 **(60 + 3 credit-units)**	**Year 3** **(60 + 3 credit-units)**
I. Software Engineering	◆ Analysis and design of software systems ◆ System architecture and distributed computing ◆ Implementation, testing, and maintenance of software systems (sub-total: 18 credit-units)	◆ Software quality and project management ◆ Professionalism and ethics ◆ Real-time and embedded systems (sub-total: 15 credit-units)
II. Computing Fundamentals	◆ Principles of operating systems ◆ Introduction to database management systems (sub-total: 12 credit-units)	◆ Computer and communications networks (sub-total: 6 credit-units)

III. Complementary Studies	◆ Engineering organization and management ◆ Engineering and society ◆ Broadening courses (sub-total: 12 credit-units)	◆ Engineering economics and finance ◆ Broadening course(s) (sub-total: 9 credit-units)
Project	◆ System integration project (sub-total: 6 credit-units)	◆ Software engineering project (sub-total: 12 credit-units)
Electives in CS and Related Areas	◆ 2 courses (sub-total: 12 credit-units)	◆ 3 courses (sub-total: 18 credit-units)
Training	◆ Workshop Training [the summer following Year 1] (sub-total: 3 credit-units)	◆ Industrial Training [the summer following Year 2] (sub-total: 3 credit-units)

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

(a) All compulsory courses in the areas of software engineering and computing fundamentals;
(b) All compulsory complementary studies courses on languages and communication;
(c) System integration and software engineering projects;
(d) The best 30 credit-units out of elective courses from computer science and related areas;
(e) The best 24 credit-units out of other complementary studies courses; and
(f) Workshop training and industrial training, with a weight of zero. [A weight of zero is given so that the Pass/Fail grade will not lower the classification.]

SYLLABUSES FOR LEVEL 2 COURSES

The following syllabuses apply to students admitted in or after 2003. Other students should consult the curriculum pertaining to their actual year of entry.

Area I: Software Engineering

CSIS0401. Analysis and design of software systems (6 credit-units)

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.
This course may not be taken with CSIS1401.

Prerequisite: CSIS0297

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

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

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

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.

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

Area II: Computing Fundamentals

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

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

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.

Prerequisites: CSIS1120 or ELEC1401

Area III: Complementary Studies

ELEC2802. Engineering organization and management (3 credit-units)

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

ELEC2803. Engineering and society (3 credit-units)

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.

ELEC2804. Engineering economics and finance (3 credit-units)

Macroeconomics; financial instruments; accounting concepts and financial statements; cost and profit; economic evaluation.

Project

CSIS0803. System integration project (6 credit-units)

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.

CSIS0802. Software engineering project (12 credit-units)

This is a team project, to be taken in the final year, which requires substantial individual contribution from every team member. The project requires students to complete end-to-end development of a software product for a real-world client. Students take their project from an initial concept through to final delivery and deployment, applying modern software process and strict standards of quality throughout. This may not be taken with CSIS0801 Final Year Project.

Summer Training

CSIS1411. Workshop training (3 credit-units)

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.

CSIS1410. Industrial training (3 credit-units)

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.

Electives in Computer Science and Related Areas

Requirements for CS and Related Areas Electives:

Students are required to take a total of 5 elective courses in computer science and related areas.

- ***Computer Science Area***
  - Level 2 courses offered by the Department of Computer Science
- ***Related Areas***
  - Level 3 courses from the Computer Engineering Programme
  - Level 3 courses from the Information Engineering Programme

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In addition to the courses prescribed in the syllabuses, students in the Faculty of Engineering may apply to take the following elective courses:

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

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

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

The course aims to help students to: (1) enhance their proficiency of the Chinese language and to improve their communication skills; (2) understand the cultural, social and commercial conditions in Hong Kong, China and neighbouring regions as reflected in language use; (3) address their needs in job search and career planning; (4) strengthen their language self-learning capacity. Main topics include: Cantonese studies; social and economic development in China and Hong Kong in the 21st Century; how to write application letters and prepare for employment interviews; relationships between product propagation, service promotion and language skill. Assessment: 100% coursework.

Prerequisite: CENG1001

ENGG1001. Improving English proficiency for engineering students (3 credit-units)

The focus of the course is on improving accuracy and fluency in speaking, raising awareness of common errors in writing, and expanding vocabulary range. Class meetings are planned as 2-hour sessions once a week over one semester. Specific difficulties in speaking and writing will be dealt with as they become apparent when students complete each task in a graded sequence. Some, mainly diagnostic, feedback will be provided by the teacher; students will also be directed to self-access resources that will enable them to work particular problems themselves. Students are expected to do further work in vocabulary building and journal writing outside class using self-access materials. Assessment is by coursework.

ENGG0001. Modern developments of engineering (3 credit-units)

The course aims to give Non-Final Year students a better understanding of engineering and an opportunity to learn latest technologies.

Students admitted through the Early Admissions Scheme to the Faculty of Engineering may take the following elective course for the purpose of completing the EAS-Credits, subject to the approval of the University:

ENGG0002. Introduction to engineering science and mathematics (6 credit-units)

The course is divided into two parts. Part A – Engineering Science: kinematics and kinetics of a particle; force systems and equilibrium; rotation of a rigid body about a fixed axis; basic theory of elasticity; simply vibration; fluids at rest; fluids in motion: Bernoulli equation; water balance concept; major hydrological processes on earth; electrostatics; electric current and electromagnetism; circuit analysis. Part B – Mathematics: algebra and analytical geometry: mathematical induction; partial fractions; series and convergence; permutations, combinations and elementary probability; scalar and vector, vector products; determinants and matrices; conic sections; calculus: further techniques in integration – substitution, integration by parts and reduction formulas.

CIVL0001. Introduction to engineering mathematics (6 credit-units)

Partial fraction; sequence and series; inequalities; mathematical induction; conics; differentiation; integration; permutation; combination; algebra of expectation; vectors; projectile and relative motion; kinematics and kinetics of particle; force systems and equilibrium; rotation of a rigid body about a fixed axis; basic theory of elasticity; simple vibration.