REGULATIONS FOR THE DEGREE OF BACHELOR OF ENGINEERING (BEng)

These regulations apply to students admitted to the three-year BEng curriculum in the academic year 2012-13.

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

EN1 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 these regulations and the syllabuses.

EN2 Period of Study

The curriculum for the BEng degree shall normally require six semesters of full-time study, extending over not fewer than three academic years, and shall include any assessment to be held during and/or at the end of each semester. Candidates shall not in any case be permitted to extend their studies beyond the maximum period of registration of five academic years.

EN3 Curriculum Requirements

To complete the curriculum, a candidate shall

(a) satisfy the requirements prescribed in UG 5 of the Regulations for the First Degree Curricula;
(b) take not fewer than 180 credits of courses, in the manner specified in these regulations and syllabuses; candidates are also required to pass all courses as specified in the syllabuses.

EN4 Candidates shall normally select not fewer than 24 and not more than 30 credits of courses in any one semester (except the summer semester), unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of credits required to satisfy the outstanding curriculum requirements is fewer than 24 credits. Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. Candidates may, with the approval of the Board of the Faculty, exceed 72 credits in an academic year provided that the total number of credits taken shall not exceed 216 credits. Students making up for failed credits can be permitted by the Faculty to take up to 360 credits.

EN5 Candidates with unsatisfactory academic progress may be required by the Board of the Faculty to take a reduced study load.

EN6 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. Changes to the selection of courses may be made only during the add/drop period of the semester in which the course begins, and such changes shall not be reflected in the transcript of the candidate. Requests for changes after the designated add/drop period of the semester shall be subject to the approval of the Board of the Faculty. Withdrawal from courses beyond the designated add/drop period will be subject to the approval of the Board of the Faculty.

EN7 Assessment and Grades

Candidates shall be assessed for each of the courses for which they have registered, 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 UG8 of the Regulations for the First Degree Curricula.

EN8 Written examinations or tests shall normally be held at the end of each semester unless otherwise specified in the syllabuses.

EN9 Candidates are required to make up for failed courses in the following manner:

i) undergoing re-assessment/re-examination in the failed course to be held no later than the end of the following semester (not including the summer semester); or
ii) re-submitting failed coursework, without having to repeat the same course of instruction; or
iii) repeating the failed course by undergoing instruction and satisfying the assessments; or
iv) for elective courses, taking another course in lieu and satisfying the assessment requirements.

EN10 Candidates shall not be permitted to repeat a course for which they have received a grade D or above for the purpose of upgrading.

EN11 There shall be no appeal against the results of examinations and all other forms of assessment.

EN12 Unless otherwise permitted by the Board of the Faculty, a candidate will be recommended for discontinuation of their studies if

(a) he/she fails to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take 36 credits in the two given semesters;

(b) he/she fails to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester); or
(c) he/she has exceeded the maximum period of registration specified in EN2.

EN13 Absence from Examination

Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

EN14 Advanced Standing

Advanced standing may be granted to candidates in recognition of studies completed successfully in an approved institution of higher education elsewhere in accordance with UG2 of the Regulations for First Degree Curricula. The amount of advanced credits 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 credits shall be accumulated through study in this University, or from transfer of credits for courses completed at other institutions in accordance with UG4(d) of the Regulations for the First Degree Curricula.

Credits granted for advanced standing shall not be included in the calculation of the GPA but will be recorded on the transcript of the candidate.

EN15 Degree Classification

To be eligible for the award of the BEng degree, candidates shall have:

a) satisfied all the requirements in the UG5 of the Regulations for First Degree Curricula;
b) passed not fewer than 180 credits, comprising
    i) introductory courses, including General Engineering courses;
    ii) advanced courses;
    iii) project courses;
    iv) training courses;
    v) an internship;
    vi) Chinese and English language enhancement courses[1];
    vii) Common Core Curriculum courses;

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

viii) all required courses as prescribed in respective syllabuses; and
ix) elective courses.

EN16 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, and Pass. The classification of honours shall be determined by the Board of Examiners for the degree of BEng with the following Cumulative GPA (CGPA) scores, with all courses taken (including failed courses) carrying equal weighting:

Class of honours	***CGPA range***
First Class	3.60 – 4.30
Second Class	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class	1.70 – 2.39
Pass	1.00 – 1.69

EN17 Honours classification may not be determined solely on the basis of a candidate's Cumulative GPA and the Board of Examiners for the BEng degree may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Cumulative GPA falls below the range stipulated in EN16 of the higher classification by not more than 0.05 of a Grade Point.

EN18 A list of candidates who have successfully completed all degree requirements shall be posted on Faculty notice boards.

SYLLABUSES FOR THE DEGREE OF
BACHELOR OF ENGINEERING
(BEng)

General Engineering courses (applicable to candidates admitted in the academic year 2012-13 to the three-year curriculum)

General Engineering courses include

ENGG1002	Computer programming and applications (6 credits)
ENGG1003	Mathematics I (6 credits)
ENGG1004	Mathematics IA (3 credits)
ENGG1005	Mathematics IB (3 credits)
ENGG1006	Engineering for sustainable development (6 credits)
ENGG1007	Foundations of computer science (6 credits)
ENGG1009	Industrial management and logistics (6 credits)
ENGG1011	Introduction to biomedical engineering (6 credits)
ENGG1015	Introduction to electrical and electronic engineering (6 credits)
ENGG1016	Computer programming and applications I (6 credits)
ENGG1018	Introduction to mechanical engineering (6 credits)

Candidates are required to satisfactorily 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 credits)

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

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

Assessment: 50% continuous assessment, 50% examination

ENGG1003 Mathematics I (6 credits)

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

Assessment: 10% continuous assessment, 90% examination

ENGG1004 Mathematics IA (3 credits)

Linear algebra, advanced calculus, ordinary differential equations.

Assessment: 10% continuous assessment, 90% examination

ENGG1005 Mathematics IB (3 credits)

Vector spaces, vector analysis, Laplace transforms.

Assessment: 10% continuous assessment, 90% examination

ENGG1006 Engineering for sustainable development (6 credits)

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.

Assessment: 50% continuous assessment, 50% examination

ENGG1007 Foundations of computer science (6 credits)

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

Assessment: 50% continuous assessment, 50% examination.

ENGG1009 Industrial management and logistics (6 credits)

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.

Assessment: 100% continuous assessment

ENGG1011 Introduction to biomedical engineering (6 credits)

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.

Assessment: 20% practical work, 40% continuous assessment, 40% examination

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ENGG1015 Introduction to electrical and electronic engineering (6 credits)

This course provides an overview of the general field of electrical and electronic engineering and its role in the modern world. The function of different electronic engineering disciplines in modern electronic system designs will be introduced, including signal processing, system-level design, digital logic design, circuits design, as well as electronic devices design. The role of electrical systems and their impact on the environment will also be discussed. Finally, the socio-economical impact of electrical and electronic technologies will be introduced.

Assessment: 40% practical work, 20% continuous assessment, 40% examination

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ENGG1016 Computer programming and applications I (6 credits)

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

Target students are those who wish to complete the programming course in a slower pace covering 2 semesters.

Assessment: 50% continuous assessment, 50% examination

ENGG1018 Introduction to mechanical engineering (6 credits)

Modeling of mechanical systems; working principles of robots; mechanics and propulsion of aircrafts; strong materials; hands-on projects

Assessment: 30% continuous assessment, 70% examination

University Language Enhancement Courses

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

CAES1515 Professional and technical oral communication for engineers
CENG1001 Practical Chinese language course for engineering students[2]

[2] Putonghua-speaking students should take CUND0002 or CUND0003. Students who have not studied Chinese language during their secondary education / who have not attained the requisite level of competence in the Chinese language to take CENG1001 can apply (i) to take credit-bearing Cantonese or Putonghua language courses offered by the School of Chinese especially for

COURSE DESCRIPTIONS

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

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: 100% continuous assessment

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

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.

Assessment: 50% continuous assessment, 50% examination

ENGG1001 Improving English proficiency for engineering students

This course aims to develop students' spoken fluency, grammatical accuracy and knowledge of academic vocabulary. Students will develop these skills through online independent work as well as assessments such as an academic essay and through participating in a series of tutorial discussions.

Assessment: 100% continuous assessment

Note: The Faculty of Engineering will enroll this course for students who are required to complete this course in addition to the graduation requirements of the BEng degree. This course cannot be counted as elective course or language enhancement course.

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

Candidates are given an option to pursue a minor in a discipline outside their own degree curriculum.. 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.

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international and exchange students; OR (ii) to be exempted from the Chinese language requirement and take an elective course in lieu.

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

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

Candidates are given an option to pursue the double-degrees in 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-degrees curriculum requirements may also be considered as equivalent courses that satisfy the complementary studies and elective requirements of the BEng curriculum, 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 54 credits of courses, as listed below, as required by the Faculty of Business and Economics during their study for BEng[3]:

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information systems	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Electives (Any 2 courses in HRM or Marketing major as specified below)	12
	Total	***54***

Elective courses for BEng/BBA (Human Resource Management)

Course Code	Course	Credits
BUSI0029	Human resource management and business strategy	6
BUSI0034	Human resource: theory and practice	6
BUSI1005	Organizational behaviour	6
BUSI2003	Leadership	6

Elective courses for BEng/BBA (Marketing)

Course Code	Course	Credits
BUSI0004	Advertising management	6

[3] Students pursuing double-degrees in BEng/BBA are required to take "CAES1907 Business Communication" in lieu of the following English enhancement courses during their first year of study as required by respective BEng curricula: CAES1503, CAES1505, CAES1507, CAES1509, CAES1511 or CAES1513.

BUSI0031	Marketing research	6
BUSI0038	Services marketing	6
BUSI0050	Consumer behaviour	6
BUSI0071	Strategic marketing management	6

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 credits of courses in compliance with the syllabuses for the minor programme.

To obtain the degree of BBA, candidates must satisfactorily complete 114 credits of courses, 54 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: Candidates may refer to the "Regulations for the Degree of Bachelor of Business Administration (BBA) in conjunction with the Degree of Bachelor of Engineering (BEng)" and "Syllabuses for the Degree of Bachelor of Business Administration (BBA) in conjunction with the Degree of Bachelor of Engineering (BEng)" for the regulations, length and contents of courses for the double-degrees in BEng/BBA option.

CIVIL ENGINEERING

SYLLABUS

This syllabus applies to students admitted in the academic year 2012-13.

Curriculum

The curriculum comprises 180 credits of courses as follows:

(a) General Engineering Courses

Students are required to successfully complete at least 24 credits of General Engineering courses.

(b) Core Engineering Courses

Students are required to successfully complete ALL core engineering courses (84 credits), comprising of 18 credits of introductory core courses and 66 credits of advanced core courses.

(c) Advanced Elective Courses in Civil Engineering

Students are required to take 36 credits of advanced elective courses in civil engineering offered by the Department of Civil Engineering.

(d) Elective Course(s)

Students are required to take 9 credits of advanced elective course(s) offered by either the Department of Civil Engineering or other department(s) within or outside of the Faculty of Engineering.

(e) University Requirements

(i) Students are required to successfully complete two English language courses to accumulate up to a maximum of 6 credits.

(ii) Students are required to successfully complete one Chinese language course (3 credits)[4].

(iii) Students are required to successfully complete 12 credits of courses in the Common Core Curriculum, selecting no more than one course from each Area of Inquiry.

(f) Internship

Students are required to successfully complete an Internship (6 credits). The training normally takes place after the second year of study.

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

To complete the curriculum, a candidate is required to gain not fewer than 180 credits from the above listed courses.

Degree Classification

The best 180 credits including the courses below shall be taken into account:

(a) 12 credits from University Common Core Curriculum.

(b) At least 24 credits from General Engineering Courses, including

(i) ENGG1002 Computer programming and applications; or ENGG1016 Computer programming and applications I; AND
(ii) ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB; AND
(iii) ENGG1006 Engineering for sustainable development; AND
(iv) Any one of below General Engineering courses:
ENGG1007 Foundation of computer science
ENGG1009 Industrial management and logistics
ENGG1011 Introduction to biomedical engineering
ENGG1015 Introduction to electrical and electronic engineering
ENGG1018 Introduction to mechanical engineering

(c) All core engineering courses, including both introductory and advanced courses;

(d) At least 45 credits advanced courses from

(i) civil engineering elective courses; AND
(ii) elective courses;

(e) Language Enhancement Courses, i.e. CAES1505 Professional and technical written communication for engineers[5], CAES1515 Professional and technical oral communication for engineers and CENG1001 Practical Chinese language course for engineering students[1].

(f) Internship (6 credits)

An example of the programme structure is as follows:

(a) First Year

General Engineering Courses	
Computer programming and applications or Computer programming and applications I	6
Engineering for sustainable development	6
One General Engineering Course from another Department within the Faculty of Engineering	6
Mathematics I or *both* Mathematics IA and Mathematics IB	6

[5] Students pursuing the double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1505

	University Requirements	
	Practical Chinese language course for engineering students	3
	Professional and technical oral communication for engineers	3
	Professional and technical written communication for engineers	3
	Course in the Common Core Curriculum	6
	Introductory / Advanced Core Engineering Courses	
	Engineering mechanics and materials	6
	Any two courses from:	
	Transportation engineering OR	6
	Environmental engineering and fluid mechanics OR	6
	Surveying and drawing	6
	Total credits	57
(b)	Second Year	
	Course in the Common Core Curriculum	6
	Introductory / Advanced Core Engineering Courses	
	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
	Theory and design of structures I	6
	Theory and design of structures II	6
	Any one course from:	
	Transportation engineering OR	6
	Environmental engineering and fluid mechanics OR	6
	Surveying and drawing	6
	Total credits	60
	Summer Semester	
	Internship	6
	Total credits	6
(c)	Third Year	
	Advanced courses	
	Civil engineering advanced elective courses	36
	Elective course(s)	9
	Project	12
	Total credits	57

COURSE DESCRIPTIONS

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

Level One

General Engineering Courses

ENGG1002 Computer programming and applications (6 credits)
ENGG1003 Mathematics I (6 credits)
ENGG1004 Mathematics IA (3 credits)
ENGG1005 Mathematics IB (3 credit- units)
ENGG1006 Engineering for sustainable development (6 credits)
ENGG1007 Foundation of computer science (6 credits)
ENGG1009 Industrial management and logistics (6 credits)
ENGG1011 Introduction to biomedical engineering (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
ENGG1016 Computer programming and applications I (6 credits)
ENGG1018 Introduction to Mechanical Engineering (6 credits)

Please refer to the General Engineering Courses in the syllabus for the degree of BEng for details.

University Requirements on Language Enhancement Courses

CAES1505 Professional and technical written communication for engineers (3 credits)

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 proposal writing; small-scale project design and implementation.

Assessment: 100% continuous assessment

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Practical Chinese language course for engineering students (3 credits)

Please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

University Common Core Curriculum

12 credits of courses in the University Common Core Curriculum, selecting no more than one course from each Area of Inquiry:

- Scientific and Technology Literacy
- Humanities

- Global Issues
- China: Culture, State and Society

Introductory Core Engineering Courses

CIVL1012 Environmental engineering and fluid mechanics (6 credits)

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.

Assessment: 20% practical work, 80% examination

CIVL1013 Engineering mechanics and materials (6 credits)

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.

Assessment: 15% practical work, 15% continuous assessment, 70% examination

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CIVL1014 Surveying and drawing (6 credits)

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

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.

Assessment: 100% continuous assessment

Advanced Core Engineering Courses

CIVL1010 Theory and design of structures I (6 credits)

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.

Prerequisite: CIVL1013 Engineering mechanics and materials
Assessment: 15% practical work, 15% continuous assessment, 70% examination

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CIVL1011 Transportation engineering (6 credits)

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.

Assessment: 20% continuous assessment, 80% examination

Level Two

Advanced Core Engineering Courses

CIVL2001 Engineering design and communication (6 credits)

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.

Assessment: 100% continuous assessment

CIVL2002 Engineering geology and rock mechanics (6 credits)

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.

Assessment: 20% practical work, 10% continuous assessment, 70% examination

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CIVL2003 Engineering mathematics II (6 credits)

Complex variables; Fourier analysis & partial differential equations; introduction to probability & statistics.

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

Assessment: 20% continuous assessment, 80% examination

CIVL2004 Hydraulics and hydrology (6 credits)

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.

Pre-requisite: CIVL1012 Environmental engineering and fluid mechanics
Assessment: 15% practical work, 15% continuous assessment; 70% examination

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CIVL2006 Soil mechanics (6 credits)

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.

Assessment: 20% practical work, 20% continuous assessment, 60% examination

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CIVL2007 Theory and design of structures II (6 credits)

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

RC short columns, bending moment and shear force envelopes, RC continuous one-way slabs, concept of T-beams, and reinforcement curtailment. Steel flexural members (lateral torsional buckling), tension members and compression members.

Prerequisite: CIVL1010 Theory and design of structures I
Assessment: 30% continuous assessment, 70% examination

CIVL2008 Principles of civil engineering management (6 credits)*

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.

Assessment: 30% continuous assessment, 70% examination

* For the double-degree in BEng/BBA, students who have completed the business course 'Principles of management' are exempted from taking this core course under the BEng curriculum.

<u>Internship</u>

CIVL2009 Internship (6 credits)

To complete a period of training in industry not less than a total of four weeks during the summer

semester , subject to satisfactory performance in training and the submission of a satisfactory training report.

Assessment: 100% continuous assessment

Advanced Elective Course

CIVL2010 Experiential Learning (6 credits)

To complete a period of training in industry, workshop training, study tour, or leadership programme, approved by the Head of Department, not less than a total of four weeks during the summer semester, subject to satisfactory performance in these activities and the submission of a satisfactory completion report.

Assessment: 100% continuous assessment

Level Three

Advanced Core Engineering Course

CIVL3013 Project (12 credits)

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

Assessment: 100% continuous assessment

Advanced Elective Courses in Civil Engineering

CIVL3001 Advanced engineering mechanics (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

CIVL3003 Construction project management (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

CIVL3006 Engineering hydraulics (6 credits)

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
Assessment: 10% practical work, 20% continuous assessment, 70% examination

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CIVL3007 Environmental impact assessment of civil engineering projects (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

CIVL3008 Foundation engineering (6 credits)

Ground investigation; bearing capacity, shallow and deep foundations, foundation settlements; foundation failure and remediation; case studies.

Prerequisite: CIVL2006 Soil mechanics
Assessment: 30% continuous assessment, 70% examination

CIVL3010 Management and communication skills for engineers (3 credits)

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

Assessment: 100% continuous assessment

CIVL3011 Municipal and industrial wastewater treatment (6 credits)

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

Prerequisite: CIVL1012 Environmental engineering and fluid mechanics
Assessment: 20% practical work, 80% examination

CIVL3012 Prestressed concrete structures (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

CIVL3014 Slope engineering (6 credits)

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

Prerequisite: CIVL2002 Engineering geology and rock mechanics and CIVL2006 Soil mechanics
Assessment: 20% continuous assessment, 80% examination

CIVL3015 Solid and hazardous waste management (6 credits)

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

Assessment: 30% continuous assessment, 70% examination

CIVL3016 Steel structures (6 credits)

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

Prerequisite: CIVL2007 Theory and design of structures II
Assessment: 20% continuous assessment, 80% examination

CIVL3018 Theory and design of structures III (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

CIVL3019 Traffic engineering (6 credits)

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

Assessment: 30% continuous assessment, 70% examination

CIVL3020 Transportation infrastructure engineering (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

CIVL3021 Water resources engineering (6 credits)

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

Prerequisite: CIVL1012 Environmental engineering and fluid mechanics
Assessment: 20% practical work, 80% examination

CIVL3022 Wind engineering (6 credits)

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

Assessment: 20% continuous assessment, 80% examination

CIVL3025 Law for civil engineers (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

CIVL3026 Engineering practice in Mainland China (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

CIVL3027 Professional practice in the built environment (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

CIVL3028 Structural dynamics and earthquake engineering (6 credits)

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

Assessment: 30% continuous assessment, 70% examination

CIVL3029 Numerical analysis in geotechnical engineering (6 credits)

Introduction to finite difference and finite element methods; general numerical considerations for geotechnical problems; elementary constitutive models for soils; application to one-dimensional consolidation, seepage and excavation problems.

Prerequisite: CIVL2006 Soil mechanics
Assessment: 35% continuous assessment, 65% examination

CIVL3030 Structural fire engineering (6 credits)

Fire behaviour, fire curve, fire development, fire safety, fire type, design principles for structures in fire, prescriptive and performance-based approaches, materials behaviour in fire condition, temperature prediction of fire compartment, temperature prediction of steel, concrete and composites members, design of steel and reinforced concrete structures in fire, practical design case study.

Prerequisite: CIVL2007 Theory and design of structures II
Assessment: 30% continuous assessment, 70% examination

CIVL3031 Earth retaining system (6 credits)

Lateral earth pressure; retaining walls, braced-cut; anchors, soil nails and rock bolts; reinforced earth structure; basement.
Assessment: 30% continuous assessment, 70% examination

CIVL3032 Geotechnical testing, instrumentation and monitoring (6 credits)

Single and multistage triaxial tests; principles of common laboratory transducers; basic instrument response; sampling and digitization; observational method; field instrumentation and construction monitoring; case histories.

Prerequisite: CIVL2006 Soil mechanics
Assessment: 15% practical work, 15% continuous assessment, 70% examination

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CIVL3033 Ground improvement (6 credits)

Ground modification techniques; deep compaction and vibro-compaction; vertical drains and electro-osmosis; grouting; soil and rock anchors; soil reinforcement; embankments; control of ground water.

Prerequisite: CIVL2006 Soil mechanics
Assessment: 20% continuous assessment, 80% examination

CIVL3034 Environmental Geotechnology (6 credits)

Introduction to environmental geotechnology; municipal waste management; environmental site assessment; contaminant transport in the subsurface; interactions between chemicals and geomaterials; hazardous waste remediation technologies.

Prerequisite: CIVL2006 Soil mechanics
Assessment: 30% continuous assessment, 70% examination

For the double degree in BEng/BBA, students may take business elective courses in Finance, HRM or Marketing major offered by the Faculty of Business and Economics to satisfy up to a maximum of 12 credits of Civil Engineering elective courses.

Advanced Elective Course

Elective Course (9 credits)

Students are expected to select 9 credits of Advanced courses offered by either the Department of Civil Engineering or other department(s) within or outside of the Faculty of Engineering.

CIVIL ENGINEERING (ENVIRONMENTAL ENGINEERING)

SYLLABUS

This syllabus applies to students admitted in the academic year 2012-13.

Curriculum

The curriculum comprises 180 credits of courses as follows:

(a) General Engineering Courses

Students are required to successfully complete at least 24 credits of General Engineering courses.

(b) Core Engineering Courses

Students are required to successfully complete ALL core engineering courses (90 credits), comprising of 18 credits of introductory core courses and 72 credits of advanced core courses.

(c) Advanced Elective Courses in Environmental Engineering

Students are required to take 30 credits of advanced elective courses in environmental engineering offered by the Department of Civil Engineering.

(d) Elective Course(s)

Students are required to take 9 credits of advanced elective course(s) offered by either the Department of Civil Engineering or other department(s) within or outside of the Faculty of Engineering.

(e) University Requirements

(i) Students are required to successfully complete two English language courses to accumulate up to a maximum of 6 credits.

(ii) Students are required to successfully complete one Chinese language course[6] (3 credits).

(iii) Students are required to successfully complete 12 credits of courses in the Common Core Curriculum, selecting no more than one course from each Area of Inquiry.

(f) Internship

Students are required to successfully complete an Internship (6 credits). The training normally takes place after the second year of study.

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

To complete the curriculum, a candidate is required to gain not fewer than 180 credits from the above listed courses.

Degree Classification

The best 180 credits including the courses below shall be taken into account:

(a) 12 credits from University Common Core Curriculum.

(b) At least 24 credits from General Engineering Courses, including

(i) ENGG1002 Computer programming and applications or ENGG1016 Computer programming and applications I; AND
(ii) ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB; AND
(iii) ENGG1006 Engineering for sustainable development; AND
(iv) Any one of below General Engineering courses:

ENGG1007	Foundation of computer science
ENGG1009	Industrial management and logistics
ENGG1011	Introduction to biomedical engineering
ENGG1015	Introduction to electrical and electronic engineering
ENGG1018	Introduction to mechanical engineering

(c) All core engineering courses, including introductory and advanced courses;

(d) At least 39 credits advanced courses from

(i) environmental engineering elective courses; AND
(ii) elective courses

(e) Language Enhancement Courses i.e. CAES1505 Professional and technical written communication for engineers[7], CAES1515 Professional and technical oral communication for engineers and CENG1001 Practical Chinese language course for engineering students[1].

(f) Internship (6 credits)

An example of the programme structure is as follows:

(a) First Year

General Engineering Courses	
Computer programming and applications or Computer programming and applications I	6
Engineering for sustainable development	6
One General Engineering course from another Department within the Faculty of Engineering	6
Mathematics I or *both* Mathematics IA and Mathematics IB	6

[7] Students pursuing the double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1505

	University Requirements	
	Practical Chinese language course for engineering students	3
	Professional and technical oral communication for engineers	3
	Professional and technical written communication for engineers	3
	Course in University Common Core curriculum	6
	Introductory Core Engineering Courses	
	Environmental engineering and fluid mechanics	6
	Engineering mechanics and materials	6
	Surveying & drawing	6
	Total credits	57
(b)	Second Year	
	Course in the University Common Core curriculum	6
	Advanced Core Engineering Courses	
	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
	Theory and design of structures I	6
	Theory and design of structures II	6
	Water and air quality: concepts and measurement	6
	Total credits	60
	Summer Semester	
	Internship	6
	Total credits	6
(c)	Third Year	
	Advanced Courses	
	Elective courses	9
	Environmental engineering advanced elective courses	30
	Project	12
	Transportation engineering	6
	Total credits	57

COURSE DESCRIPTIONS

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

Level One

General Engineering Courses

ENGG1002 Computer programming and applications (6 credits)
ENGG1003 Mathematics I (6 credits)
ENGG1004 Mathematics IA (3 credits)
ENGG1005 Mathematics IB (3 credits)
ENGG1006 Engineering for sustainable development (6 credits)
ENGG1007 Foundation of computer science (6 credits)
ENGG1009 Industrial management and logistics (6 credits)
ENGG1011 Introduction to biomedical engineering (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
ENGG1016 Computer programming and applications I (6 credits)
ENGG1018 Introduction to mechanical engineering (6 credits)

For course descriptions, please refer to the General Engineering Courses in the syllabus for the degree of BEng for details.

University Requirements on Language Enhancement Courses

CAES1505 Professional and technical written communication for engineers (3 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

CAES1515 Professional and technical oral communication for engineers (3 credit units)
CENG1001 Practical Chinese language course for engineering students (3 credits)

For course descriptions, please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

University Common Core Curriculum

12 credits of courses in the University Common Core curriculum, selecting no more than one course from each Area of Inquiry:

- Scientific and Technology Literacy
- Humanities
- Global Issues
- China: Culture, State and Society

Introductory Core Engineering Courses

CIVL1012 Environmental engineering and fluid mechanics (6 credits)
CIVL1013 Engineering mechanics and materials (6 credits)
CIVL1014 Surveying and drawing (6 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

Advanced Core Engineering Courses

CIVL1010 Theory and design of structures I (6 credits)
CIVL1011 Transportation engineering (6 credits)

For course descriptions please refer to the syllabuses of the Civil Engineering programme.

Level Two

Advanced Core Engineering Courses

CIVL2001 Engineering design and communication (6 credits)
CIVL2002 Engineering geology and rock mechanics (6 credits)
CIVL2003 Engineering mathematics II (6 credits)
CIVL2004 Hydraulics and hydrology (6 credits)
CIVL2006 Soil mechanics (6 credits)
CIVL2007 Theory and design of structures II (6 credits)
CIVL2008 Principles of civil engineering management (6 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

CIME2001 Water and air quality: concepts and measurement (6 credits)

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)
Assessment: 10% practical work, 10% continuous assessment, 80% examination

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Internship

CIVL2009 Internship (6 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

Advanced Elective Course

CIVL2010 Experiential Learning (6 credits)

To complete a period of training in industry, workshop training, study tour, or leadership programme, approved by the Head of Department, not less than a total of four weeks during the summer semester, subject to satisfactory performance in these activities and the submission of a satisfactory completion report.

Assessment: 100% continuous assessment

Level Three

Advanced Core Engineering Course

CIVL3013 Project (12 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

Advanced Elective Courses in Environmental Engineering

CIVL3003 Construction project management (6 credits)
CIVL3006 Engineering hydraulics (6 credits)
CIVL3007 Environmental impact assessment of civil engineering projects (6 credits)
CIVL3008 Foundation engineering (6 credits)
CIVL3010 Management and communication skills for engineers (3 credits)
CIVL3011 Municipal and industrial wastewater treatment (6 credits)
CIVL3015 Solid and hazardous waste management (6 credits)
CIVL3018 Theory and design of structures III (6 credits)
CIVL3021 Water resources engineering (6 credits)
CIVL3022 Wind engineering (6 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

For double-degrees in BEng/BBA, students may take business elective courses in Finance, HRM or Marketing major offered by the Faculty of Business and Economics up to a maximum of 12 credits to satisfy the requirements of advanced elective courses in environmental engineering.

Advanced Elective Course (9 credits)

Students are expected to select 9 credits of Advanced courses offered by either the Department of Civil Engineering or other department(s) within or outside of the Faculty of Engineering.

Minor Programmes (not applicable to candidates from the Department of Civil Engineering)

In the 2011-12 academic year, candidates from other departments in the Faculty of Engineering or from other faculties may pursue a Minor in Environmental Engineering or Minor in Geotechnical Engineering.

Minor in Environmental Engineering

Candidates are required to complete a total of 36 credits of courses comprising:

(a) Introductory courses (12 credits)

Students are required to complete ENGG1006 Engineering for sustainable development* (6 credits) AND CIVL1012 Environmental engineering and fluid mechanics (6 credits).

* Students opting for the Minor cannot use the course ENGG1006 Engineering for sustainable development as satisfying the requirements of the General Engineering Course.

(b) Advanced Elective courses (24 credits)

Students must complete 24 credits of advanced elective courses to be chosen from the following list:

CIVL2004 Hydraulics and hydrology (6 credits)
CIVL3006 Engineering hydraulics (6 credits)
CIVL3007 Environmental impact assessment of civil engineering projects (6 credits)
CIVL3011 Municipal and industrial wastewater treatment (6 credits**)**
CIVL3015 Solid and hazardous waste management (6 credits)
CIVL3021 Water resources engineering (6 credits)
CIVL3022 Wind engineering (6 credits)

Minor in Geotechnical Engineering

Candidates are required to complete a total of 36 credits of courses comprising:

(a) Introductory courses (12 credits)

Students are required to complete ENGG1003 Mathematics I (6 credits) AND CIVL2006 Soil Mechanics (6 credits).

(b) Advanced Elective courses (24 credits)

Students must complete 24 credits of advanced elective courses to be chosen from the following list:

CIVL2002 Engineering geology and rock mechanics (6 credits)
CIVL3008 Foundation engineering (6 credits)
CIVL3014 Slope engineering (6 credits)
CIVL3029 Numerical analysis in geotechnical engineering (6 credits)
CIVL3031 Earth retaining system (6 credits)
CIVL3032 Geotechnical testing, instrumentation and monitoring (6 credits)
CIVL3033 Ground improvement (6 credits)
CIVL3034 Environmental Geotechnology (6 credits)

Double–Degrees in BEng/BBA Option

Candidates pursuing studies for the double-degrees in BEng/BBA are required to satisfy all the requirements of the above BEng curriculum and pass 54 credits of courses as listed below:

Course Code	**Course**	**Credits**
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information system	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Business Electives (Any 2 courses in HRM or Marketing major)	12
	Total	**54**

Candidates pursuing the double-degrees in BEng/BBA are granted exemptions from the following courses:

Courses in the BEng curriculum to be exempted	**Business courses to be completed**
CAES1505 Professional and technical written communication for engineers (3 credits)	CAES1907 Business communication (3 credits)
CIVL2008 Principles of civil engineering management (6 credits)	BUSI1007 Principles of management
One Advanced Elective Course in Civil Engineering (6 credits)	BUSI1003 Introduction to management information system or other equivalent Business course as approved by the Department of Civil Engineering and the Faculty
One Advanced Elective Course (6 credits)	One 6-credit Business Elective course

COMPUTER SCIENCE (2012-13)

SYLLABUS

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

The curriculum comprises 180 credits of courses as follows:
(a) 75-78 credits of core courses [see table for list of courses];
(b) 30 credits of discipline electives;
(c) Industrial training (6 credits)
(d) UG5 requirements (21 credits) [see table for list of courses];
(e) 6 credits of complementary studies courses [see table for list of courses];
(f) 39-42 credits of free electives.

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

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

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

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

	Introductory(Note 1)	**Advanced**(Note 1)
Core courses (75-78 credits)	• ENGG1003 Mathematics I (6 credits) / ENGG1004 Mathematics IA (3 credits) • One General Engineering course(Note 2) • ENGG1007 Foundations of computer science • ENGG1002 Computer programming and applications • CSIS1122 Computer programming II (for intakes of 2010 and 2011) / CSIS1123 Programming technologies and tools (for intake of 2012) • CSIS1120 Computer organization CSIS1119 Introduction to data structures and algorithms (sub-total: 39-42 credits)	• CSIS0230 Principles of operating systems • CSIS0234 Computer and communication networks • CSIS0250 Design and analysis of algorithms • CSIS0278 Introduction to database management systems • CSIS0801 Final year project (12 credits) (sub-total: 36 credits)
Discipline Electives (30 credits)	• At least 30 credits of electives in computer science, excluding Research internship	
Training (6 credits)	• CSIS1412 Industrial training (Note 3)	

UG5 Requirements (21 credits)	• CAES1515 Professional and technical oral communication for engineers • CAES1503 English for computer science[(Note 4)] • CENG1001 Practical Chinese language course for engineering students [(Note 5)] (sub-total: 9 credits) • Two University Common Core Curriculum Courses (selecting no more than one course from each Area of Inquiry) (sub-total: 12 credits)
Complementary Studies (6 credits)	• ELEC2803 Engineering and society • ELEC2802 Engineering organization and management / ELEC2804 Engineering economics and finance / CSIS0311 Legal aspects of computing[(Note 6) (Note 7)]
Free Electives (39-42 credits)	

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

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

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

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

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

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

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

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

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

The degree classification shall be based on the best 180 credits according to the curriculum :

(a) all the core courses (75-78 credits);

(b) Industrial training (6 credits);

(c) all the courses in the category of the UG5 Requirements (21 credits);

(d) Complementary Studies courses (6 credits); and

(e) the remaining courses with the best results, including at least 30 credits of discipline electives.

Second Major in Computer Science

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

Minimum Entry Requirement:	1. Grade E or above in AL Pure Mathematics or Applied Mathematics; or 2. Grade D or above in AS Mathematics & Statistics or Applied Mathematics; or 3. Grade C or above in HKCEE Additional Mathematics; or 4. Grade C or above in HKCEE Mathematics and grade E or above in Additional Mathematics.
Minimum Credit Requirement:	72 credits (36 credits of core courses, 36 credits of electives)* **no capstone requirement*
Impermissible Combination:	Minor in Computer Science

Required courses (72 credits)

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

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

CSIS0230	Principles of operating systems	6
CSIS0234	Computer and communication networks	6
CSIS0250	Design and analysis of algorithms	6
CSIS0270	Artificial intelligence	6
CSIS0271	Computer graphics	6
CSIS0293	Introduction to theory of computation	6
CSIS0297	Introduction to software engineering	6
CSIS0311	Legal aspects of computing	6
CSIS0315	Multimedia computing and applications	6
CSIS0317	Computer vision	6
CSIS0320	Electronic commerce technology	6
CSIS0322	Internet and the World Wide Web	6
CSIS0327	Computer and network security	6
CSIS0396	Object-oriented programming and Java	6
CSIS3330	Interactive mobile application design and programming	6

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

Note 2 Students may apply to enroll in other CSIS courses not listed above, subject to the approval of the Head of Department of Computer Science.

Minor in Computer Science (Note 1)

Introduction

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

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

Core Courses:

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

Elective Courses: (Note 3)

- CSIS1119 Introduction to data structures and algorithms
- CSIS0250 Design and analysis of algorithms
- CSIS0270 Artificial intelligence
- CSIS0271 Computer graphics

- CSIS0278 Introduction to database management systems
- CSIS0293 Introduction to theory of computation
- CSIS0297 Introduction to software engineering
- CSIS0311 Legal aspects of computing
- CSIS0315 Multimedia computing and applications
- CSIS0317 Computer vision
- CSIS0320 Electronic commerce technology
- CSIS0322 Internet and the World Wide Web
- CSIS0396 Object-oriented programming and Java
- CSIS3330 Interactive mobile application design and programming

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

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

Note 3 Students may apply to enrol in other CSIS courses not listed above, subject to the approval of the Head of Department of Computer Science.

COURSE DESCRIPTIONS

ENGG1002 Computer programming and applications (6 credits)

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

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

Assessment: 50% continuous assessment, 50% examination

ENGG1003 Mathematics I (6 credits)

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

Assessment: 10% continuous assessment, 90% examination

ENGG1004 Mathematics IA (3 credits)

Linear algebra, advanced calculus, ordinary differential equations.

Assessment: 10% continuous assessment, 90% examination

ENGG1007 Foundations of computer science (6 credits)

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

Assessment: 50% continuous assessment, 50% examination

CAES1503 English for computer science (3 credits)
(course code revised from ECEN1503 from 2010-11)

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

Assessment: 100% continuous assessment

CAES1515 Professional and technical oral communication for engineers (3 credits)
(course code revised from ECEN1515 from 2010-11)
CENG1001 Practical Chinese language course for engineering students (3 credits)

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

CSIS1117 Computer programming I (6 credits)

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

Assessment: 50% continuous assessment, 50% examination

CSIS1118 Foundations of computer science (6 credits)
(renamed from Mathematical foundations of computer science from 2009-10)

OR

CSIS1121 Discrete mathematics (6 credits)

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

Assessment: 50% continuous assessment, 50% examination

CSIS1119 Introduction to data structures and algorithms (6 credits)

Arrays, linked lists, trees and graphs; stacks and queues; symbol tables; priority queues, balanced trees; sorting algorithms; complexity analysis.
Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112
Pre-/Co-requisite: CSIS1122 or CSIS1123 or COMP2123

Assessment: 40% continuous assessment, 60% examination

CSIS1120 Computer organization (6 credits)

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

Introduction to computer organization and architecture; data representations; instruction sets; machine and assembly languages; basic logic design and integrated devices; the central processing unit and its control; memory and caches; I/O and storage systems; computer arithmetic.
Co-requisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Assessment: 50% continuous assessment, 50% examination

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

This is the second programming course following ENGG1002/CSIS1117. The goal of this course is to strengthen students' programming skills, in particular, on implementing basic data structures and algorithms. Students will also learn various tools for developing programs in the UNIX/Linux environment.
Prerequisite: CSIS1117 or ENGG1002

Assessment: 50% continuous assessment, 50% examination

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

This course introduces various technologies and tools that are useful for software development, including Linux, C++ STL, the C language, shell scripts, python and xml. Learning materials will be provided but there will be no lecture. This strengthens the self-learning ability of the students.
Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Assessment: 50% continuous assessment, 50% examination

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

OR

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

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

Assessment: 100% continuous assessment

CSIS0218 Discrete event simulation (6 credits)

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 COMP2119 or CSIS1122 or CSIS1123 or COMP2123 or ELEC1502 or ELEC1503 or ELEC2543
Assessment: 40% continuous assessment, 60% examination

CSIS0230 Principles of operating systems (6 credits)

Operating system structures, process and thread, CPU scheduling, process synchronization, deadlocks, memory management, file systems, I/O systems and device driver, mass-storage structure and disk scheduling, case studies.

Prerequisites: CSIS1122 or CSIS1123 or COMP2123; and CSIS1120 or COMP2120 or ELEC1401 or ELEC2441
Assessment: 50% continuous assessment, 50% examination

CSIS0231 Computer architecture (6 credits)

Introduction to computer design process; performance and cost analysis; instruction set design; data-path and controller design; pipelining; memory system; I/O design; introduction to advanced topics.

Prerequisite: CSIS1120 or COMP2120
Assessment: 40% continuous assessment, 60% examination

CSIS0234. Computer and communication networks (6 credits)

Network structure and architecture; reference models; stop and wait protocol; sliding window protocols; character and bit oriented protocols; virtual circuits and datagrams; routing; flow control; congestion control; local area networks; issues and principles of network interconnection; transport protocols and

application layer; and examples of network protocols.

Prerequisite: CSIS1120 or COMP2120 or ELEC1401 or ELEC2441
Assessment: 50% continuous assessment, 50% examination

CSIS0235 Compiling techniques (6 credits)

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

Prerequisite: CSIS0259 or COMP3259
Assessment: 50% continuous assessment, 50% examination

CSIS0247 Topics in computer systems (6 credits)

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

Assessment: 50% continuous assessment, 50% examination

CSIS0250 Design and analysis of algorithms (6 credits)

The course studies various algorithm design techniques, such as divide and conquer, and dynamic programming. These techniques are applied to design highly non-trivial algorithms from various areas of computer science. Topics include: advanced data structures; graph algorithms; searching algorithms; geometric algorithms; overview of NP-complete problems.

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

CSIS0259 Principles of programming languages (6 credits)

Syntax and semantics specification; data types; data control and memory management; expressions, precedence and associativity of operators; control structures; comparative study of existing programming languages; advanced topics such as polymorphism, programming paradigms, exception handling and concurrency.

Prerequisites: CSIS1119 or COMP2119; and CSIS1120 or COMP2120 or ELEC1401 or ELEC2441
Assessment: 40% continuous assessment, 60% examination

CSIS0262 Topics in computer applications (6 credits)

Some specialized application areas of computers.

Assessment: 50% continuous assessment, 50% examination

CSIS0270 Artificial intelligence (6 credits)

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

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

CSIS0271 Computer graphics (6 credits)

Overview of graphics hardware, basic drawing algorithms, 2-D transformations, windowing and clipping, interactive input devices, curves and surfaces, 3-D transformations and viewing, hidden-surface and hidden-line removal, shading and colour models, modelling, illumination models, image synthesis, computer animation.

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

CSIS0278 Introduction to database management systems (6 credits)

This course studies the principles, design, administration, and implementation of database management systems. Topics include: entity-relationship model, relational model, relational algebra, database design and normalization, database query languages, indexing schemes, integrity and concurrency control. This course may not be taken with BUSI0052.

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

CSIS0293 Introduction to theory of computation (6 credits)

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

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

CSIS0297 Introduction to software engineering (6 credits)

This course introduces the fundamental principles and methodologies of software engineering. It covers the software process and methods and tools employed in the development of modern systems. The use of CASE tools and the UML are emphasized. The course includes a team-based project in which students apply their new knowledge to a full development lifecycle, including maintenance.

Prerequisite: CSIS1122 or CSIS1123 or COMP2123
Assessment: 50% continuous assessment, 50% examination

CSIS0311 Legal aspects of computing (6 credits)

To introduce students to the laws affecting computing and the legal issues arising from the technology. Contents include: the legal system of Hong Kong; copyright protection for computer programs; intellectual property issues on the Internet; data privacy; computer-related crimes; codes of professional conduct for computer professionals.

Prerequisite: CSIS1122 or CSIS1123 or COMP2123
Assessment: 30% continuous assessment, 70% examination

CSIS0314 Pattern classification and machine learning (6 credits)

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

CSIS0315 Multimedia computing and applications (6 credits)

This course introduces various aspects of the interdisciplinary and multidisciplinary field of multimedia computing. Current developments of technologies and techniques in multimedia will also be covered. Applications of multimedia techniques are also highlighted through a media production course project. Major topics include: what are media, audio, acoustics and psychoacoustics, MIDI, basic compression techniques, video compression techniques, standards, and current multimedia technologies. This course may not be taken with BUSI0068.

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

CSIS0317 Computer vision (6 credits)

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

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

CSIS0320 Electronic commerce technology (6 credits)

This course aims to help students to understand the technical and managerial challenges they will face as electronic commerce becomes a new locus of economics activities. Topics include Internet and WWW technology, information security technologies, public-key crypto-systems, public-key infrastructure, electronic payment systems, and electronic commerce activities in different sectors.

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

CSIS0322 Internet and the World Wide Web (6 credits)

Introduction and history; networks, internetworking, and network protocols; TCP/IP and related protocols; client-server model and programming; distributed applications; Domain Name System; Internet applications: TELNET, mail, FTP, etc.; Internet security; intranet and extranet; virtual private networks; World Wide Web; Web addressing; HTTP; HTML, XML, style sheets, etc.; programming the Web: CGI, Java, JavaScript, etc.; Web servers; Web security; Web searching; push technology; other topics of current interest.
This course may not be taken with BUSI0063.

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

CSIS0323 Advanced database systems (6 credits)

The course will study some advanced topics and techniques in database systems, with a focus on the system and algorithmic aspects. It will also survey the recent development and progress in selected areas. Topics include: query optimization, spatial-spatiotemporal data management, multimedia and time-series data management, information retrieval and XML, data mining.

Prerequisite: CSIS0278 or COMP3278
Assessment: 50% continuous assessment, 50% examination

CSIS0324 Topics in theoretical computer science (6 credits)

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 COMP3293 or CSIS0250 or COMP3250
Assessment: 30% continuous assessment, 70% examination

CSIS0325 Topics in Web technologies (6 credits)

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 COMP3234 or CSIS0322 or COMP3322
Assessment: 50% continuous assessment, 50% examination

CSIS0326 Computational molecular biology (6 credits)

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 COMP3250 or BIOC2808
Assessment: 40% continuous assessment, 60% examination

CSIS0327 Computer and network security (6 credits)

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

Pre-requisites: CSIS0230 or COMP3230 and CSIS0234 or COMP3234
Assessment: 30% continuous assessment, 70% examination

CSIS0328 Wireless and mobile communication (6 credits)

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

Prerequisite: CSIS0234 or COMP3234 and CSIS0396 or COMP2396
Assessment: 50% continuous assessment, 50% examination

CSIS0329 Computer game design and programming (6 credits)

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

Pre-requisite: CSIS1119 or COMP2119
Assessment: 50% continuous assessment, 50% examination

CSIS0351 Advanced algorithm analysis (6 credits)

This class introduces advanced mathematical techniques for analyzing the complexity and correctness of algorithms. NP-complete problems are believed to be not solvable in polynomial time and we study how

approximation algorithms could give near optimal solutions. In particular, we will see that probability theory gives us a very powerful tool to tackle problems that are otherwise hard to solve.

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

CSIS0396 Object-oriented programming and Java (6 credits)

Introduction to object-oriented programming; abstract data types and classes; inheritance and polymorphism; object-oriented program design; Java language and its program development environment; user interfaces and GUI programming; collection class and iteration protocol; program documentation.
Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112

Assessment: 50% continuous assessment, 50% examination

CSIS0402 System architecture and distributed computing (6 credits)

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

Prerequisite: CSIS0396 or COMP2396
Assessment: 50% continuous assessment, 50% examination

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

This course examines the theory and practice of software implementation, testing and maintenance. Topics in implementation include: detailed design issues and implementation strategies; coding style and standards; the review process; 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: CSIS0396 or COMP2396
Assessment: 50% continuous assessment, 50% examination

CSIS0404 Software quality and project management (6 credits)

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 or COMP3297
Assessment: 40% continuous assessment, 60% examination

CSIS0406 Real-time and embedded systems (6 credits)

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 or COMP3230
Assessment: 50% continuous assessment, 50% examination

CSIS0407 Scientific computing (6 credits)

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

Prerequisites: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112; and CSIS1118 or ENGG1007 or COMP2121

Assessment: 50% continuous assessment, 50% examination

CSIS3330 Interactive mobile application design and programming (6 credits)

This course introduces the Android platform for developing interactive mobile applications. Topics include user interface, parallel computing, graphics, multimedia, sensors, database, and social computing. Students participate in both individual assignments and group projects to practice ideation, reading, writing, coding, and presentation.
Prerequisite: CSIS1117 or COMP1117 or ENGG1002 or ENGG1111 or ENGG1112 or CSIS0396 or COMP2396

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

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COMP3412 Internship (6 credits) *[for intakes of 2012 and thereafter (4-year curriculum)]*

The course consists of two components: internship and professionalism. Internship requires students to spend a minimum of four weeks employed, full-time, as IT interns or trainees. During this period, they are engaged in work of direct relevance to their programme of study. The Internship provides students with practical, real-world experience and represents a valuable complement to their academic training. Professionalism exposes students to social and professional issues in computing. Students need to understand their professional roles when working as computer professionals as well as the responsibility that they will bear. They also need to develop the ability to ask serious questions about the social impact of computing and to evaluate proposed answers to those questions. Topics include social context of computing, risks, safety and security concerns for computer professionals, professional and ethical responsibilities, and continuing professional development.

Assessment: 100% continuous assessment

CSIS0412 Research internship (6 credits)

The student will participate in a research project under the guidance and supervision of a teacher over a prescribed period of time; the results will be presented in an oral and a written report.

Assessment: 100% continuous assessment

CSIS0801 Final year project (12 credits)

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

Assessment: 100% continuous assessment

ELEC2802 Engineering organization and management (3 credits)

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

Assessment: 30% continuous assessment, 70% examination

ELEC2803 Engineering and society (3 credits)

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

Assessment: 100% continuous assessment

ELEC2804 Engineering economics and finance (3 credits)

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

Assessment: 30% continuous assessment, 70% examination

ELEC2814 Engineering management and society (6 credits)

Professional conduct and social responsibility, sustainability and safety issues, technology and environment, ethics at work; Engineering organization and project, management functions and managerial

skills, decision making processes, contingency and crisis management, leadership, corporate culture and philanthropy. Contract, intellectual property, tort, professional negligence and related law issues.

Assessment: 50% continuous assessment, 50% examination

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

COMPUTER ENGINEERING

SYLLABUS

This syllabus applies to students admitted in the academic year 2011-12 and 2012-13.

Definitions and Terminology:

Each course offered by the Department of Electrical and Electronic Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses include Level Two and Three courses.

All courses are grouped into the following 10 Subject Groups:

A. Electrical Energy
B. Electronics and Photonics
C. Signal Processing and Control Systems
D. Communications and Networking
E. Computer Systems
F. Complementary Studies
G. Projects
H. General Engineering
I. Mathematics
J. Software and IT Applications

A Discipline 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 and a Depth Course is a Level 3 course that is offered in one of the subject groups as an optional course for the curriculum.

The Curriculum

The curriculum shall comprise at least 180 credits including the following:

(a) 24 credits from General Engineering courses, including:
  (i) ENGG1002 Computer programming and applications; AND
  (ii) ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB; AND
  (iii) ENGG1015 Introduction to electrical and electronic engineering; AND
  (iv) ENGG1007 Foundations of computer science
(b) 60 credits of Computer Engineering (CE) Discipline Core Courses
(c) 33 credits of Breadth/Depth Courses comprising
  (i) 12 credits of course(s) selected from Groups E, J; *and*
  (ii) the remaining are courses selected from Groups A, B, C, D, E, H, I, J but no more than 6 credits from Group H.
(d) Complementary Studies courses comprising (Total 12 credits):
  (i) ELEC2814 Engineering management and society (6 credits)
  (ii) ELEC2815 Economics, finance and marketing for engineers (6 credits)
(e) ELEC2818 Integrated design project (6 credits)
(f) ELEC3818 Senior design project (12 credits)

(g) ELEC1812 Engineering training (6 credits)
(h) ELEC1813 Internship (6 credits)
(i) UG5 requirements (21 credits):
    (i) CAES1507 Professional and technical written communication for engineers[8] (3 credits)
    (ii) CAES1515 Professional and technical oral communication for engineers (3 credits)
    (iii) CENG1001 Practical Chinese language course for engineering students[9] (3 credits)
    (iv) 12 credits of courses in the Common Core Curriculum, selecting no more than one course from each Area of Inquiry

To complete the degree requirement, a candidate must pass all the courses specified in the Curriculum and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credits satisfying the Curriculum described above shall be taken into account for degree classification.

Order of Study

Order of study is dictated by prerequisite 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. Courses in Complementary Studies and UG5 Requirements can be taken in any order.

First Year

The first-year syllabus shall include the following courses:

General Engineering Courses (Total 24 credits)

Either
ENGG1003 Mathematics I (6 credits)
or
ENGG1004 Mathematics IA (3 credits) *and* ENGG1005 Mathematics IB (3 credits)
ENGG1002 Computer programming and applications (6 credits)
ENGG1007 Foundations of computer science (6 credits)
(can be replaced by CSIS1118 Foundations of computer science (6 credits))
(mutually exclusive with: ELEC1807, CSIS1118)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)

[8] Students pursuing the double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

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

Discipline Core Courses for CE (Total 24 credits)

CSIS1119	Introduction to data structures and algorithms (6 credits)
CSIS1123	Programming technologies and tools (6 credits)
ELEC1306	Electric and electronic circuits (6 credits) (mutually exclusive with ENGG1008)
ELEC1401	Computer organization and microprocessors (6 credits)

UG5 Requirements (Total 9 credits)

CAES1507	Professional and technical written communication for engineers (3 credits)[10]
CAES1515	Professional and technical oral communication for engineers (3 credits)
CENG1001	Practical Chinese language course for engineering students (3 credits)[11]

Training (Total 6 credits)

ELEC1812	Engineering training (6 credits)

Second Year

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

Discipline Core Courses for CE (Total 36 credits)

CSIS0230	Principles of operating systems (6 credits)
CSIS0234	Computer and communication networks (6 credits)
CSIS0297	Introduction to software engineering (6 credits)
ELEC1802	Engineering mathematics II (6 credits)
ELEC2302	Digital system design (6 credits)
ELEC2401	Computer architecture (6 credits)

Complementary Studies (Total 6 credits)

ELEC2814	Engineering management and society (6 credits)

UG5 Requirements (Total 12 credits)

Two Common Core Curriculum Courses (12 credits)

Project (Total 6 credits)

ELEC2818	Integrated design project (6 credits)

[10] Students pursuing the double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

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

Training (Total 6 credits)

ELEC1813 Internship (6 credits)

Third Year

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

Breadth/Depth Courses (Total 33 credits)

33 credits of Breadth/Depth Courses selected according to item (c) of the curriculum.

Complementary Studies: (Total 6 credits)

ELEC2815 Economics, finance and marketing for engineers (6 credits)

Project (Total 12 credits)

ELEC3818 Senior design project (12 credits)

ELECTRONIC AND COMMUNICATIONS ENGINEERING

SYLLABUS

This syllabus applies to students admitted in the academic year 2011-12 and 2012-13.

Definitions and Terminology

All courses offered by the Department of Electrical and Electronic Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses include Level Two and Three courses.

All courses are grouped into the following 10 Subject Groups:

A. Electrical Energy
B. Electronics and Photonics
C. Signal Processing and Control Systems
D. Communications and Networking
E. Computer Systems
F. Complementary Studies
G. Projects
H. General Engineering
I. Mathematics
J. Software and IT Applications

A Discipline 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 and a Depth Course is a Level 3 course that is offered in one of the subject groups as an optional course for the curriculum.

The Curriculum

The curriculum shall comprise at least 180 credits including the following:

(a) 24 credits from General Engineering courses comprising:
  (i) ENGG1002 Computer programming and applications; AND
  (ii) ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB; AND
  (iii) ENGG1015 Introduction to electrical and electronic engineering; AND
  (iv) An additional 6-credit General Engineering course from Group H
(b) 60 credits of Electronic and Communications Engineering Discipline Core Courses
(c) 33 credits of Breadth/Depth Courses comprising:
  (i) 12 credits of Breadth/Depth Courses from Groups A, B, C, D, E, J; AND
  (ii) 6 credits of Breadth/Depth Course from Group I; AND
  (iii) 15 credits of Depth Courses from Groups B, C, D, E with at least 12 credits selected from Groups B, D
(d) 12 credits of Complementary Studies courses comprising:
  (i) ELEC2814 Engineering management and society (6 credits)
  (ii) ELEC2815 Economics, finance and marketing for engineers (6 credits)
(e) 30 credits of Project and Training comprising:
  (i) ELEC2818 Integrated design project (6 credits)
  (ii) ELEC3818 Senior design project (12 credits)
  (iii) ELEC1812 Engineering training (6 credits)
  (iv) ELEC1813 Internship (6 credits)
(f) UG5 requirements (21 credits):
  (i) CAES1507 Professional and technical written communication for engineers[12] (3 credits)
  (ii) CAES1515 Professional and technical oral communication for engineers (3 credits)
  (iii) CENG1001 Practical Chinese language course for engineering students[13] (3 credits)
  (iv) 12 credits of courses in the Common Core Curriculum, selecting no more than one course from each Area of Inquiry

To complete the degree requirement, a candidate must pass all the courses specified in the Curriculum and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credits satisfying the Curriculum described above shall be taken into account for degree classification.

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[12] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

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

Order of Study

Order of study is dictated by prerequisite 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. Courses in Complementary Studies and UG5 Requirements can be taken in any order.

First Year

The first-year syllabus shall include the following courses:

General Engineering Courses (Total 24 credits)

Either

ENGG1003 Mathematics I (6 credits)

or

ENGG1004 Mathematics IA (3 credits) *and* ENGG1005 Mathematics IB (3 credits)

ENGG1002 Computer programming and applications (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
Additional 6 credits of General Engineering course from Group H

Discipline Core Courses for EComE (Total 24 credits)

ELEC1202	Introduction to electromagnetic waves and fields (6 credits)
ELEC1306	Electric and electronic circuits (6 credits) (mutually exclusive with ENGG1008)
ELEC1401	Computer organization and microprocessors (6 credits)
ELEC1503	Object oriented programming and data structures (6 credits)

UG5 Requirements (Total 9 credits)

CAES1507	Professional and technical written communication for engineers (3 credits)[14]
CAES1515	Professional and technical oral communication for engineers (3 credits)
CENG1001	Practical Chinese language course for engineering students (3 credits)[15]

Training (Total 6 credits)

ELEC1812 Engineering training (6 credits)

Second Year

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

[14] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

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

Discipline Core Courses for EComE (Total 36 credits)

ELEC1802	Engineering mathematics II (6 credits)
ELEC2201	Signals and linear systems (6 credits)
ELEC2202	Communications engineering (6 credits)
ELEC2302	Digital system design (6 credits)
ELEC2306	Electronic devices and circuits (6 credits)
ELEC2501	Software engineering and operating systems (6 credits)

Complementary Studies (Total 6 credits)

ELEC2814	Engineering management and society (6 credits)

UG5 Requirements (Total 12 credits)

Two Common Core Curriculum Courses (12 credits)

Project (Total 6 credits)

ELEC2818	Integrated design project (6 credits)

Training (Total 6 credits)

ELEC1813	Internship (6 credits)

Third Year

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

Breadth/Depth Courses (Total 33 credits)

33 credits of Breadth/Depth Courses selected according to item (c) of the curriculum

Complementary Studies (Total 6 credits)

ELEC2815	Economics, finance and marketing for engineers (6 credits)

Project (Total 12 credits)

ELEC3818	Senior design project (12 credits)

ELECTRICAL ENGINEERING

SYLLABUS

This syllabus applies to students admitted in the academic year 2011-12 and 2012-13.

Definitions and Terminology:

Each course offered by the Department of Electrical and Electronic Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses include Level Two and Three courses.

All courses are grouped into the following 10 Subject Groups:

A. Electrical Energy
B. Electronics and Photonics
C. Signal Processing and Control Systems
D. Communications and Networking
E. Computer Systems
F. Complementary Studies
G. Projects
H. General Engineering
I. Mathematics
J. Software and IT Applications

A Discipline 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 and a Depth Course is a Level 3 course that is offered in one of the subject groups as an optional course for the curriculum.

The Curriculum

The curriculum shall comprise at least 180 credits including the following:

(a) 24 credits from General Engineering courses, including:
  (i) ENGG1002 Computer programming and applications; AND
  (ii) ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB; AND
  (iii) ENGG1015 Introduction to electrical and electronic engineering; AND
  (iv) An additional 6-credit General Engineering Course from Group H
(b) 48 credits of Electrical Engineering (EE) Discipline Core Courses
(c) 45 credits of Breadth/Depth Courses comprising:
  (i) 21 credits of Breadth/Depth Courses from Groups A, B, C, D, E, J; AND
  (ii) 6 credits of Breadth/Depth Course from Group I; AND
  (iii) 18 credits of Depth Courses from Group A
(d) 12 credits of Complementary Studies Courses comprising:
  (i) ELEC2814 Engineering management and society (6 credits)
  (ii) ELEC2815 Economics, finance and marketing for engineers (6 credits)
(e) ELEC2818 Integrated design project (6 credits)
(f) ELEC3818 Senior design project (12 credits)
(g) ELEC1812 Engineering training (6 credits)
(h) ELEC1813 Internship (6 credits)
(i) UG5 requirements (21 credits):
  (i) CAES1507 Professional and technical written communication for engineers[16] (3 credits)

[16] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

(ii) CAES1515 Professional and technical oral communication for engineers (3 credits)
(iii) CENG1001 Practical Chinese language course for engineering students[17] (3 credits)
(iv) 12 credits of courses in the Common Core Curriculum, selecting no more than one course from each Area of Inquiry

To complete the degree requirement, a candidate must pass all the courses specified in the Curriculum and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credits satisfying the Curriculum described above shall be taken into account for degree classification.

Order of Study

Order of study is dictated by prerequisite 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. Courses in Complementary Studies and UG 5 Requirements can be taken in any order.

First Year

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

General Engineering Courses (Total 24 credits)

Either
ENGG1003 Mathematics I (6 credits)
or
ENGG1004 Mathematics IA (3 credits) *and* ENGG1005 Mathematics IB (3 credits)

ENGG1002 Computer programming and applications (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
Additional 6 credits of General Engineering Course from Group H

Discipline Core Courses for EE (Total 24 credits)

ELEC1107 Electrical energy technology (6 credits)
ELEC1401 Computer organization and microprocessors (6 credits)
ELEC1802 Engineering mathematics II (6 credits)
ELEC1306 Electric and electronic circuits (6 credits)
(mutually exclusive with ENGG1008)

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

UG5 Requirements (Total 9 credits)

CAES1507	Professional and technical written communication for engineers (3 credits)
CAES1515	Professional and technical oral communication for engineers (3 credits)
CENG1001	Practical Chinese language course for engineering students (3 credits)

Training (6 credits)

ELEC1812	Engineering training (6 credits)

Second Year

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

Discipline Core Courses for EE (Total 24 credits)

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

Breadth/Depth Courses (Total 12 credits)

12 credits of Breadth/Depth Courses selected according to item (c) of the curriculum

Complementary Studies (Total 6 credits)

ELEC2814	Engineering management and society (6 credits)

UG5 Requirements (Total 12 credits)

Two Common Core Curriculum Courses (12 credits)

Project (Total 6 credits)

ELEC2818	Integrated design project (6 credits)

Training (6 credits)

ELEC1813	Internship (6 credits)

Third Year

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

Breadth/Depth Courses (Total 33 credits)

33 credits of Breadth/Depth Courses selected according to item (c) of the curriculum.

Complementary Studies (Total 6 credits)

ELEC2815 Economics, finance and marketing for engineers (6 credits)

Project (Total 12 credits)

ELEC3818 Senior design project (12 credits)

INFORMATION ENGINEERING

SYLLABUS

This syllabus applies to students admitted in the academic year 2011-12.

Definitions and Terminology:

Each course offered by the Department of Electrical and Electronic Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses includes Level Two and Three courses.

All subject-related courses are grouped into the following 10 Subject Groups:

A. Electrical Energy
B. Electronics and Photonics
C. Signal Processing and Control Systems
D. Communications and Networking
E. Computer Systems
F. Complementary Studies
G. Projects
H. General Engineering
I. Mathematics
J. Software and IT Applications

A Discipline 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 and a Depth Course is a Level 3 course that is offered in one of the subject groups as an optional course for the curriculum.

The Curriculum

The curriculum shall comprise at least 180 credits including the following:

(a) 24 credits from General Engineering courses, including:
  (i) ENGG1002 Computer programming and applications; AND
  (ii) ENGG1003 Mathematics I or both ENGG1004 Mathematics IA and ENGG1005 Mathematics IB; AND
  (iii) ENGG1015 Introduction to electrical and electronic engineering; AND
  (iv) An additional 6-credits of General Engineering course from Group H

(b) 54 credits of Information Engineering (InfoE) Discipline Core Courses
(c) 39 credits of Breadth/Depth Courses comprising:
    (i) 18 credits of Depth Courses from Groups A, B, C, D, E, J; AND
    (ii) 21 credits of Breadth/Depth Courses from Group A, B, C, D, E, I, J but no more than 6 credits from Group I.
(d) 12 credits of Complementary Studies courses comprising:
    (i) ELEC2814 Engineering management and society (6 credits)
    (ii) ELEC2815 Economics, finance and marketing for engineers (6 credits)
(e) ELEC2818 Integrated design project (6 credits)
(f) ELEC3818 Senior design project (12 credits)
(g) ELEC1812 Engineering training (6 credits)
(h) ELEC1813 Internship (6 credits)
(i) UG5 requirements (21 credits):
    (i) CAES1507 Professional and technical written communication for engineers[18] (3 credits)
    (ii) CAES1515 Professional and technical oral communication for engineers (3 credits)
    (iii) CENG1001 Practical Chinese language course for engineering students[19] (3 credits)
    (iv) 12 credits of courses in the Common Core Curriculum, selecting no more than one course from each Area of Inquiry

To complete the degree requirement, a candidate must pass all the courses specified in the Curriculum and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credits satisfying the Curriculum described above shall be taken into account for degree classification.

Order of Study

Order of study is dictated by prerequisite 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. Courses in Complementary Studies and UG5 Requirements can be taken in any order.

First Year

The first-year syllabus shall include the following courses:

General Engineering Courses (Total 24 credits)

[18] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

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

Either

ENGG1003 Mathematics I (6 credits)

or

ENGG1004 Mathematics IA (3 credits) *and* ENGG1005 Mathematics IB (3 credits)

ENGG1002 Computer programming and applications (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
Additional 6 credits of General Engineering course from Group H

Discipline Core Courses for InfoE (Total 24 credits)

ELEC1306 Electric and electronic circuits (6 credits)
(mutually exclusive with ENGG1008)
ELEC1401 Computer organization and microprocessors (6 credits)
ELEC1503 Object oriented programming and data structures (6 credits)
ELEC1802 Engineering mathematics II (6 credits)

UG5 Requirements (Total 9 credits)

CAES1507 Professional and technical written communication for engineers (3 credits)[20]
CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Practical Chinese language course for engineering students (3 credits)[21]

Training (Total 6 credits)

ELEC1812 Engineering training (6 credits)

Second Year

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

Discipline Core Courses for InfoE (Total 30 credits)

ELEC2201 Signals and linear systems (6 credits)
ELEC2202 Communications engineering (6 credits)
ELEC2403 Computer networks (6 credits)
ELEC2501 Software engineering and operating systems (6 credits)
ELEC2817 Probability and statistics in engineering (6 credits)

Breadth/Depth Courses (Total 6 credits)

6 credits of Breadth/Depth Courses selected according to item (c) of the curriculum

[20] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1507

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

UG5 Requirements (Total 12 credits)

Two Common Core Curriculum Courses (12 credits)

Complementary Studies (Total 6 credits)

ELEC2814 Engineering management and society (6 credits)

Project (Total 6 credits)

ELEC2818 Integrated design project (6 credits)

Training (Total 6 credits)

ELEC1813 Internship (6 credits)

Third Year

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

Breadth/Depth Courses (Total 33 credits)

33 credits of Breadth/Depth Courses selected according to item (c) of the curriculum.

Complementary Studies (Total 6 credits)

ELEC2815 Economics, finance and marketing for engineers (6 credits)

Project (Total 12 credits)

ELEC3818 Senior design project (12 credits)

List of Courses by Subject Groups

Note:

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. Subject to approval, some MSc courses may also be taken as Depth Courses in their respective subject groups. Each MSc course is counted as 3 credits.

Group A: Electrical Energy

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	ELEC1107	Electrical energy technology (core: EE)	6	-	-
2	ELEC2101	Power transmission and distribution (core: EE)	6	-	ELEC1104 or ELEC1107

2	ELEC2102	Electrical energy conversion (core: EE)	6	-	ELEC1103 or ELEC1107
2	ELEC2103	Power electronics (core: EE)	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	ELEC3111	Electric railway systems	6	ELEC1103 or ELEC1107	-
3	ELEC3112	Power system protection and switchgear	6	ELEC2101	-

Group B: Electronics and Photonics

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	ELEC1306	Electric and electronic circuits (core: CE, EE, EComE, InfoE) (mutually exclusive with ENGG1008)	6	-	-
2	ELEC2301	Analogue electronics	6	ELEC1306	-
2	ELEC2302	Digital system design (core: CE)	6	ELEC1306 or ELEC1401	-
2	ELEC2305	Electronic materials and devices	6	ELEC2306	-
2	ELEC2306	Electronic devices and circuits	6	-	-
3	ELEC3303	Design of digital integrated circuits (mutually exclusive with ELEC2303)	6	ELEC2305 or ELEC1304 or ELEC2306	-
3	ELEC3223	Optical networking devices and technologies	6	ELEC2206 or ELEC2207	-
3	ELEC3612	VLSI design principles	6	-	-

Group C: Signal Processing and Control Systems

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
2	ELEC2201	Signals and linear systems (core: EComE, EE, InfoE)	6	-	-
2	ELEC2204	Digital signal processing	6	ELEC2201	-
2	ELEC2205	Control and instrumentation	6	-	ELEC2201
3	ELEC3206	Control systems	6	ELEC2205	-
3	ELEC3222	Robotics	6	ELEC2205	-
3	ELEC3224	Multimedia signals and applications (mutually exclusive with CSIS0315)	6	ELEC2201	-

3	ELEC3225	Digital image processing (mutually exclusive with ELEC3505)	6	ELEC2201	-

Group D: Communications and Networking

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	ELEC1202	Introduction to electromagnetic waves and fields (core: EComE)	6	-	-
2	ELEC2202	Communications engineering (core: EComE, InfoE)	6	-	ELEC2201
2	ELEC2207	Engineering electromagnetism	6	ELEC1201 or ELEC1202	-
2	ELEC2403	Computer networks (mutually exclusive with ELEC2402, ELEC2701, CSIS0234) (core: InfoE)	6	-	-
3	ELEC3201	Communication systems	6	ELEC2202	-
3	ELEC3203	Cellular radio and personal communication systems (mutually exclusive with CSIS0328, ELEC6071)	6	ELEC2202	-
3	ELEC3221	Microwave engineering	6	ELEC1201 or ELEC1202 or ELEC2206 or ELEC2207	-
3	ELEC3227	Information theory and coding (mutually exclusive with ELEC3204)	6	-	-
3	ELEC3402	Advanced networking technologies (mutually exclusive with ELEC3401)	6	ELEC2402 or ELEC2403 or ELEC2701 or CSIS0234	-

Group E: Computer Systems

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	ELEC1401	Computer organization and microprocessors (core: CE, EComE, EE, InfoE) (mutually exclusive with CSIS1120)	6	-	-
1	ELEC1503	Object-Oriented programming and data structures (mutually exclusive with CSIS0396) (core: EComE, InfoE,)	6	ENGG1002	-

2	ELEC2401	Computer architecture (core: CE) (mutually exclusive with CSIS0231)	6	ELEC1401	-
2	ELEC2501	Software engineering and operating systems (mutually exclusive with CSIS0230 and CSIS0297) (core: EComE, InfoE)	6	-	-
2	ELEC2601	Human computer interaction	6	ELEC1502 or ELEC1503 or CSIS0396	-
2	ELEC2603	Systems and network programming (mutually exclusive with ELEC3628, CSIS0402)	6	ELEC1502 or ELEC1503 or (CSIS1119 & CSIS0396)	-
3	ELEC3226	Embedded systems	6	ELEC1401 & ELEC2302	-
3	ELEC3503	Fuzzy systems and neural networks	6	-	-
3	ELEC3629	Parallel computing	6	ELEC2401	-
3	ELEC3630	Distributed computing systems	6	(ELEC2501 or CSIS0230) & (ELEC2402 or ELEC2403 or CSIS0234)	-
3	ELEC3631	Computer network security (mutually exclusive with CSIS0327)	6	ELEC2402 or ELEC2403 or CSIS0234	-

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Group F: Complementary Studies

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	ELEC1812	Engineering training	6	-	-
1	ELEC1813	Internship	6	-	-
2	ELEC2814	Engineering management and society	6	-	-
2	ELEC2815	Economics, finance and marketing for engineers	6	-	-

Group G: Projects

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
2	ELEC2818	Integrated design project	6	-	-
3	ELEC3818	Senior design project	12	-	-

Group H: General Engineering

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	ENGG1002	Computer programming and applications	6	-	-

1	ENGG1003	Mathematics I	6	-	-
1	ENGG1004	Mathematics IA (mutually exclusive with ENGG1003)	3	-	-
1	ENGG1005	Mathematics IB (mutually exclusive with ENGG1003)	3	-	-
1	ENGG1006	Engineering for sustainable development	6	-	-
1	ENGG1007	Foundations of computer science (can be replaced by CSIS1118 Foundations of computer science) (mutually exclusive with: ELEC1807, CSIS1118)	6	-	-
1	ENGG1009	Industrial management and logistics	6	-	-
1	ENGG1018	Introduction to mechanical engineering	6	-	-
1	ENGG1011	Introduction to biomedical engineering	6	-	-
1	ENGG1015	Introduction to electrical and electronic engineering	6	-	-

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Group I: Mathematics

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
2	ELEC1802	Engineering mathematics II (core: CE, EComE, EE, InfoE)	6	-	-
2	ELEC2816	Numerical methods and optimization (mutually exclusive with CSIS0407)	6	-	-
2	ELEC2817	Probability and statistics in engineering (core: InfoE)	6	-	-
3	ELEC3705	Queueing theory	6	ELEC2811 ELEC2817	-

Group J: Software and IT Applications

Level	Code	Course Title	Credit	Prerequisite	Co-requisite
1	CSIS1119	Introduction to data structures and algorithms (core: CE)	6	CSIS1117 or ENGG1002	CSIS1122 (Computer Programming II) (Pre- or Co-requisites)
1	CSIS1123	Programming technologies and tools (core: CE)	6	CSIS1117 or ENGG1002	-
2	CSIS0230	Principles of operating systems (mutually exclusive with ELEC2501) (core: CE)	6	CSIS1122 & (CSIS1120 or ELEC1401)	-

2	CSIS0234	Computer and communication networks (mutually exclusive with ELEC2402, ELEC2403) (core: CE)	6	CSIS1120 or ELEC1401	-
2	CSIS0259	Principles of programming languages	6	CSIS1119 & (CSIS1120 or ELEC1401)	-
2	CSIS0278	Introduction to database management systems	6	CSIS1119 or ELEC1502 or ELEC1503	-
2	CSIS0297	Introduction to software engineering (core: CE)	6	CSIS1122	-
2	CSIS0311	Legal aspects of computing	6	-	-
2	CSIS0396	Object-oriented programming and Java (mutually exclusive with ELEC1502, ELEC1503)	6	CSIS1117 or ENGG1002	-
3	CSIS0218	Discrete event simulation	6	CSIS1119 or CSIS1122 or ELEC1502 or ELEC1503	-
3	CSIS0235	Compiling techniques	6	CSIS0259	-
3	CSIS0250	Design and analysis of algorithms	6	CSIS1119 or ELEC1502 or ELEC1503 (Pre- or Co-requisites)	
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 ELEC1502 or ELEC1503	-
3	CSIS0315	Multimedia computing and applications (mutually exclusive with ELEC3224)	6	CSIS1119	-
3	CSIS0317	Computer vision	6	CSIS1119 or ELEC1502 or ELEC1503	-
3	CSIS0320	Electronic commerce technology	6	CSIS0278	-
3	CSIS0322	Internet and the World Wide Web (mutually exclusive with CSIS0325)	6	CSIS1117 or ENGG1002	-
3	CSIS0323	Advanced database systems	6	CSIS0278	-
3	CSIS0325	Topics in Web technologies (mutually exclusive with CSIS0322)	6	CSIS0322 or CSIS0234	-
3	CSIS0326	Computational molecular biology	6	CSIS0250; or BIOC2808	-
3	CSIS0327	Computer and network security	6	CSIS0230 &	-

		(mutually exclusive with ELEC3631, ELEC3626)		CSIS0234	
3	CSIS0328	Wireless and mobile computing (mutually exclusive with ELEC3203, ELEC6071)	6	CSIS0234 & CSIS0396	-
3	CSIS0329	Computer game design and programming	6	CSIS0271	-
3	CSIS0351	Advanced algorithm analysis	6	CSIS0250	-
3	CSIS0402	System architecture and distributed computing (mutually exclusive with ELEC2603)	6	CSIS0396	-
3	CSIS0403	Implementation, testing and maintenance of software systems	6	CSIS0396 (Pre- or Co-requisite)	-
3	CSIS0407	Scientific computing (mutually exclusive with ELEC2816)	6	(CSIS1117 or ENGG1002) and (CSIS1118 or CSIS1121 or ENGG1007)	-

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Minor in Electrical and Electronic Engineering

Candidates who are interested in pursuing minor in Electrical and Electronic Engineering must satisfy the following prerequisites:

- Passed in HKALE Pure Mathematics and
- Passed in HKAL/AS Physics/Engineering Science

Candidates are required to complete a total of 36 credits of courses in the following manner:

Code	**Course Name**	**Credits**
(i) 12 credits of core courses		
ELEC1306	Electric and Electronic circuits	6
ENGG1015	Introduction to electrical and electronic engineering*	6
(ii) 24 credits of discipline elective courses selected from the following:		
ELEC1107	Electrical energy technology	6
ELEC1202	Introduction to electromagnetic waves and fields	6
ELEC1401	Computer organization and microprocessors	6
ELEC1503	Object-oriented programming and data structures	6
ELEC2101	Power transmission and distribution	6
ELEC2102	Electrical energy conversion	6
ELEC2103	Power electronics	6
ELEC2201	Signals and linear systems	6
ELEC2202	Communications engineering	6
ELEC2204	Digital signal processing	6

ELEC2205	Control and instrumentation	6
ELEC2207	Engineering electromagnetism	6
ELEC2301	Analogue electronics	6
ELEC2302	Digital system design	6
ELEC2305	Electronic materials and devices	6
ELEC2306	Electronic devices and circuits	6
ELEC2401	Computer architecture	6
ELEC2403	Computer networks	6
ELEC2501	Software engineering & operating systems	6
ELEC2601	Human computer interaction	6
ELEC2603	Systems and network programming	6
ELEC3303	Design of digital integrated circuits	6

*ENGG1015 cannot be used for satisfying the requirement of both this Minor programme and another degree programme. If ENGG1015 has already been taken for another degree programme, the student should take 6 credits of discipline elective course in list (ii) as a replacement.

Double-Degrees in BEng/BBA

Students pursuing studies for the double-degrees in BEng/BBA curriculum are required to satisfy all the requirement of the above BEng curriculum and pass 54 credits of courses as listed below:

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information system	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Business Electives (Any 2 courses in Finance, HRM or Marketing major)	12
	Total	**54**

Furthermore, such students are deemed to have satisfied 6 credits of Complementary Studies (ELEC2815 Economics, finance and marketing for engineers), 6 credits of Engineering Training (ELEC1812), 12 credits of Breadth Courses after they have successfully completed 24 credits of courses from the following list. The students are also deemed to have satisfied "CAES1507 Professional and technical written communication for engineers" after they have successfully completed the course "CAES1907 Business communication".

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information systems	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6

Minor in Business/Economics/Finance

Students pursuing studies for Minor in Business/Economics/Finance are required to satisfy all the requirement of the above BEng curriculum and pass 36 credits of courses as prescribed by the Faculty of Business and Economics (information also available from http://engg.hku.hk/).

Furthermore, such students are deemed to have satisfied 6 credits of Complementary Studies (ELEC2815 Economics, finance and marketing for engineers) and 6 credits of Engineering Training (ELEC1812) after they have successfully completed 12 credits of courses from the following list.

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
ECON1002	Introduction to economics II	6
ECON2101	Microeconomic theory	6
ECON2113	Microeconomic analysis	6
FINA1003	Corporate finance	6
FINA2802	Investments and portfolio analysis	6

Descriptions of the courses offered by the Department of Electrical and Electronic Engineering for the four specialties: Computer Engineering, Electrical Engineering, Electronic and Communications Engineering, and Information Engineering.

Level One

ELEC1107 Electrical energy technology (6 credits)

This is an introductory course on various electrical energy technologies and systems by which students will be able to comprehend their major industry and their applications.

The course covers: Characteristics of values of electricity; Renewable electrical energy sources, convertible forms and sustainability; Generation and delivery; Direct current and alternating current supplies, Single-phase and three-phase systems, waveform inversion, rectification and transformation, Engineering and service applications of electrical technology; Analogue and digital instruments and measurements.

At the end of this course, students who fulfill the requirements of this course will be able to:
1. link technology to betterment of the society in a renewable manner;
2. apply electrical engineering to offer appropriate technical solutions;
3. describe the generation, delivery and utilization of electrical energy;
4. use circuit diagrams, phasor diagrams, graphs and mathematical equations to describe systems and to analyse performances;
5. manage electrical technology in a valuable, sustainable, dependable, efficient and smart manner.

Assessment: 20% practical work, 20% continuous assessment, 60% examination

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ELEC1202 Introduction to electromagnetic waves and fields (6 credits)

This is the first course introducing basic mathematical and physical concepts of electromagnetism. It aims at providing fundamental understanding about key electromagnetic principles. It tries to establish the mathematical foundation through vector analysis and then gradually go through essentials of Maxwell's equations. Wave equations, boundary conditions and the basic methods of solving Poisson and Helmholtz equations are all discussed to provide a complete picture of electromagnetic problems. Material properties are studied and compared to understand various wave propagation features in different medium.

Specifically, the course covers the following topics in contemporary electromagnetics: vectors and fields, Gauss' Law, Ampere's Circular Law, Faraday's Law, electrostatic field, wave propagations, material properties, and transmission lines (optional). It serves as the entry class of engineering electromagnetism.

Assessment: 60% continuous assessment, 40% examination

ELEC1306 Electric and electronic circuits (6 credits)

The aim of this course is to provide students with a basic understanding of simple electric and electronic circuits.

Mutually exclusive with: ENGG1008
Assessment: 20% practical work, 20% continuous assessment, 60% examination

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ELEC1401 Computer organization and microprocessors (6 credits)

This course aims at providing fundamental knowledge on the principles of computer organization and microprocessors, and serves as the first course to other more advanced computer courses. In order to bring out the essential principles, a simple processor is used for illustration and is studied in detail, and on top of it, more general systems are also introduced.

Specifically, the course covers the following topics: integer and floating point number representations; 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; memory cells and systems; exception handling; assembler, linker and loader.

Mutually exclusive with: CSIS1120
Assessment: 10% practical work, 20% continuous assessment, 70% examination

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ELEC1503 Object-oriented programming and data structures (6 credits)

This course aims to provide a hands-on and in depth survey of object oriented programming paradigm, and the basic concepts of data structures through the Java programming language. It serves to provide a solid foundation of essential concepts on object oriented programming and data structures that will be

required in its sequels —including the Systems and Network Programming (Level-2), Distributed Computing Systems (Level-3) or Embedded Systems (Level-3).

Specifically, the course covers the following topics: basics of the Java development environment; Java applications and applets; Java syntaxes; control structures; methods in Java; iteration; recursion; objects; classes; interfaces; inheritance; polymorphism; overloading; overriding; wrapper classes; type conversions; strings; string manipulations in Java; Java exceptions; try blocks; throwing and catching exceptions in Java; byte and character streams; stream classes; file classes; file manipulation in Java; arrays; dynamic memory allocation; dynamic data structures including the dynamically linked lists, stacks, queues, trees, graphs, hash tables; sorting; searching; examples of Java applications.

Pre-requisite: ENGG1002 Computer programming and applications
Mutually exclusive with: ELEC1502, CSIS0396
Assessment: 40% continuous assessment, 60% examination

ELEC1802 Engineering mathematics II (6 credits)

The aim of this course is to provide students with expanded topics of mathematics which are necessary to engineering students. It emphasizes the ability of problem-solving, abstract thinking and solving real-world problems while utilizing mathematical tools.

At the end of this course, students will be able to:
1. demonstrate knowledge and understanding of basic engineering mathematics;
2. apply mathematical skills to some typical engineering applications;
3. have a general grasp on the relationship between mathematics and engineering problems;
4. gain understanding of the solution to various engineering problems.

Assessment: 20% continuous assessment, 80% examination

ELEC1812 Engineering training (6 credits)

The aims of ELEC1812 Engineering Training are to provide practical trainings for students to acquire essential practical skills related to Electrical and Electronic Engineering. There are 5 modules namely Electronic Practice, Practical Networking, CAD/CAE tools practice, Virtual Instrumentation and Microcontroller. Students of each program (CE, EE, InfoE and EComE) were required to take 4 compulsory modules to fulfill the workshop training requirement. The aims of each module are:-

- CAD/CAE tools practice – To learn how to use CAD software application to design circuit
- Electronics Practice – To learn how to produce a PCB circuit broad and soldering technique
- Practical Networking – To learn how to design and configure a data network
- Microcontroller – To learn how to design and program a microcontroller
- Virtual instrumentation – To learn how to write codes and build hardware on virtual instrumentation circuits

Assessment: 100% continuous assessment

ELEC1813 Internship (6 credits)

Students are trained on-the-job under the supervision of a company from the industry. At the end of the training, every student is required to submit a training report to the Department for assessment.

Assessment: 100% continuous assessment

CAES1507 Professional and Technical Written Communication for Engineers (3 credits)

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

Assessment: 100% continuous assessment

Level Two

ELEC2101 Power transmission and distribution (6 credits)

The course aims at providing detailed understanding about power transmission and distribution systems. The emphasis is on the mathematical models and equivalent circuits of power transmission lines and the basic structure of distribution systems. The model for high voltage transmission system is the basis for power system analysis and operation. The introduction of distribution systems provides the basic understanding of how power is distributed to customers and the technologies applied in power distribution.

Specifically, the course covers the following topics:

- Power transmission systems
- Transmission line model
- Power distribution systems
- Distribution overhead lines and underground cables
- Various issues in distribution systems

Co-requisite: ELEC1104 Electrical power plants or ELEC1107 Electrical energy technology
Assessment: 10% continuous assessment, 90% examination

ELEC2102 Electrical energy conversion (6 credits)

This course aims at providing sound understanding of various electrical energy conversion devices and systems. The emphasis is on four kinds of electrical energy conversion – electromechanical motion, electric heating, electric lighting and electrochemistry.

Specifically, the course covers the following topics: electric machines including DC machines, synchronous machines, induction machines and special machines; electric heating including resistive

heating, induction heating and dielectric heating; electric lighting including incandescent lighting, discharge lighting and LED lighting; electrochemical sources including batteries and ultracapacitors.

Co-requisite: ELEC1103 Electrical technology or ELEC1107 Electrical energy technology
Assessment: 20% practical work, 20% continuous assessment, 60% examination

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ELEC2103 Power electronics (6 credits)

Electrical energy is essential today. In order to effectively utilize electrical energy it must be converted and processed to the right forms for different types of loads. A modern microprocessor might need low voltage high current DC for its power supply whereas a rotational machine might need high voltage high frequency AC for its operation. Power electronics is a power conversion technology. It enables conversion of electrical energy to the right form. It also enables the conversion process to be carried out with high efficiency. High efficiency power conversion plays a crucial role in energy saving, reducing carbon emission and global warming. Power electronics is based on the application of electronics technology to control the electrical conversion process. It is a field that spreads across various disciplines such as electrical, electronics and control.

The course starts with an introduction to various power semiconductors. Power semiconductors are the basic components for power converters. Power converters for AC to DC, AC to AC, DC to DC and DC to AC conversions are studied. Students are expected to learn the operation and design of these converters. Students should also know where and how these converters are applied in various electrical and electronic engineering systems.

Assessment: 20% continuous assessment, 80% examination

ELEC2201 Signals and linear systems (6 credits)

Signals and linear system theory is fundamental to all engineering discipline, especially in the field of electrical, computer and medical engineering. This is a first course in signals and linear systems for engineering students without any pre-requisite knowledge in signal theory or signal processing other than some knowledge in fundamental calculus and use of complex numbers. The course uses simple real life examples of signals and systems to illustrate how signal theory can be used in practical application, and will including an introduction to MATLAB as a tool for signal analysis and system modelling.

This course aims to help students gain a firm understanding of the fundamentals of signal and linear systems concepts and theory using adequate mathematical and computing techniques to tackle simple signal processing problems. It serves as a pre-requisite course for many other courses including Digital Signal Processing, Control and Instrumentation, Communication Systems, and Digital Image Processing.

Specifically, the course covers the following topics: time-domain signal representation, periodic and aperiodic signals; spectral representation of signals, Fourier series and Fourier transform; system responses and linear system modelling; sampling, aliasing and analog-to-digital conversion; z-transform and concepts of poles and zeros; convolution; FIR filters and digital filtering; IIR filters and frequency response of digital filters; continuous-time systems and Fourier transform properties; application examples of signal analysis and processing.

At the end of the course, students should have a clear understanding of the fundamentals of signals and system theory to enable them to perform simple signal analysis and processing using both analytical method as well as using computing tools, link the mathematical representation of signals to some very simple real life signals and vice versa, and appreciate the applications of linear systems theory in solving some simple real life problems. In addition, students should be aware of the complexity of real life problems and the need to continue investigation in practice after graduation.

Assessment: 20% practical work, 10% continuous assessment, 70% examination

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ELEC2202 Communications engineering (6 credits)

This course is an introduction to communications systems taught at a level appropriate for second-year undergraduates in electrical and electronic engineering. It is aimed at providing a general understanding of the basic communications theory and the principles of communications systems.

The following topics will be covered in the course: communications system models; modes of transmissions; properties of signals; baseband transmission; analogue modulations such as amplitude modulation, phase modulation and frequency modulation; noise in CW modulations; digital modulations such as binary-phase shift keying, quaternary binary-phase shift keying, frequency-shift keying, quadrature-amplitude modulation; antenna basic; basic concepts of modern communications systems such as cellular mobile systems and GPS system.

At the end of the course, students should have gained an understanding of the concepts of communications systems and modern communications systems.

Co-requisite: ELEC2201 Signals and linear systems
Assessment: 20% practical work, 20% continuous assessment, 60% examination

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ELEC2204 Digital signal processing (6 credits)

This course aims to help students gain a firm understanding of digital signal processing theory and practice. It includes the discussion on the theoretical aspect of the interfaces between the continuous-time domain and the discrete-time domain, and the design of discrete-time infinite impulse response filters as well as finite impulse response filters. It also covers the formulation of convolution, correlation and fast algorithms. Moreover, it outlines the derivation of discrete Fourier transform, from which a detailed study of fast Fourier transform algorithms is given. It concludes by the study of sampling rate conversion and its application.

Specifically, the course covers the following topics in digital signal processing: DSP fundamentals, filter structures, analog-to-digital conversion, digital-to-analog conversion, design of IIR filters, design of other frequency selective filters, design of FIR filters, digital convolution, cross- and auto-correlation, fast convolution, discrete Fourier transform, fast Fourier transform algorithms, decimation, interpolation, sampling rate conversion, applications of multi-rate signal processing.

Pre-requisite: ELEC2201 Signals and linear systems
Assessment: 20% practical work, 20% continuous assessment, 60% examination

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ELEC2205 Control and instrumentation (6 credits)

Control systems and instrumentation methods are fundamental to many engineering disciplines. In this course, a general approach will be taken to study of control systems and instrumentation, so that the theory and methods are applicable to other disciplines at the system level.
The course is aimed at providing a general understanding of the fundamental principles of control systems and instrumentation methods. The following topics will be covered in the course: system modeling, transient response, principles of feedback, root locus, frequency response methods, state-space models, introduction to digital control, instrumentation and measurement systems, electromagnetic compatibility, noise and interference.
At the end of the course, students should have gained an understanding of the concepts and methodologies for the complete process of modeling, analysis and design of a feedback control system, including instrumentation technologies for measuring controlled variables.

Co-requisite: ELEC2201 Signals and linear systems
Assessment: 15% practical work, 85% examination

ELEC2207 Engineering electromagnetism (6 credits)

The objective of this course is to offer comprehensive understanding in electromagnetics including topics of Maxwell's Equations, property of matters, wave propagation, wave reflection and transmission as well as important electromagnetic theorems. With the knowledge on the topics, students can have the ability to understand the physics and details of other courses and technologies such as microwave engineering, optoelectronics, photonics etc.

Students will also learn some representing devices of electromagnetic such as waveguides and antennas. The course will focuses more on the dynamic field analysis.

Pre-requisite: ELEC1201 Fundamental electromagnetic theory or ELEC1202 Introduction to electromagnetic waves and fields
Assessment: 60% continuous assessment, 40% examination

ELEC2301 Analogue electronics (6 credits)

The aim of this course is to provide students with more advanced knowledge on analogue electronic circuits.

Pre-requisite: ELEC1306 Electric and electronic circuits
Assessment: 10% practical work, 20% continuous assessment, 70% examination

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ELEC2302 Digital system design (6 credits)

This course aims at providing students the fundamental understanding of digital system structures and system design techniques using discrete and programmable devices. Digital system design as a synthesis process using building block components, and the electrical characteristics of basic gate components are discussed. The main issues in system interconnection are treated with major emphasis on design considerations for high-speed digital systems. Use of Hardware Description Language (HDL) for design

is introduced. The analysis and synthesis of digital system structure, especially those related to circuit timing, data transfer, and data clocking are discussed. Various testing schemes for logic and memory testing are introduced. Simple stuck-at fault detection techniques and modern Design for Test (DFT) techniques are discussed.

Specifically this course covers the following topics in digital system design: Digital system concepts and digital components; digital design using discrete and programmable devices; high speed digital system design considerations; Hardware Description Language (HDL); design of digital system structures; digital logic and memory testing; fault detection analysis and design; Design for Test (DFT) techniques.

Pre-requisite: ELEC1306 Electric and electronic circuits or ELEC1401 Computer organization and microprocessors
Assessment: 15% practical work, 85% examination

ELEC2305 Electronic materials and devices (6 credits)

The aim of this course is to provide students with an understanding of (i) the properties of materials and their applications from the microscopic point of view and (ii) the principles underlying the operation of semiconductor devices.

Pre-requisite: ELEC2306 Electronic devices and circuits
Assessment: 10% practical work, 20% continuous assessment, 70% examination

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ELEC2306 Electronic devices and circuits (6 credits)

The aim of this course is to provide students with an understanding of (i) the properties of materials and their applications from the microscopic point of view and (ii) the principles underlying the operation of semiconductor devices.

Pre-requisite: ELEC1306
Assessment: 10% practical work, 20% continuous assessment, 70% examination

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ELEC2401 Computer architecture (6 credits)

This course aims at providing detailed understanding about how modern high performance microprocessors are designed and the rationales behind their different design principles. The emphasis is on the relationship between the microarchitecture and the system software (e.g., operating system and compiler). Contemporary processors such as MIPS and Pentium are used as practical cases to illustrate the different design principles. Pipelining microarchitecture and some elementary concepts on instruction level parallelism (ILP) are discussed. Compiler support and optimizations for exploiting the parallel processing capability provided by the microarchitecture are discussed.

Specifically, the course covers the following topics in contemporary computer architecture design: 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; and parallel processors.

Pre-requisite: ELEC1401 Computer organization and microprocessors

Mutually exclusive with: CSIS0231 Computer architecture
Assessment: 40% continuous assessment, 60% examination

ELEC2403 Computer networks (6 credits)

This course aims at providing detailed understanding of the basic principles of computer and data communications, and the essential functions and protocols for co-ordinated exchange of data through computer networks. It covers data communication networks and facilities; network structures; protocols; local area networks; wide area networks; network trends; data security.

Mutually exclusive with: ELEC2402, ELEC2701 & CSIS0234
Assessment: 20% continuous assessment, 80% examination

ELEC2501 Software engineering & operating systems (6 credits)

This course aims at providing students the fundamental knowledge of software engineering practices and system software for development and execution of computer software. The first part of this course presents software engineering methodologies for the development of quality, cost-effective, and maintainable software. Software is dealt with as an engineered product that requires planning, analysis, design, implementation, testing and maintenance. The object is to provide a concise presentation of each step in the engineering process. The second part of the course aims at providing fundamental concepts and ideas of operating systems, and the underlying principles of computer resource management by system software.

Specifically this course covers the following topics in Software Engineering and Operating Systems: software engineering process; principles that guide practice; requirements and modeling; software design concepts; software architectural and detail design methodologies; software testing strategies; software maintenance; software quality; software documentation.
Software development systems: assembler, linker and loader, compiler; basic operating system and process concepts; concurrent processes; processor management; primary and secondary memory management; file and database systems.

Mutually exclusive with CSIS0230 & CSIS0297
Assessment: 15% practical work, 85% examination

ELEC2601 Human computer interaction (6 credits)

This course aims at providing fundamental knowledge on the principles of Human Computer Interaction (HCI): Design and Programming, and serves as the first course to other more advanced computer courses. In order to bring out the essential principles, a simple processor is used for illustration and is studied in detail, and on top of it, more general systems are also introduced.

Specifically, the course covers the following topics: 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.

Pre-requisite: ELEC1501 Computer programming and data structures or ELEC1502 Object oriented programming and data structures or ELEC1503 Object-oriented programming and data structures or CSIS0396 Object-oriented programming and Java
Assessment: 40% continuous assessment, 60% examination

ELEC2603 Systems and network programming (6 credits)

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. It covers both classical UNIX multiprogramming software development and object oriented system implementations for networked applications.

Specifically, the course covers the following topics: Unix system calls, file I/O, Unix system data; process control, signals; daemon processes; threading approaches; concurrency control; socket programming; I/O multiplexing; IPv4 and IPv6 interoperability; broadcasting; multicasting; concurrent network servers; the 3-tier model; middlewares and their classification; distributed objects; Java sockets; multicasting in Java; the Java distributed computing platform including the Remote Method Invocation (RMI), the Java Servlets; the JavaServer Pages (JSP); the Extensible Markup Language (XML); the Java peer-to-peer (P2P) technologies.

Pre-requisite: ELEC1501 Computer programming and data structures or ELEC1502 Object oriented programming and data structures or ELEC1503 Object-oriented programming and data structures or (CSIS1119 Introduction to data structures and algorithms and CSIS0396 Object-oriented programming and Java)
Mutually exclusive with: ELEC3628 & CSIS0402
Assessment: 40% continuous assessment, 60% examination

ELEC2814 Engineering management and society (6 credits)

The aims of ELEC2814 Engineering Management and Society are to develop basic understanding of organization and management skills, professional ethics and legal foundation for the engineering discipline. Topics on engineering organization, project management and managerial skills, decision making processes, contingency and crisis management, leadership, corporate culture and philanthropy will be discussed. In order to provide a clear and right insight for engineering students to interact and contribute to the society, topics related to professional conduct, social responsibility, sustainability and safety issues, technology and environment, professional ethics are included. For the legal foundation, topics such as contract, intellectual property, tort, professional negligence and related law issues are discussed.

Assessment: 50% continuous assessment, 50% examination

ELEC2815 Economics, finance and marketing for engineers (6 credits)

The aims of ELEC2815 Economics, finance and marketing for engineers are to develop basic understanding of economics, finance and marketing for the engineering discipline. The syllabus includes macroeconomics, microeconomics, value chain, financial management, cost and profit, shares and bonds, accounting concepts and financial statements, cash flow, rate of return; risk management, investment portfolio, technical analysis; marketing management, marketing mix, marketing media, marketing plan, and business ethics.

Assessment: 30% continuous assessment, 70% examination

ELEC2816 Numerical methods and optimization (6 credits)

This course aims to provide the students with the fundamental concepts of optimization theory. In particular, the course will introduce and analyze basic classes of optimization problems as well as optimization algorithms, and will show applications in engineering and other fields. Student will learn how to formulate, analyze, and solve typical optimization problems.

Mutually exclusive with: CSIS0407
Assessment: 20% continuous assessment, 80% examination

ELEC2817 Probability and statistics in engineering (6 credits)

The objective of the course is to introduce applied probability and statistics at the intermediate level. The concepts of random variables, mathematical expectation, functions of random variables, moment generating functions and characteristics functions, fundamental sampling distributions, sample estimation problems, hypothesis testing, and linear regression are discussed. Applications of the concepts to various disciplines in engineering are also illustrated.

At the end of this course, students will be able to:
1. Gain understanding of concepts in applied probability and statistics;
2. Illustrate the applications of concepts to various disciplines in engineering;
3. Explore the foundations of analytical and critical thinking, academic research, and preparing students some mathematical techniques for conducting academic research;
4. Acquire learning strategies that will enhance their learning experience;
5. Explore some topics as a showcase over the course of the Engineering degree.

Assessment: 30% continuous assessment, 70% examination

ELEC2818 Integrated design project (6 credits)

This course aims at providing students in small teams an opportunity to apply and integrate their knowledge in electrical and electronic engineering courses, as well as project management, to implement a practical system. At the beginning of the course, students are guided to acquire skills in using hardware and software development tools through a sequence of laboratory exercises. Students then begin working on the project. Regular lecture and tutorial sessions are conducted to help students throughout the process.

Besides implementing the system to the required project specification, students are encouraged to extend the project with their own inputs.

Assessment: 100% continuous assessment

Level Three

ELEC3104 Electric vehicle technology (6 credits)

This course aims at providing sound understanding of various electric vehicle (EV) technologies. The emphasis is on fiver key areas of EVs – System integration, propulsion systems, energy sources, auxiliaries and impacts.
Specifically, the course covers the following topics: system integration including battery EVs, hybrid EVs and fuel cell EVs; propulsion systems including single-motor and multiple-motor drives, geared and gearless in-wheel motors and hybrid powertrains; energy sources including batteries, fuel cells, ultracapacitors and ultrahigh-speed flywheels; auxiliaries including battery chargers and indicators, temperature control units, power steering units, auxiliary power supplies and regenerative braking units; impacts including power system, environment and economy.

Assessment: 40% continuous assessment, 60% examination

ELEC3105 Building services- electrical services (6 credits)

The aim of this course is to provide fundamental knowledge of building services design and installation, on system and component levels. It elaborates on the Heating, Ventilation and Air-conditioning System, Plumbing & Drainage System, Fire Services System, Lighting Installation, Vertical Transportation System and Building Automation System. Various building services systems are discussed covered engineering fundamentals, system components, design and statutory requirements, system integration as well as practical familiarization of systems.

At the end of this course, students who fulfill the requirements of this course will be able to:

1. describe and understand the construction and functions of building services installation for building to operate;
2. explain different building services installation forming part of a building and its connection between each others;
3. understand the lighting installation;
4. understand the vertical transportation system;
5. understand the plumbing and drainage systems;
6. understand the fire services system;
7. understand the heating, ventilation and air-conditioning system;
8. understand the building automation system.

Assessment: 20% continuous assessment, 80% examination

ELEC3106 Building services- electrical installations (6 credits)

To develop classmates' potential in selecting electrical equipment, designing electrical installation, and making them professional in achieving optimal benefits in building services without compromising safety.

At the end of this course, students who fulfill the requirements of this course will be able to:

1. describe and understand the electrical installation as a system; and the major components that build up the installations;
2. be aware of the potential hazards of electrical installations, yet be able to prevent those hazards;
3. select proper equipment and protective devices to facilitate expected functions of the electrical installations;
4. be competent in electrical safety and codes of practice;
5. design schematically a safe electrical installation for a typical high-rise building;
6. analyse data and carry out relevant calculations in respect of aforementioned aims;
7. demonstrate knowledge, problem solving skill, and relevant management for health and safety.

Assessment: 20% continuous assessment, 80% examination

ELEC3107 Power system analysis and control (6 credits)

The aim of this course is to provide fundamental knowledge of electric power in power system analysis and control. It elaborates on the power flow analysis, fault analysis, economic dispatch algorithms, and small/large disturbance stability. Power system component models and network matrices are included.

At the end of this course, students who fulfill the requirements of this course will be able to:

1. describe and understand the structure and functions of electrical power systems;
2. understand electrical power network modeling and algorithms for network matrices construction;
3. understand the basic concepts of steady-state analysis for power systems and some algorithms for power flow analysis;
4. have a general grasp on the basic concepts of power system operation and understand some algorithms for power system economic dispatch;
5. understand the basic concepts and methods of fault analysis for power systems;
6. understand the basic concepts and methods of stability analysis for power systems.

Pre-requisite: ELEC2101 Power transmission and distribution
Assessment: 10% continuous assessment, 90% examination

ELEC3111 Electric railway systems (6 credits)

The aim of this course is to provide fundamental knowledge of electric power in railways, on system and component levels. It elaborates on the power supply systems, rolling-stocks, traction systems, supporting systems, automatic train operation, control, and protection systems. Magnetic levitation systems are discussed. Topics on high-speed rail networks, railway engineering management, health and safety are included.

At the end of this course, students who fulfill the requirements of this course will be able to:

1. describe and understand the construction and functions of electrical installations and the prerequisites that apply in the operation of installations;

2. explain different electrical installations that are parts of the operation of electric railway traffic with respect to both function and the essential connections with the parts of the installation;
3. understand the basic concepts of power supply systems for railways;
4. understand the rolling-stocks, traction systems and supporting systems of electric railway systems;
5. understand the automatic train operation, control, and protection systems;
6. have a general grasp on the basic concepts of magnetic levitation systems;
7. demonstrate knowledge, understanding of high-speed rail networks and railway engineering management, health and safety.

Pre-requisite: ELEC1103 Electrical technology or ELEC1107 Electrical energy technology

Assessment: 25% continuous assessment, 75% examination

ELEC3112 Power system protection and switchgear (6 credits)

The aim of this course is to provide fundamental knowledge of electric power in power system protection and switchgear. It elaborates on protective relays, protection transformer, transmission line protection, rotating machine protection, substation protection. Principles of over-voltages and electrical breakdown are discussed. Circuit breaker technologies, switchgears and their protection schemes, and auto-recloser and sectionalizer are included.

At the end of this course, students who fulfill the requirements of this course will be able to:

1. grasp and understand the basic principles and functions of protection relays and switchgears;
2. have a general grasp on the basic concepts of protection transformer;
3. understand the basic concepts of over-current protection, distance protection, pilot protection of transmission lines;
4. understand the basic concepts of rotating machinery protection;
5. understand the basic concepts of substation protection;
6. have a general grasp on the basic concepts of electric arc and switching overvoltage;
7. understand the general principles of circuit breaker technologies;
8. have a general grasp on the switchgear technologies;
9. understand the basic concepts of auto-recloser and sectionalizer for power systems.

Pre-requisite: ELEC2101 Power transmission and distribution
Assessment: 10% continuous assessment, 90% examination

ELEC3201 Communication systems (6 credits)

This course aims at providing detailed understanding of the basic principles of analogue and digital communication systems in the presence of noise with focus on basic issues relating to system design. It covers spectral analysis; random signal theory; information theory; noise in analogue systems; digital transmission through AWGN channels; digital carrier-modulation schemes; DM and PCM, error control coding.

Pre-requisite: ELEC2202 Communications engineering
Assessment: 10% continuous assessment, 90% examination

ELEC3203 Cellular radio and personal communications systems (6 credits)

This course is an introduction to cellular radio communications systems taught at a level appropriate for third-year undergraduates in electrical and electronic engineering. It is aimed at providing a general understanding of the basic theory and design of wireless communications.

The following topics will be covered in the course: cellular-systems concepts, advanced digital modulations, digital cellular technologies, code-division-multiple access, GSM system, IS-95 CDMA system, 3G mobile systems, TD-SCDMA system, and safety issues on non-ionizing radiation from wireless systems.

At the end of the course, students should have gained an understanding of the concepts of cellular radio communications systems and analyses the advantages and disadvantages of different mobile systems.

Pre-requisite: ELEC2202 Communications engineering
Mutually exclusive with: CSIS0328, ELEC6071
Assessment: 30% continuous assessment, 70% examination

ELEC3206 Control systems (6 credits)

This course provides the students with a good understanding of feedback control systems. The fundamental concepts, mathematics and techniques for the analysis of control systems will be given. Both analogue and digital control systems will be covered as well as a basic understanding of fuzzy control systems. The course will also provide many examples of feedback control systems in different domains of engineering.

This course will cover many important topics in the field of control systems. By the end of this course, student should possess a firm grounding in the concepts and techniques of feedback control systems. The student should be able to apply the acquired knowledge for the analysis of control systems, as well as to carry out design of feedback systems.

Pre-requisite: ELEC2205 Control and instrumentation
Assessment: 20% practical work, 10% continuous assessment, 70% examination

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ELEC3221 Microwave engineering (6 credits)

This course focuses on the fundamental concepts necessary for real world design of microwave circuits and components. It aims to establish necessary design methodologies and introduce essential tools for engineering development related but not limited to microwave engineering. Using Maxwell's equations as the basis, this course will introduce the transmission line theory, network parameters, Smith chart, and thereby developed matching techniques. Waveguide modes will be derived from wave equations to establish the important waveguide concept. Important microwave circuit and component, such as couplers and filters, will be discussed based on learned technologies in the course. Antenna and microwave system analysis will be briefly discussed at the end of the course to establish a complete microwave transceiver system which could serve as the foundation of broad applications.

Pre-requisite: ELEC1201 Fundamental electromagnetic theory or ELEC1202 Introduction to electromagnetic waves and fields or ELEC2206 Electromagnetic waves or ELEC2207 Engineering electromagnetism
Assessment: 60% continuous assessment, 40% examination

ELEC3222 Robotics (6 credits)

The development of robotics has evolved from early programmable industrial arms or manipulators (consisting of a driven mechanical structure) to a diverse range of objects that may generally be referred to as robots. As a result, robotics has become a highly interdisciplinary subject involving different kinds of technologies.
The first part of the course is aimed at providing a general understanding of the fundamental principles of robot manipulators covering robot kinematics, robot dynamics and robot control. The second part of the course will venture into selected topics in robotics (such as robot vision, AI in robotics etc.) and then consider robot applications to different areas (such as humanoid robot, medical and surgical robots, etc.).
At the end of the course, students should have gained an understanding in the principles and mathematical techniques that underlie the traditional manipulator as a basic building block of different kinds of robots, and also an appreciation of how other technologies can be applied to enhance the capabilities and scope of applications of robots.

Pre-requisite: ELEC2205 Control and instrumentation
Assessment: 20% continuous assessment, 80% examination

ELEC3223 Optical networking devices and technologies (6 credits)

The course aims at providing detailed understanding about the optical networks. Students will learn optical components for building optical networks such as optical waveguides, fibers, variety of light sources, passive and active components, wavelength division multiplixer, transmitters and receivers. Students will gain the knowledge in the operation principles and the applications of optical components. With the knowledge, the requirement and knowhow to build the network from optical components are discussed. Some commercial devices and demons units are also discussed for gaining the practical knowledge.

Pre-requisite: ELEC2206 Electromagnetic waves or ELEC2207 Engineering electromagnetism
Assessment: 20% continuous assessment, 80% examination

ELEC3224 Multimedia signals and applications (6 credits)

This course provides an introduction to the basic concept of multimedia applications with particular emphasis on media compression standards/formats for speech, audio, image and videos. Specifically, the course will cover basic concept and terminology in multimedia applications. Furthermore, the course will also discuss in detail about digital representations of important media such as speech, audio, images and videos. Finally, the course will include in-depth coverage of digital media formats, compression methods and standards.

Pre-requisite: ELEC2201 Signal and Linear Systems
Mutually exclusive with: CSIS0315
Assessment: 30% continuous assessment, 70% examination

ELEC3225 Digital image processing (6 credits)

This course aims to help students gain a firm understanding in digital image processing and master its methods and techniques. It intends to build upon the knowledge students acquire in Signals and Linear Systems (ELEC2201) and extends it.

The course in general begins with the basics in 2D signals and systems, visual perception, image sensing and acquisition. It then proceeds to study various intensity transformations, histogram processing techniques, filters in both spatial and frequency domains, and how they can be used to enhance the quality of digital images. Next, it considers reconstruction and restoration of images due to degradations, how image quality is measured and color image processing. It then moves onto Image compression, which plays a pivotal role today's Internet and multimedia applications. A core area of this course is to learn how to segment features/patterns from images. This includes using various methods to extract point, line, edge and regions. The course concludes by considering some typical image processing applications.

Specifically, it covers the areas of image acquisition and imaging systems, 2D continuous- time and discrete- time signals and systems, time and frequency representations, sampling and quantization issues, image filtering, convolution and enhancement, image reconstruction and restoration, color image processing, image quality evaluation, image transform and compression, applications and computer implementations.

Pre-requisite: ELEC2201 Signal and Linear Systems
Mutually exclusive with: ELEC3505
Assessment: 40% continuous assessment, 60% examination

ELEC3226 Embedded systems (6 credits)

This course introduces the design concepts of modern embedded systems, with an emphasis on the integration of hardware and software. Topics include: hardware/software interface design and implementation, the role of operating system in embedded systems, embedded application development and the tradeoffs involving the use of hardware accelerators. A key component of the course is to design and implement a real-world embedded system using field-programmable gate array (FPGA) as a platform.

Pre-requisite: ELEC1401 Computer organization and microprocessors & ELEC2302 Digital system design
Assessment: 40% practical work, 60% continuous assessment

ELEC3227 Information theory and coding (6 credits)

This course aims at providing the basic principles of information theory and coding techniques for compact data representation, error control and data secrecy. The fundamental concepts of information theory - entropy, mutual information, information channel, channel capacity, Shannon's theorems are introduced. Various techniques for lossless source coding are examined, including Huffman code, arithmetic code, dictionary code and transform coding. Analysis and design of error-control channel codes are considered, covering linear block code, cyclic code, BCH and RS codes, and convolution code. Finally, private-key and public-key encryption systems are studied.

Mutually exclusive with: ELEC3204
Assessment: 30% continuous assessment, 70% examination

ELEC3303 Design of digital integrated circuits (6 credits)

The aim of this course is to provide students with more advanced knowledge on analogue electronic circuits.

Pre-requisite: ELEC2305 Electronic materials and devices or ELEC1304 Electronic devices or ELEC2306 Electronic devices and circuits
Mutually exclusive with: ELEC2303
Assessment: 50% continuous assessment, 50% examination

ELEC3402 Advanced networking technologies (6 credits)

This course takes a systematic approach to study the various components that form the infrastructure of the next generation Internet. Topics include optical switching technologies, survivable optical networks, IEEE 802.11, wireless mesh networks, mobile ad hoc networks, wireless sensor networks, high performance switches and routers, advanced topics on congestion and flow control, traffic management.

- To provide a comprehensive coverage of key technologies in optical and wireless networking;
- To study fundamental problems and approach in providing QoS in the next generation Internet.

Pre-requisite: ELEC2402 Computer communications or ELEC2403 Computer networks or ELEC2701 Internet technologies and applications or CSIS0234 Computer and communication networks
Assessment: 40% continuous assessment, 60% examination

ELEC3503 Fuzzy systems and neural networks (6 credits)

This course provides a general introduction to fuzzy logic and neural network. The fundamental concepts and techniques in the general field of fuzzy systems and neural networks will be given. The course will also provide examples on the application of fuzzy logic and neural network to a variety of engineering problems.

This course will cover two important topics in the field of Artificial Intelligence. By the end of this course, student should possess a firm grounding in the concepts and techniques of fuzzy logic and neural network. The student should be able to apply the acquired knowledge to the development of intelligent systems or to the exploration of research problems.

Assessment: 30% continuous assessment, 70% examination

ELEC3612 VLSI design principles (6 credits)

To give a detailed treatment on the principles and methods for designing large-scale digital integrated circuits.

The course content ranges from low level fabrics like MOSFET (metal-oxide-semiconductor field-effect transistor) basics, logic gate families, layout and fabrication practices, to higher level system knowledge like finite state machine, memory, adders, design optimization and tests; and eventually extends into basic

analog circuit blocks like CMOS (complementary metal-oxide-semiconductor) transistor amplifiers and opamps etc.

The course also includes a Verilog design project that covers the typical VLSI design flow using the most popular electronic design automation (EDA) tools.

Assessment: 50% continuous assessment, 50% examination

ELEC3629 Parallel computing (6 credits)

This course aims at providing detailed understanding about parallel computing architecture and parallel programming techniques. The course starts with a survey of multiprocessor architectures including multi-core processors, symmetric multiprocessors, high-performance interconnection networks, clusters, and computing Grids. This is followed by quantitative discussions about software development challenges such as synchronization issues, cache coherency, memory consistency, performance scaling, and high speed I/O. The final group of topics mainly focus on parallel programming. Specifically, parallel programming models such as PRAM, LogP, BSP, etc. are introduced. Using variants of the MPI language (e.g., OpenMP), different parallel programming techniques are discussed. Example algorithms including searching, sorting, matrix arithmetic, etc. are used.

Pre-requisite: ELEC2401
Assessment: 40% continuous assessment, 60% examination

ELEC3630 Distributed computing systems (6 credits)

This course aims at providing detailed understanding about the concept and design of distributed computing systems. The emphasis is on distributed protocol design and analysis. Various existing distributed systems, such as the Internet, are discussed. Network programming is introduced for students to develop their own distributed applications.

Pre-requisite: (ELEC2501 Software engineering and operating systems or CSIS0230 Principles of operating systems) and (ELEC2402 Computer communications or ELEC2403 Computer networks or CSIS0234 Computer and communication networks)
Mutually exclusive with: ELEC3622
Assessment: 40% continuous assessment, 60% examination

ELEC3631 Computer network security (6 credits)

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.).

Pre-requisite: ELEC2402 Computer communications or ELEC2403 Computer networks or CSIS0234 Computer and communication networks (mutually exclusive with CSIS0327 Computer and network security)

Assessment: 40% continuous assessment, 60% examination

ELEC3705 Queuing theory (6 credits)

The objective of the course is to introduce the basic principles of queueing theory. The concepts of random processes, birth-death queueing systems, Markovian queues in equilibrium, and simulation techniques are discussed. Applications of these concepts are also illustrated.

At the end of this course, students will be able to:
1. Gain understanding of concepts in queueing theory;
2. Illustrate the applications of concepts to engineering;
3. Explore the foundations of analytical and critical thinking, academic research, and preparing students some mathematical techniques for conducting academic research;
4. Acquire learning strategies that will enhance their learning experience;
5. Explore some practical examples as a showcase over the course of the Engineering degree.

Pre-requisite: ELEC2811 or ELEC2817 Probability and Statistics in Engineering
Assessment: 30% continuous assessment, 70% examination

ELEC3818 Senior design project (12 credits)

This course aims at providing the very fundamental training in conducting a Technical Project prior to leaving the University.
The essence of Technical Project is for student to re-enforce and consolidate all the learned engineering skill and theory in the school into a real-life practical technical project. The aims of the Project are not limited to technical achievement, but also reflected on self-awareness, self-management and probing the limitation of oneself.

Depending on each Technical Project offered by teaching staff, students are usually required to conduct the Project Requirement and Design, Implementation and Evaluation, Report and Presentation on the selected project. Students are encouraged to explore and lean his/her own direction of the Project over the year during which project supervisor shall provide assistance and aids along each Project phase with the students.

Students are required to have meeting and discussion with his/her supervisors on a regular basis, usually every week or every fortnight. Mid-term Review will be held with both the supervisors and the 2nd examiner in order review the student progress. The final assessment will be based Project Report, Presentation and Demonstration.

Assessment: 100% continuous assessment

INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT

SYLLABUS
(Applicable to students admitted in the academic year 2012-13)

Definitions and Terminology

Each course offered by the Department of Industrial and Manufacturing Systems Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses includes Level Two and Three courses. The course level 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 Discipline Elective course refers to any optional subject offered by the Department, provided that it does not overlap significantly with the other courses that the student has already enrolled in. An Elective Courses is a course offered by other departments under the Faculty of Engineering, or by other faculties.

The Curriculum

The curriculum comprises 180 credits of courses as follows:

(a) 96 credits of Core Engineering courses of the curriculum, including:
  (i) Integrative project (6 credits)
  (ii) Technical project (12 credits)
  (iii) either (1) ENGG1002 Computer programming and applications (6 credits) or ENGG1016 Computer programming and applications I (6 credits)
  (iv) either (1) ENGG1003 Mathematics I (6 credits) or
  (2) ENGG1004 Mathematics IA (3 credits) and IMSE1018 Mathematics (IMSE) (3 credits)

(b) 51 credits of Elective courses, including:
  (i) Discipline Elective courses (36 credits)
  (ii) General Engineering Courses (12 credits)
  (iii) Elective course (3 credits)

(c) 9 credits of Language Enhancement courses, comprising:
  (i) Professional and technical written communication for engineers (3 credits)[22]
  (ii) Professional and technical oral communication for engineers (3 credits)
  (iii) Practical Chinese language course for engineering students (3 credits)[23]

(d) Common Core Curriculum Courses (selecting not more than one course from each Area of Inquiry)
(12 credits)

(e) Engineering training (6 credits)

(f) Internship (6 credits)

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[22] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1509

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

To complete the curriculum, a candidate must enroll in all the courses specified in the curriculum, and must pass the courses listed under (a) to (f) for a combination totaling to 180 credits.

Degree Classification

All the 180 credits under the curriculum will be counted towards degree classification, according to the following:

(a) 9 credits of Language Enhancement courses;
(b) 96 credits of Core Engineering courses;
(c) 12 credits of Engineering training and Internship;
(d) 12 credits of Common Core Courses;
(e) The remaining courses with the best results, including at least 36 credits of Discipline Elective courses, 12 credits of General Engineering Courses and 3 credits of Elective course.

Order of Study

Order of study is dictated by the prerequisite 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 Engineering courses should be taken before Discipline Elective courses.

First Year

Loading

The normal loading is 60 credits of Level One courses, with 30 credits of courses in each semester. Students are required to do Engineering Training (6 credits / Major Course Level: Introductory) within the 60 credits of courses.

Courses

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

(a) Core Engineering courses (24 credits)
(b) 2 Elective courses from the General Engineering Courses (12 credits)
(c) 3 Language Enhancement courses (9 credits) consisting of
    (i) 2 English Communications courses (6 credits)
    (ii) 1 Chinese Language course (3 credits)
(d) 1 course from the Common Core Curriculum (6 credits)
(e) 1 elective course offered by other departments of the Faculty of Engineering or other faculties (3 credits)
(f) Engineering Training (6 credits)

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1003	Introduction to business and management	6	1	Introductory
IMSE1009	Fundamentals of engineering design	6	1	Introductory

ENGG1003	Mathematics I	6	1	N/A
OR				
ENGG1004	Mathematics IA	3	1	N/A
IMSE1018	Mathematics (IMSE)	3	1	Introductory
ENGG1002	Computer programming and applications	6	1	N/A
OR				
ENGG1016	Computer programming and applications I	6	1&2	N/A
Credits required: 24				

General Engineering Courses			
Code	Title	Credits	Length (Sem)
ENGG1009	Industrial management and logistics	6	1
ENGG1006	Engineering for sustainable development	6	1
ENGG1007	Foundations of computer science	6	1
ENGG1011	Introduction to biomedical engineering	6	1
ENGG1015	Introduction to electrical and electronic engineering	6	1
ENGG1018	Introduction to mechanical engineering	6	1
Select 2 courses from the above General Engineering Courses; credits required: 12			

Language Enhancement Courses			
Code	Title	Credits	Length (Sem)
CAES1509	Professional and technical written communication for engineers[24]	3	1
CAES1515	Professional and technical oral communication for engineers	3	1
CENG1001	Practical Chinese language course for engineering students[25]	3	1
Credits required: 9			

Common Core / Elective Courses			
Code	Title	Credits	Length (Sem)
	Common Core Course	6	1
	(Any Elective course)	3	1
Credits required: 9			

Training			
Code	Title	Credits	Length (Sem)
IMSE1021	Engineering Training	6	Summer
Credits required: 6			

[24] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1509

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

Second Year

Loading

The normal loading for a student is 60 credits of Level Two courses, with 30 credits of courses in each semester. Students are required to do Internship (6 credits / Major Course Level: Advanced) within the 60 credits of courses.

Courses

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

(a) 7 Core Engineering courses (42 credits)
(b) 1 Discipline Elective course (6 credits)
(c) 1 course from the Common Core Curriculum (6 credits)
(d) Internship (6 credits)

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE2005	Managerial accounting and finance	6	1	Advanced
IMSE2006	Manufacturing technology	6	1	Advanced
IMSE2008	Operational research techniques	6	1	Advanced
IMSE2009	Quality management	6	1	Advanced
IMSE2024	Mathematics II	6	1	Advanced
IMSE2025	Integrative studies (IE practice)	6	1	Advanced
IMSE2026	Engineers in society	6	1	Advanced
Credits required: 42				

Discipline Elective Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
Select 1 course from the list of Discipline Elective Courses; credits required: 6				

Common Core Course			
Code	Title	Credits	Length (Sem)
	Common Core Course	6	1
Credits required: 12			

Training			
Code	Title	Credits	Length (Sem)
IMSE2029	Internship	6	Summer
Credits required: 6			

Third Year

Loading

The normal loading for a student is 60 credits of Level Three courses, with 30 credits of courses in each semester.

Courses

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

(a) 4 Core Engineering courses (30 credits), comprising:
  (i) IMSE3001 Computer integrated manufacturing (6 credits)
  (ii) Technical Project - IMSE3014 Project (12 credits)
  (iii) Integrative project - IMSE3015 Industrial systems integration (6 credits)
  (iv) IMSE3016 Operations planning and controls (6 credits)

(b) A combination of Discipline Elective courses totaling to 30 credits

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE3001	Computer integrated manufacturing	6	1	Advanced
IMSE3014	Project	12	2	Advanced
IMSE3015	Industrial systems integration	6	2	Advanced
IMSE3016	Operations planning and control	6	1	Advanced
Credits required: 30				

Discipline Elective Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
Select 5 courses from the list of Discipline Elective courses: credits required: 30				
Credits required: 30				

List of Discipline Elective Courses (IETM)

Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1012	Engineering technology	6	1	Introductory
IMSE1013	Introduction to information systems	6	1	Introductory
IMSE1014	Product development	6	1	Introductory
IMSE1017	Engineering systems analysis	6	1	Introductory
IMSE1019	Industrial systems modeling and simulation	6	1	Introductory
IMSE0201	Supply chain design and development	6	1	Advanced
IMSE2003	Industrial automation	6	1	Advanced
IMSE2016	Internet technology for e-commerce	6	1	Advanced
IMSE2018	Industrial organisation and management	6	1	Advanced
IMSE2019	Stochastic decision systems	6	1	Advanced
IMSE2027	Facilities planning and design	6	1	Advanced

IMSE2028	Human factors engineering	6	1	Advanced
IMSE3002	Engineering project management	6	1	Advanced
IMSE3010	Financial engineering	6	1	Advanced
IMSE3018	Advanced manufacturing technology	6	1	Advanced
IMSE3019	Digital enterprises and e-commerce	6	1	Advanced
IMSE3020	Technology marketing	6	1	Advanced
IMSE3021	Strategic management of business and technology	6	1	Advanced
IMSE3028	Innovation and entrepreneurship	6	1	Advanced
IMSE3029	Manufacturing system analysis and design	6	1	Advanced
Credits required:				
Level 1:	Students have an option to choose one of the above courses to fulfill the 3-credit elective course requirement.			
Level 2:	6			
Level 3:	30			

Summary of the prerequisite relationship between First, Second and Third Year courses

First Year

Code	Title	Prerequisite
Core Engineering courses		
IMSE1003	Introduction to business and management	None
IMSE1009	Fundamentals of engineering design	None
ENGG1003	Mathematics I	None
OR		
ENGG1004 IMSE1018	Mathematics IA Mathematics (IMSE)	None None
ENGG1002	Computer programming and applications	None
OR		
ENGG1016	Computer programming and applications I	None
General Engineering Courses		
ENGG1009	Industrial management and logistics	None
ENGG1006	Engineering for sustainable development	None
ENGG1007	Foundations of computer science	None
ENGG1011	Introduction to biomedical engineering	None
ENGG1015	Introduction to electrical and electronic engineering	None
ENGG1018	Introduction to mechanical engineering	None

Second Year

Code	Title	Prerequisite
Core Engineering Courses		
IMSE2005	Managerial accounting and finance	IMSE1003 Introduction to business management

IMSE2006	Manufacturing technology	None
IMSE2008	Operational research techniques	ENGG1003 Mathematics I or ENGG1004 Mathematics IA *and* IMSE1018 Mathematics (IMSE)
IMSE2009	Quality management	None
IMSE2024	Mathematics II	ENGG1003 Mathematics I or ENGG1004 Mathematics IA *and* IMSE1018 Mathematics (IMSE)
IMSE2025	Integrative studies (IE practice)	None
IMSE2026	Engineers in society	None
Discipline Elective Courses (6 credits)		
IMSE1012	Engineering technology	None
IMSE1013	Introduction to information systems	None
IMSE1014	Product development	None
IMSE1017	Engineering systems analysis	None
IMSE1019	Industrial systems modeling and simulation	None
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)
IMSE2016	Internet technology for e-commerce	None
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)
IMSE2027	Facilities planning and design	
IMSE2028	Human factors engineering	None
IMSE3002	Engineering project management	Co-requisite: IMSE2008 Operational research techniques
IMSE3010	Financial engineering	IMSE2005 Managerial accounting and finance
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 or ENGG1013 Computer programming and applications IA and ENGG1014 Computer programming and applications IB or ENGG1016 Computer programming and applications I
IMSE3020	Technology marketing	IMSE1003 Introduction to business and management
IMSE3021	Strategic management of business and technology	IMSE1003 Introduction to business and management
IMSE3028	Innovation and entrepreneurship	None
IMSE3029	Manufacturing system analysis and design	IMSE2008 Operational research techniques

Third Year

Code	Title	Prerequisite
Core Engineering Courses		
IMSE3001	Computer integrated manufacturing	IMSE1009 Fundamentals of engineering design
IMSE3014	Project	None
IMSE3015	Industrial systems integration	None
IMSE3016	Operations planning and control	IMSE2008 Operational research techniques
Discipline Elective Courses (30 credits)		
IMSE1012	Engineering technology	None
IMSE1013	Introduction to information systems	None
IMSE1014	Product development	None
IMSE1017	Engineering systems analysis	None
IMSE1019	Industrial systems modeling and simulation	None
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)
IMSE2016	Internet technology for e-commerce	None
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)
IMSE2027	Facilities planning and design	
IMSE2028	Human factors engineering	None
IMSE3002	Engineering project management	Co-requisite: IMSE2008 Operational research techniques
IMSE3010	Financial engineering	IMSE2005 Managerial accounting and finance
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 or ENGG1013 Computer programming and applications IA and ENGG1014 Computer programming and applications IB or ENGG1016 Computer programming and applications I
IMSE3020	Technology marketing	IMSE1003 Introduction to business and management
IMSE3021	Strategic management of business and technology	IMSE1003 Introduction to business and management
IMSE3028	Innovation and entrepreneurship	None
IMSE3029	Manufacturing system analysis and design	IMSE2008 Operational research techniques

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COURSE DESCRIPTIONS

Level One

A. Core Engineering Courses

IMSE1003 Introduction to business and management (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE1009 Fundamentals of engineering design (6 credits)

Visualization of technical information; application of CAD software to prepare product design models and drawings; principles of engineering graphics: orthographic projections, isometric views, auxiliary views, sectioning, dimensioning and tolerancing; assembly modelling and drawing; design of components; general principles of product and tool design.

Assessment: 100% continuous assessment

IMSE1018 Mathematics (IMSE) (3 credits)

Probability laws, random variables, probability distributions and expectation; optimization of functions of two or more variables; numerical methods in root-finding, approximation and integration of single variable functions.

Assessment: 10% continuous assessment, 90% examination

B. Language Enhancement Courses

CAES1509 Professional and technical written communication for engineers (3 credits)

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, analyzing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

Assessment: 100% continuous assessment

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Professional Chinese language course for engineering students (3 credits)

Please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

C. Common Core Course (6 credits)

D. Elective Course (3 credits)

E. Engineering Training

IMSE1021 Engineering training (6 credits)

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

Assessment: 100% practical work

Level Two

A1. Core Engineering Courses

IMSE2005 Managerial accounting and finance (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE2006 Manufacturing technology (6 credits)

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.

Assessment: 25% continuous assessment and 75% examination

IMSE2008 Operational research techniques (6 credits)

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)
Assessment: 10% continuous assessment, 90% examination

IMSE2009 Quality management (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE2024 Mathematics II (6 credits)

Probability laws, random variables, probability distributions and expectation; some important discrete and continuous distributions; random samples and sampling distributions; parameter estimation and hypothesis testing; design of experiments and analysis of variance; regression analysis; non-parametric methods; statistical quality control and reliability engineering; introduction to stochastic processes and Markov chains; application examples in industrial and logistics engineering.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
Assessment: 10% continuous assessment, 90% examination

IMSE2025 Integrative studies (IE practice) (6 credits)

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.

The major element of the module is a group project on the product and manufacturing system design of a manufactured product. The group project is to integrate the applications of various topics including: project management; product life-cycle management; manufacturing logistics; cost accounting; scheduling; process planning and workflow; human factors; distribution and marketing.

Assessment: 100% continuous assessment

IMSE2026 Engineers in society (6 credits)

Economic, industrial and social context of engineering; responsibilities of professional engineers, the legal, environmental, economical and ethical roles of engineers in society, judgment and decision process based on non-technical aspects such as financial, environmental and cultural considerations, meeting with

professional engineers from the industrial and logistics sectors.

Assessment: 30% continuous assessment, 70% examination

A2. Discipline Elective Courses

IMSE1012 Engineering technology (6 credits)

Kinematics and dynamics of rigid bodies, centre of percussion, design for reduction of impact stress; analysis, simulation and applications of 4-bar mechanisms, velocity diagram and instantaneous centre of rotation; Geneva mechanism, gear train and motion transmission; analysis and applications of simple harmonic motion, damping of vibrations; fundamental electrical circuit analysis; alternating current electricity, AC circuits sand phasors.

Assessment: 20% continuous assessment, 80% examination

IMSE1013 Introduction to information systems (6 credits)

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

Assessment: 40% continuous assessment, 60% examination

IMSE1014 Product development (6 credits)

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.

Assessment: 40% continuous assessment, 60% examination

IMSE1017 Engineering systems analysis (6 credits)

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.

Assessment: 20% continuous assessment, 80% examination

IMSE1019 Industrial systems modeling and simulation (6 credits)

Basic concepts of modelling and simulation; discrete-event simulation techniques; introduction to computer-aided simulation and the use of simulation packages; methodology of simulation study of industrial systems; model development for industrial systems, analysis of systems; model validation and

verification; analysis of simulation results, case studies of industrial and manufacturing systems using discrete event simulations.

Assessment: 40% continuous assessment, 60% examination

IMSE0201 Supply chain design and development (6 credits)

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
Assessment: 20% continuous assessment, 80% examination

IMSE2003 Industrial automation (6 credits)

Conditions and justification for automation; basic components of industrial automation; electric, pneumatic/hydraulic systems, automation systems design, introduction to robotics. Open-loop and closed-loop control; system performance analysis, system stability assessment; analogue and digital control systems, and their applications in industry.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
Assessment: 20% continuous assessment, 80% examination

IMSE2016 Internet technology for e-commerce (6 credits)

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: user requirement analysis, system development paradigms, structured system development and object-oriented system development methods. Adoption and Implementation: internet programming, web-based system development, online database design and implementation, case studies and mini-project.

Assessment: 60% continuous assessment, 40% examination

IMSE2018 Industrial organisation and management (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE2019 Stochastic decision systems (6 credits)

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)
Assessment: 30% continuous assessment, 70% examination

IMSE2027 Facilities planning and design (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE2028 Human factors engineering (6 credits)

Human-organization interaction; human-machine interface usability and design; workplace safety and health; applied anthropometry and biomechanics; physical work and manual material handling; workplace and environmental design, illumination, noise, thermal; information processing; display and control; skills and learning; job design and shift work.

Assessment: 20% continuous assessment, 80% examination

B. Common Core Course (6 credits)

C. Internship

IMSE2029 Internship (6 credits)

A minimum of six week summer internship in the industry.

Assessment: 100% practical work

Level Three

A1. Core Engineering Courses

IMSE3001 Computer integrated manufacturing (6 credits)

Overview of Computer Integrated Manufacturing (CIM) system and CAD/CAM functions; geometric modelling in CAD - principles of surface and solid modelling; CNC applications in CAM; computer aided process planning, automated process planning; rapid and virtual manufacturing; CAD and CAM integration.

Prerequisite: IMSE1009 Fundamentals of Engineering Design
Assessment: 30% continuous assessment, 70% examination

Technical project

IMSE3014 Project (12 credits)

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

Assessment: 100% continuous assessment

Integrative project

IMSE3015 Industrial systems integration (6 credits)

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.

Assessment: 100% continuous assessment

IMSE3016 Operations planning and control (6 credits)

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
Assessment: Continuous assessment (20%) and Examination (80%)

A2. Discipline Elective Courses

For the syllabuses of Discipline Elective Courses with the code IMSE1XXX and IMSE2XXX, please refer to the previous section Level 2 A2.

IMSE3002 Engineering project management (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3010 Financial engineering (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3018 Advanced manufacturing technology (6 credits)

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
Assessment: 20% continuous assessment, 80% examination

IMSE3019 Digital enterprises and e-commerce (6 credits)

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, or ENGG1013 Computer programming and applications IA and ENGG1014 Computer programming and applications IB, or ENGG1016 Computer programming and applications I
Assessment: 40% continuous assessment, 60% examination

IMSE3020 Technology marketing (6 credits)

Customer relationships and value, marketing strategies and plans, marketing environment, ethical and social responsibility in marketing, marketing mix, marketing research and forecasting, marketing segmentation and positioning, technology trend, distribution channels, intellectual property, e-marketing.

Prerequisite: IMSE1003 Introduction to business and management
Assessment: 30% continuous assessment, 70% examination

IMSE3021 Strategic management of business and technology (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3028 Innovation and entrepreneurship (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE3029 Manufacturing system analysis and design (6 credits)

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.

Prerequisite: IMSE2008 Operational research techniques
Assessment: 30% continuous assessment, 70% examination

DOUBLE-DEGREES IN BENG/BBA OPTION
(Applicable to students admitted in the academic year 2010-11 and thereafter)

Candidates are given an option to pursue the double-degrees in 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.

Candidates who have satisfied all the requirements of the BEng curriculum will be awarded the degree of Bachelor of Engineering. The BEng(IETM) curriculum under the double-degrees in BEng/BBA option is as follows:

Exemptions

Candidates who have taken and passed the courses BUSI1007 (Principles of Management) and BUSI0027 (Management accounting I) under the double-degrees in BEng/BBA option are automatically granted exemption for the courses IMSE1003 (Introduction to business and management), IMSE2005 (Managerial accounting and finance) and IMSE3021 (Strategic management of business and technology).

First Year

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1009	Fundamentals of engineering design	6	1	Introductory
IMSE2009	Quality management	6	1	Introductory
ENGG1003	Mathematics I	6	1	N/A
OR				
ENGG1004	Mathematics IA	3	1	N/A
IMSE1018	Mathematics (IMSE)	3	1	N/A
ENGG1002	Computer programming and applications	6	1	N/A
OR				
ENGG1016	Computer programming and applications I	6	1&2	N/A
Credits required: 24				

General Engineering Courses			
Code	Title	Credits	Length (Sem)
ENGG1009	Industrial management and logistics	6	1
ENGG1006	Engineering for sustainable development	6	1
ENGG1007	Foundations of computer science	6	1
ENGG1011	Introduction to biomedical engineering	6	1
ENGG1015	Introduction to electrical and electronic engineering	6	1
ENGG1018	Introduction to mechanical engineering	6	1
Select 2 courses from the above General Engineering Courses; credits required: 12			

Language Enhancement Courses			
Code	Title	Credits	Length (Sem)
CAES1907	Business Communication	3	1
CAES1515	Professional and technical oral communication for engineers	3	1

CENG1001	Practical Chinese language course for engineering students	3	1
Credits required: 9			

Common Core Courses			
Code	Title	Credits	Length (Sem)
	Common Core Course	6	1
	Common Core Course	6	1
Credits required: 12			

Second Year

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1021	Engineering training	6	summer	Introductory
IMSE2006	Manufacturing technology	6	1	Advanced
IMSE2008	Operational research techniques	6	1	Advanced
IMSE2018	Industrial organisation and management	6	1	Advanced
IMSE2024	Mathematics II	6	1	Advanced
IMSE2025	Integrative studies (IE practice)	6	1	Advanced
IMSE2026	Engineers in society	6	1	Advanced
IMSE2027	Facilities planning and design	6	1	Advanced
IMSE2028	Human factors engineering	6	1	Advanced
Credits required: 54				

Third Year

Core Engineering courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE2029	Internship	6	summer	Advanced
IMSE3001	Computer integrated manufacturing	6	1	Advanced
IMSE3002	Engineering project management	6	1	Advanced
IMSE3014	Project	12	2	Advanced
IMSE3015	Industrial systems integration	6	2	Advanced
IMSE3016	Operations planning and controls	6	1	Advanced
IMSE3029	Manufacturing system analysis and design	6	1	Advanced
Credits required: 48				

Elective Course			
Code	Title	Credits	Length (Sem)
	(Any Elective course)	3	1
Credits required: 3			

Note: Candidates can refer to the previous sections for further information on the prerequisite relationship and course syllabuses of the above-listed courses.

To be eligible for proceeding to the BBA programme in the 4th year, candidates must (1) fulfill the requirements of the BEng curriculum; and (2) pass the 54 credits of courses, as listed below, as required by the Faculty of Business and Economics during their study for BEng:

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information systems	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Electives (Any 2 courses in Finance, HRM or Marketing major)	12
	Total	*54*

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 credits of courses in compliance with the syllabuses for the minor programme.

To obtain the degree of BBA, candidates must satisfactorily complete 114 credits of courses, 54 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.

MINOR OPTION - INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT
(Applicable to students admitted in the academic year 2010-11 and thereafter)
(Candidates enrolled in BEng degree curriculum with specialism in either Industrial Engineering and Technology Management or Logistics Engineering and Supply Chain Management are NOT eligible to choose this Minor Option.)

Candidates are given an option to pursue the minor in Industrial Engineering and Technology Management, 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 listed below in addition to the graduation requirements of their own degree curriculum:

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1019	Industrial systems modeling and simulation	6	1	Introductory
IMSE2027	Facilities planning and design	6	1	Advanced
Credits required: 12				

Discipline Elective Courses				
Code	Title	Credit-units	Length (Sem)	Major Course Level
IMSE1014	Product development	6	1	Introductory
IMSE2005	Managerial accounting and finance	6	1	Advanced
IMSE2008	Operational research techniques	6	1	Advanced
IMSE2026	Engineers in society	6	1	Advanced
IMSE3001	Computer integrated manufacturing	6	1	Advanced
Select 4 courses from the above Discipline Elective Courses; credits required: 24				

LOGISTICS ENGINEERING AND SUPPLY CHAIN MANAGEMENT

SYLLABUS
(Applicable to students admitted in the academic year 2012-13)

Definitions and Terminology

Each course offered by the Department of Industrial and Manufacturing Systems Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses includes Level Two and Three courses. The course level 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 Discipline Elective course refers to any optional subject offered by the Department, provided that it does not overlap significantly with the other courses that the student has already enrolled in. An Elective Course is a course offered by other departments under the Faculty of Engineering, or by other faculties.

The Curriculum

The curriculum comprises 180 credits of courses as follows:

(a) 96 credits of Core Engineering courses of the curriculum, including
  (i) Integrative project (6 credits)
  (ii) Technical project (12 credits)
  (iii) either (1) ENGG1002 Computer programming and applications (6 credits)
  or
  (2) ENGG1016 Computer programming and applications I (6 credits
  (iv) either (1) ENGG1003 Mathematics I (6 credits)
  or
  (2) ENGG1004 Mathematics IA (3 credits) and
  IMSE1018 Mathematics (IMSE) (3 credits)

(b) 51 credits of Elective courses, including:
  (i) Discipline Elective courses (36 credits)
  (ii) General Engineering Courses (12 credits)
  (iii) Elective course (3 credits)

(c) 9 credits of Language Enhancement courses, comprising:
  (i) Professional and technical written communication for engineers (3 credits)[26]
  (ii) Professional and technical oral communication for engineers (3 credits)
  (iii) Practical Chinese language course for engineering students (3 credits)[27]

(d) Common Core Curriculum Courses (selecting not more than one course from each Area of Inquiry) (12 credits)

(e) Engineering training (6 credits)

(f) Internship (6 credits)

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[26] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1509

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

To complete the curriculum, a candidate must enroll in all the courses specified in the curriculum and must pass the courses listed under (a) to (f) for a combination totaling to 180 credits.

Degree Classification

All the 180 credits under the curriculum will be counted towards degree classification, according to the following:

(a) 9 credits of Language Enhancement courses;
(b) 96 credits of Core Engineering courses;
(c) 12 credits of Engineering training and Internship;
(d) 12 credits of Common Core Courses;
(e) The remaining courses with the best results, including at least 36 credits of Discipline Elective courses, 12 credits of General Engineering Courses and 3 credits of Elective course.

Order of Study

Order of study is dictated by prerequisite 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 Engineering courses should be taken before Elective courses.

First Year

Loading

The normal loading is 60 credits of Level One courses, with 30 credits of courses in each semester. Students are required to do Engineering Training (6 credits / Major Course Level: Introductory) within the 60 credits of courses.

Courses

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

(a) Core Engineering courses (30 credits)
(b) 2 Elective courses from the General Engineering Courses (12 credits)
(c) 3 Language Enhancement courses (9 credits) consisting of
    (i) 2 English Communications courses (6 credits)
    (ii) 1 Chinese Language course (3 credits)
(d) 1 Elective course offered by other departments of the Faculty of Engineering or other faculties (3 credits)
(e) Engineering Training (6 credits)

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1003	Introduction to business and management	6	1	Introductory

IMSE1009	Fundamentals of engineering design	6	1	Introductory
IMSE1016	Fundamentals of business logistics	6	1	Introductory
ENGG1003	Mathematics I	6	1	N/A
OR				
ENGG1004	Mathematics IA	3	1	N/A
IMSE1018	Mathematics (IMSE)	3	1	N/A
ENGG1002	Computer programming and applications	6	1	N/A
OR				
ENGG1016	Computer programming and applications I	6	1&2	N/A
Credits required: 30				

General Engineering Courses			
Code	Title	Credits	Length (Sem)
ENGG1009	Industrial management and logistics	6	1
ENGG1006	Engineering for sustainable development	6	1
ENGG1007	Foundations of computer science	6	1
ENGG1011	Introduction to biomedical engineering	6	1
ENGG1015	Introduction to electrical and electronic engineering	6	1
ENGG1018	Introduction to mechanical engineering	6	1
Select two courses from the above General Engineering courses; credits required: 12			

Language Enhancement Courses			
Code	Title	Credits	Length (Sem)
CAES1509	Professional and technical written communication for engineers[28]	3	1
CAES1515	Professional and technical oral communication for engineers	3	1
CENG1001	Practical Chinese language course for engineering students[29]	3	1
Credits required: 9			

Elective Course			
Code	Title	Credits	Length (Sem)
	(Any Elective course)	3	1
Credits required: 3			

Training			
Code	Title	Credits	Length (Sem)
IMSE1021	Engineering Training	6	Summer
Credits required: 6			

[28] Students pursuing double-degrees in BEng/BBA should take CAES1907 in lieu of CAES1509

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

Second Year

Loading

The normal loading is 60 credits of Level Two courses, with 30 credits of courses in each semester. Students are required to do Internship (6 credits / Major Course Level: Advanced) within the 60 credits of courses.

Courses

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

(a) 6 Core Engineering courses (36 credits)
(b) 1 Discipline Elective course (6 credits)
(c) 2 courses from the Common Core Curriculum, selecting not more than one course from each Area of Inquiry (12 credits)
(d) Internship (6 credits)

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE0201	Supply chain design and development	6	1	Advanced
IMSE2008	Operational research techniques	6	1	Advanced
IMSE2021	Transportation and distribution planning	6	1	Advanced
IMSE2024	Mathematics II	6	1	Advanced
IMSE2026	Engineers in society	6	1	Advanced
IMSE2035	Integrative studies (LSC practice)	6	1	Advanced
Credits required: 36				

Discipline Elective Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
Select 1 course from the list of Discipline Elective Courses; credits required: 6				

Common Core Courses			
Code	Title	Credits	Length (Sem)
	Common Core Course	6	1
	Common Core Course	6	1
Credits required: 12			

Training			
Code	Title	Credits	Length (Sem)
IMSE2029	Internship	6	Summer

Third Year

Loading

The normal loading for a student is 60 credits of Level Three courses (excluding summer vacation) with 30 credits of courses in each semester.

Courses

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

(a) 4 Core Engineering courses (30 credits) comprising:
  (i) IMSE3016 Operations planning and controls (6 credits)
  (ii) IMSE3022 Global logistics systems (6 credits)
  (iii) Technical project - IMSE 3024 Project (12 credits)
  (iv) Integrative project - IMSE3025 Industrial systems integration (6 credits)

(b) A combination of Discipline Elective courses totaling to 30 credits

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE3016	Operations planning and control	6	1	Advanced
IMSE3022	Global logistics systems	6	1	Advanced
IMSE3024	Project	12	2	Advanced
IMSE3025	Logistics systems integration	6	2	Advanced
Credits required: 30				

Discipline Elective Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
Select 5 courses from the list of Discipline Elective courses: credits required: 30				
Credits required: 30				

List of Discipline Elective Courses (LESCM)

Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1012	Engineering technology	6	1	Introductory
IMSE1013	Introduction to information systems	6	1	Introductory
IMSE1014	Product development	6	1	Introductory
IMSE1017	Engineering systems analysis	6	1	Introductory
IMSE1029	Logistics systems modeling and simulation	6	1	Advanced
IMSE2003	Industrial automation	6	1	Advanced
IMSE2005	Managerial accounting and finance			
IMSE2009	Quality management			
IMSE2016	Internet technology for e-commerce	6	1	Advanced
IMSE2018	Industrial organisation and management	6	1	Advanced
IMSE2019	Stochastic decision systems	6	1	Advanced
IMSE2020	Purchasing and supply management			

IMSE2027	Facilities planning and design	6	1	Advanced
IMSE2028	Human factors engineering	6	1	Advanced
IMSE3001	Computer integrated manufacturing	6	1	Advanced
IMSE3002	Engineering project management	6	1	Advanced
IMSE3010	Financial engineering	6	1	Advanced
IMSE3019	Digital enterprises and e-commerce	6	1	Advanced
IMSE3020	Technology marketing	6	1	Advanced
IMSE3021	Strategic management of business and technology	6	1	Advanced
IMSE3023	Warehousing and terminal operations	6	1	Advanced
IMSE3028	Innovation and entrepreneurship	6	1	Advanced
Credits required:				
Level 1:	Students have an option to choose one of the above courses to fulfill the 3-credit elective course requirement.			
Level 2:	6			
Level 3:	30			

Summary of the prerequisite relationship between First, Second and Third Year courses

First Year

Code	Title	Prerequisite
Core Engineering courses		
IMSE1003	Introduction to business and management	None
IMSE1009	Fundamentals of engineering design	None
IMSE1016	Fundamentals of business logistics	None
ENGG1003	Mathematics I	None
OR		
ENGG1004 IMSE1018	Mathematics IA Mathematics (IMSE)	None None
ENGG1002	Computer programming and applications	None
OR		
ENGG1016	Computer programming and applications I	None
General Engineering Courses		
ENGG1009	Industrial management and logistics	None
ENGG1006	Engineering for sustainable development	None
ENGG1007	Foundations of computer science	None
ENGG1011	Introduction to biomedical engineering	None
ENGG1015	Introduction to electrical and electronic engineering	None
ENGG1018	Introduction to mechanical engineering	None

Second Year

Code	Title	Prerequisite
Core Engineering Courses		
IMSE0201	Supply chain design and development	IMSE1003 Introduction to business and management
IMSE2008	Operational research techniques	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2021	Transportation and distribution planning	IMSE1016 Fundamentals of business logistics
IMSE2024	Mathematics II	ENGG1003 Mathematics I or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
IMSE2026	Engineers in society	None
IMSE2035	Integrative studies (LCS practice)	None
Discipline Elective Courses		
IMSE1012	Engineering technology	None
IMSE1013	Introduction to information systems	None
IMSE1014	Product development	None
IMSE1017	Engineering systems analysis	None
IMSE1029	Logistics systems modeling and simulation	None
IMSE2003	Industrial automation	ENGG1003 Mathematics I or ENGG1004 Mathematics IA *and* IMSE1018 Mathematics (IMSE)
IMSE2005	Managerial accounting and finance	IMSE1003 Introduction to business and management
IMSE2009	Quality management	
IMSE2016	Internet technology for e-commerce	None
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
IMSE2027	Facilities planning and design	
IMSE2028	Human factors engineering	None
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

IMSE3019	Digital enterprises and e-commerce	IMSE2016 or IMSE1013 or IMSE1008 or ENGG1002 or ENGG1013 and ENGG1014 or ENGG1016	Internet technology for e-commerce Introduction to information systems Computer applications for engineers Computer programming and applications Computer programming and applications IA Computer programming and applications IB Computer programming and applications I
IMSE3020	Technology marketing	IMSE1003	Introduction to business and management
IMSE3021	Strategic management of business and technology	IMSE1003	Introduction to business and management
IMSE3023	Warehousing and terminal operations	IMSE1016	Fundamentals of business logistics
IMSE3028	Innovation and entrepreneurship	None	

Third Year

Code	Title	Prerequisite
Core Engineering Courses		
IMSE3016	Operations planning and control	IMSE2008 Operational research techniques
IMSE3022	Global logistics systems	IMSE1016 Fundamentals of business logistics
IMSE3024	Project	None
IMSE3025	Logistics systems integration	None
Discipline Elective Courses		
IMSE1012	Engineering technology	None
IMSE1013	Introduction to information systems	None
IMSE1014	Product development	None
IMSE1017	Engineering systems analysis	None
IMSE1029	Logistics systems modeling and simulation	None
IMSE2003	Industrial automation	ENGG1003 Mathematics I or ENGG1004 Mathematics IA *and* IMSE1018 Mathematics (IMSE)

IMSE2005	Managerial accounting and finance	IMSE1003 Introduction to business and management
IMSE2009	Quality management	
IMSE2016	Internet technology for e-commerce	None
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
IMSE2027	Facilities planning and design	IMSE2008 Operational research techniques
IMSE2028	Human factors engineering	None
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
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 or ENGG1013 Computer programming and applications IA and ENGG1014 Computer programming and applications IB or ENGG1016 Computer programming and applications I
IMSE3020	Technology marketing	IMSE1003 Introduction to business and management
IMSE3021	Strategic management of business and technology	IMSE1003 Introduction to business and management
IMSE3023	Warehousing and terminal operations	IMSE1016 Fundamentals of business logistics
IMSE3028	Innovation and entrepreneurship	None

COURSE DESCRIPTIONS

Level One

A. Core Engineering Courses

IMSE1003 Introduction to business and management (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE1009 Fundamentals of engineering design (6 credits)

Visualization of technical information; application of CAD software to prepare product design models and drawings; principles of engineering graphics: orthographic projections, isometric views, auxiliary views, sectioning, dimensioning and tolerancing; assembly modelling and drawing; design of components; general principles of product and tool design.

Assessment: 100% continuous assessment

IMSE1016 Fundamentals of business logistics (6 credits)

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.

Assessment: 20% continuous assessment, 80% examination

IMSE1018 Mathematics (IMSE) (3 credits)

Probability laws, random variables, probability distributions and expectation; optimization of functions of two or more variables; numerical methods in root-finding, approximation and integration of single variable functions.

Assessment: 10% continuous assessment, 90% examination

B. Language enhancement courses

CAES1509 Professional and technical written communication for engineers (3 credits)

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.

Assessment: 100% continuous assessment

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Professional Chinese language course for engineering students (3 credits)

Please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

C. Elective Course (3 credits)

D. Engineering Training

IMSE1021 Engineering training (6 credits)

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

Assessment: 100% practical work

Level Two

A1. Core Engineering Courses

IMSE0201 Supply chain design and development (6 credits)

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
Assessment: 20% continuous assessment, 80% examination

IMSE2008 Operational research techniques (6 credits)

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)
Assessment: 10% continuous assessment, 90% examination

IMSE2021 Transportation and distribution planning (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE2024 Mathematics II (6 credits)

Probability laws, random variables, probability distributions and expectation; some important discrete and continuous distributions; random samples and sampling distributions; parameter estimation and hypothesis testing; design of experiments and analysis of variance; regression analysis; non-parametric methods; statistical quality control and reliability engineering; introduction to stochastic processes and Markov chains; application examples in industrial and logistics engineering.

Prerequisite: ENGG1003 Mathematics I, or ENGG1004 Mathematics IA and IMSE1018 Mathematics (IMSE)
Assessment: 10% continuous assessment, 90% examination

IMSE2026 Engineers in society (6 credits)

Economic, industrial and social context of engineering; responsibilities of professional engineers, the legal, environmental, economical and ethical roles of engineers in society, judgment and decision process based on non-technical aspects such as financial, environmental and cultural considerations, meeting with professional engineers from the industrial and logistics sectors.

Assessment: 30% continuous assessment, 70% examination

IMSE2035 Integrative studies (LSC practice) (6 credits)

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.

The major element of the module is a group project on the design of a logistic system or a logistic-related product or service. The group project is to integrate the applications of various topics including: project management; product life-cycle management; business logistics; cost accounting; scheduling; transportation planning; material handling; workflow design; human factors; distribution and marketing.

Assessment: 100% continuous assessment

A2. Discipline Elective Courses

IMSE1012 Engineering technology (6 credits)

Kinematics and dynamics of rigid bodies, centre of percussion, design for reduction of impact stress; analysis, simulation and applications of 4-bar mechanisms, velocity diagram and instantaneous centre of rotation; Geneva mechanism, gear train and motion transmission; analysis and applications of simple harmonic motion, damping of vibrations; fundamental electrical circuit analysis; alternating current electricity, AC circuits sand phasors.

Assessment: 20% continuous assessment, 80% examination

IMSE1013 Introduction to information systems (6 credits)

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

Assessment: 40% continuous assessment, 60% examination

IMSE1014 Product development (6 credits)

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.

Assessment: 40% continuous assessment, 60% examination

IMSE1017 Engineering systems analysis (6 credits)

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.

Assessment: 20% continuous assessment, 80% examination

IMSE1029 Logistics systems modeling and simulation (6 credits)

Basic concepts of modelling and simulation; discrete-event simulation techniques; introduction to computer-aided simulation and the use of simulation packages; methodology of simulation study of logistics systems and operation; model development for logistics systems, analysis of systems; model validation and verification; analysis of simulation results, case studies of logistics and supply chain systems using discrete event simulations.

Assessment: 40% continuous assessment, 60% examination

IMSE2003 Industrial automation (6 credits)

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)
Assessment: 20% continuous assessment, 80% examination

IMSE2005 Managerial accounting and finance (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE2009 Quality management (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE2016 Internet technology for e-commerce (6 credits)

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: user requirement analysis, system development paradigms, structured system development and object-oriented system development methods. Adoption and Implementation: internet programming,

web-based system development, online database design and implementation, case studies and mini-project.

Assessment: 60% continuous assessment, 40% examination

IMSE2018 Industrial organisation and management (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE2019 Stochastic decision systems (6 credits)

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)
Assessment: 30% continuous assessment, 70% examination

IMSE2020 Purchasing and supply management (6 credits)

Introduction of purchasing function/process; quality management for goods and service; sourcing and market analysis; make-or-buy decisions and subcontracting ; negotiation; controlling price and costs; vendor selection; commodity buying; service buying; capital buying; strategic purchasing; e-procurement and public procurement

Assessment: 40% continuous assessment, 60% examination

IMSE2027 Facilities planning and design (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

IMSE2028 Human factors engineering (6 credits)

Human-organization interaction; human-machine interface usability and design; workplace safety and health; applied anthropometry and biomechanics; physical work and manual material handling; workplace and environmental design, illumination, noise, thermal; information processing; display and control; skills and learning; job design and shift work.

Assessment: 20% continuous assessment, 80% examination

B. Common Core Curriculum Courses (12 credits)

C. Internship

IMSE2029 Internship (6 credits)

A minimum of six week summer internship in the industry.

Assessment: 100% practical work

Level Three

A1. Core Engineering Courses

IMSE3016 Operations planning and control (6 credits)

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
Assessment: 20% continuous assessment, 80% examination

IMSE3022 Global logistics systems (6 credits)

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
Assessment: 20% continuous assessment, 80% examination

Technical project

IMSE3024 Project (12 credits)

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

Assessment: 100% continuous assessment

Integrative project

IMSE3025 Logistics systems integration (6 credits)

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.

Assessment: 100% continuous assessment

A2. Discipline Elective Courses

For the syllabuses of Discipline Elective Courses with the code IMSE1XXX and IMSE2XXX, please refer to the previous section Level 2 A2.

IMSE3001 Computer integrated manufacturing (6 credits)

Overview of Computer Integrated Manufacturing (CIM) system and CAD/CAM functions; geometric modelling in CAD - principles of surface and solid modelling; CNC applications in CAM; computer aided process planning, automated process planning; rapid and virtual manufacturing; CAD and CAM integration.
Prerequisite: IMSE1009 Fundamentals of Engineering Design
Assessment: 30% continuous assessment, 70% examination

IMSE3002 Engineering project management (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3010 Financial engineering (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3019 Digital enterprises and e-commerce (6 credits)

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, or ENGG1013 Computer programming and applications IA and ENGG1014 Computer programming and applications IB, or ENGG1016 Computer programming and applications I
Assessment: 40% continuous assessment, 60% examination

IMSE3020 Technology marketing (6 credits)

Customer relationships and value, marketing strategies and plans, marketing environment, ethical and social responsibility in marketing, marketing mix, marketing research and forecasting, marketing segmentation and positioning, technology trend, distribution channels, intellectual property, e-marketing.

Prerequisite: IMSE1003 Introduction to business and management
Assessment: 30% continuous assessment, 70% examination

IMSE3021 Strategic management of business and technology (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3023 Warehousing and terminal operations (6 credits)

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
Assessment: 30% continuous assessment, 70% examination

IMSE3028 Innovation and entrepreneurship (6 credits)

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.

Assessment: 30% continuous assessment an 70% examination

DOUBLE-DEGREES IN BENG/BBA OPTION
(Applicable to students admitted in the academic year 2010-11 and thereafter)

Candidates are given an option to pursue the double-degrees in 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.

Candidates who have satisfied all the requirements of the BEng curriculum will be awarded the degree of Bachelor of Engineering. The BEng(LESCM) curriculum under the double-degrees in BEng/BBA option is as follows:

Exemptions

Candidates who have taken and passed the courses BUSI1007 (Principles of Management) and BUSI0027 (Management accounting I) under the double-degrees in BEng/BBA option are automatically granted exemption for the courses IMSE1003 (Introduction to business and management), IMSE2005 (Managerial accounting and finance) and IMSE3021 (Strategic management of business and technology).

First Year

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1009	Fundamentals of engineering design	6	1	Introductory
IMSE1016	Fundamentals of business logistics	6	1	Introductory
ENGG1003	Mathematics I	6	1	N/A
OR				
ENGG1004	Mathematics IA	3	1	N/A
IMSE1018	Mathematics (IMSE)	3	1	N/A
ENGG1002	Computer programming and applications	6	1	N/A
OR				
ENGG1016	Computer programming and applications I	6	1&2	N/A
Credits required: 24				

General Engineering Courses			
Code	Title	Credits	Length (Sem)
ENGG1009	Industrial management and logistics	6	1
ENGG1006	Engineering for sustainable development	6	1
ENGG1007	Foundations of computer science	6	1
ENGG1011	Introduction to biomedical engineering	6	1
ENGG1015	Introduction to electrical and electronic engineering	6	1
ENGG1018	Introduction to mechanical engineering	6	1
Select two courses from the above General Engineering Courses; credits required: 12			

Language Enhancement Courses			
Code	Title	Credits	Length (Sem)
CAES1907	Business Communication	3	1
CAES1515	Professional and technical oral communication for engineers	3	1
CENG1001	Practical Chinese language course for engineering students	3	1
Credits required: 9			

Common Core Courses			
Code	Title	Credits	Length (Sem)
	Common Core Course	6	1
	Common Core Course	6	1
Credits required: 12			

Second Year

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1021	Engineering training	6	summer	Introductory
IMSE0201	Supply chain design and development	6	1	Advanced
IMSE2008	Operational research techniques	6	1	Advanced
IMSE2009	Quality management	6	1	Advanced

IMSE2016	Internet technology for e-commerce	6	1	Advanced
IMSE2021	Transportation and distribution planning	6	1	Advanced
IMSE2024	Mathematics II	6	1	Advanced
IMSE2026	Engineers in society	6	1	Advanced
IMSE2035	Integrative studies (LSC practice) – Project	6	1	Advanced
Credits required: 54				

Third Year

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE2029	Internship	6	summer	Advanced
IMSE3002	Engineering project management	6	1	Advanced
IMSE3016	Operations planning and control	6	1	Advanced
IMSE3022	Global logistics systems	6	1	Advanced
IMSE3023	Warehousing and terminal operations	6	1	Advanced
IMSE3024	Project	12	2	Advanced
IMSE3025	Logistics systems integration	6	2	Advanced
Credits required: 48				

Elective Course			
Code	Title	Credits	Length (Sem)
	(Any Elective course)	3	1
Credits required: 3			

Note: Candidates can refer to the previous sections for further information on the prerequisite relationship and course syllabuses of the above-listed courses.

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 54 credits of courses, as listed below, as required by the Faculty of Business and Economics during their study for BEng:

Course Code	**Course**	**Credits**
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information systems	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Electives (Any 2 courses in Finance, HRM or Marketing major)	12
	Total	***54***

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 credits of courses in compliance with the syllabuses for the minor programme.

To obtain the degree of BBA, candidates must satisfactorily complete 114 credits of courses, 54 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.

MINOR OPTION - LOGISTICS ENGINEERING AND SUPPLY CHAIN MANAGEMENT
(Applicable to students admitted in the academic year 2010-11 and thereafter)
(Candidates enrolled in BEng degree curriculum with specialism in either Industrial Engineering and Technology Management or Logistics Engineering and Supply Chain Management are NOT eligible to choose this Minor Option.)

Candidates are given an option to pursue the minor in Logistics Engineering and Supply Chain Management, 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 listed below in addition to the graduation requirements of their own degree curriculum:

Core Engineering Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE1029	Logistics systems modeling and simulation	6	1	Introductory
IMSE0201	Supply chain design and development	6	1	Advanced
Credits required: 12				

Discipline Elective Courses				
Code	Title	Credits	Length (Sem)	Major Course Level
IMSE2005	Managerial accounting and finance	6	1	Advanced
IMSE2008	Operational research techniques	6	1	Advanced
IMSE2021	Transportation and distribution planning	6	1	Advanced
IMSE2026	Engineers in society	6	1	Advanced
IMSE3019	Digital enterprises and e-commerce	6	1	Advanced
Select 4 courses from the above Discipline Elective Courses; credits required: 24				

MECHANICAL ENGINEERING
(with optional Environmental Engineering and Energy Engineering Streams)

SYLLABUS

This syllabus applies to students admitted in the academic year 2012-13.

Definitions and Terminology

Each course offered by the Department of Mechanical Engineering shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses include Levels Two and Three courses.

A *Discipline Core Course* is a compulsory course which a candidate must pass in the manner provided in the Regulations. A *Project Course* is also a compulsory course which a candidate must pass. A *Breadth Course* is a Level 1, Level 2 or Level 3 course that is offered normally as an optional course for the curriculum. A *Depth Course* is a Level 3 course offered as an optional course for the curriculum. *Elective course* is a course offered by the Department of Mechanical Engineering, other departments under the Faculty of Engineering, or by other faculties.

The Curriculum

The curriculum comprises of 180 credits of courses as follows:

(a) 24 credits from General Engineering courses, including:
  (i) either ENGG1002 Computer programming and applications (6 credits) or
  ENGG1016 Computer programming and applications I (6 credits); AND
  (ii) either ENGG1003 Mathematics I (6 credits) or
  ENGG1004 Mathematics IA (3 credits) and ENGG1005 Mathematics IB (3 credits); AND
  (iii) ENGG1018 Introduction to mechanical engineering (6 credits); AND
  (iv) Any one General Engineering course offered by other departments of the Faculty of Engineering (6 credits)
(b) Discipline Core courses: 72 credits (for Main Stream); 84 credits (for Environmental Engineering Stream) and 90 credits (for Energy Engineering Stream)
(c) 18 credits of Project courses
(d) 39 credits of Elective courses (Main stream students); OR
  27 credits of Elective courses (for Environmental Engineering stream students) OR
  21 credits of Elective courses (for Energy Engineering stream students)
(e) University requirements (21 credits), including:
  (i) CAES1513 Professional and technical written communication for engineers (3 credits)[30]
  (ii) CAES1515 Professional and technical oral communication for engineers (3 credits)
  (iii) CENG1001 Practical Chinese language course for engineering students (3 credits)[31]

[30] Students pursuing BEng/BBA should take CAES1907 in lieu of CAES1513.

[31] "Putonghua-speaking students should take CUND0002 or CUND0003. Students who have not studied Chinese language during their secondary education / who have not attained the requisite level of competence in the Chinese language to take CENG10xx can apply (i) to take credit-bearing Cantonese or Putonghua language courses offered by the School of Chinese especially for international and exchange students; OR (ii) to be exempted from the Chinese language requirement and take an elective language course in lieu".

(iv) 12 credits of courses from the University Common Core Curriculum, selecting no more than one course from each Area of Inquiry

(f) 6 credits of Breadth course

To complete the degree curriculum, a candidate must pass at least a total of 180 credits, including all the courses listed under (a) to (e) and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credits satisfying the Curriculum described above shall be taken into account for degree classification.

Order of Study

There are no course prerequisites but lower level courses should preferably be taken before higher level courses.

First Year

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

General Engineering Courses (Total 24 credits)

Either
ENGG1002 Computer programming and applications (6 credits); or
ENGG1016 Computer programming and applications I (6 credits); AND

Either
ENGG1003 Mathematics I (6 credits) or
both ENGG1004 Mathematics IA (3 credits) and ENGG1005 Mathematics IB (3 credits); AND

ENGG1018 Introduction to mechanical engineering (6 credits); AND
Any one General Engineering Courses (6 credits) from the following:

ENGG1007	Foundation of computer science
ENGG1009	Industrial management and logistics
ENGG1011	Introduction to biomedical engineering
ENGG1015	Introduction to electrical and electronic engineering
ENGG1018	Introduction to mechanical engineering

Discipline Core Courses (Total 24 credits)

MECH1004 Drawing and elements of design and manufacture (6 credits)
MECH1005 Fundamentals of electrical and electronic engineering (6 credits)
MECH1013 Engineering mechanics (6 credits)
MECH1014 Thermofluids (6 credits)

UG5 requirements (Total 9 credits)

CAES1513 Professional and technical written communication for engineers (3 credits)

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Practical Chinese language course for engineering students (3 credits)

Optional Elective Course (Total 6 credits)

MECH1018 Engineering training (6 credits) (Summer semester)

Second Year

Main Stream

The second-year syllabuses for Main Stream students shall normally include the following courses:

Discipline Core Courses (Total 48 credits)

MECH1019 Properties of materials (6 credits)
MECH2002 Engineering thermodynamics (6 credits)
MECH2005 Design and manufacture (6 credits)
MECH2006 Electrical and electronic engineering (6 credits)
MECH2007 Mathematics II (6 credits)
MECH2008 Mechanics of fluids (6 credits)
MECH2009 Mechanics of solids (6 credits)
MECH2018 Dynamics and control (6 credits)

UG5 requirements (Total 12 credits)

2 University Common Core Curriculum Courses (12 credits)

Optional Elective Courses (Total 12 credits)

MECH2016 Fundamentals of aeronautical engineering (6 credits)
MECH2017 Industrial training (6 credits) (Summer semester)
MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)

Environmental Engineering Stream

The second-year syllabuses for Environmental Engineering Stream students shall normally include the following courses:

Discipline Core Courses (Total 48 credits)

MECH1019 Properties of materials (6 credits)
MECH2002 Engineering thermodynamics (6 credits)
MECH2005 Design and manufacture (6 credits)
MECH2007 Mathematics II (6 credits)
MECH2008 Mechanics of fluids (6 credits)
MECH2009 Mechanics of solids (6 credits)
MECH2018 Dynamics and control (6 credits)
CIME2001 Water and air quality: concepts and measurement (6 credits)

UG5 requirements (Total 12 credits)

2 University Common Core Curriculum Courses (12 credits)

Optional Elective Courses (Total 12 credits)

MECH2016 Fundamentals of aeronautical engineering (6 credits)
MECH2017 Industrial training (6 credits) (Summer semester)
MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)

Energy Engineering Stream

The second-year syllabuses for Energy Engineering Stream students shall normally include the following courses:

Discipline Core Courses (Total 48 credits)

MECH1019 Properties of materials (6 credits)
MECH2002 Engineering thermodynamics (6 credits)
MECH2005 Design and manufacture (6 credits)
MECH2006 Electrical and electronic engineering (6 credits)
MECH2007 Mathematics II (6 credits)
MECH2008 Mechanics of fluids (6 credits)
MECH2009 Mechanics of solids (6 credits)
MECH2018 Dynamics and control (6 credits)

UG5 requirements (Total 12 credits)

2 University Common Core Curriculum Courses (12 credits)

Optional Elective Courses (Total 12 credits)

MECH2016 Fundamentals of aeronautical engineering (6 credits)
MECH2017 Industrial training (6 credits) (Summer semester)
MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)

Third Year

Main Stream

The third-year syllabuses for Main Stream students shall normally include the following courses:

Project Courses (Total 18 credits)

MECH3008 Design (6 credits)
MECH3022 Project (12 credits)

Breadth Course (Total 6 credits)
MECH3010 Engineering and technology management (6 credits)

Elective Courses (39 credits)

Students are required to complete 39 credits of Elective courses in the following manner:

(i) Elective Breadth/Depth Courses (up to 39 credits)
(ii) Elective MSc(Eng) Courses (up to 6 credits)
(iii) Free Elective Courses(up to 12 credits)

Elective Breadth/Depth Courses (Up to 39 credits from the following)

BBSE3009	Project management and engineering economics (6 credits)
MECH2016	Fundamentals of aeronautical engineering (6 credits)
MECH2019	Advanced computer programming in mechanical engineering applications (6 credits)
MECH3002	Air pollution control (6 credits)
MECH3004	Automatic control (6 credits)
MECH3005	Building services (6 credits)
MECH3007	Computer-aided design and manufacture (CAD/CAM) (6 credits)
MECH3009	Energy conversion systems (6 credits)
MECH3011	Heat transfer (6 credits)
MECH3012	Product design and development (6 credits)
MECH3014	Materials for engineering applications (6 credits)
MECH3015	Applied stress and strength analysis (6 credits)
MECH3020	Vibration (6 credits)
MECH3021	Viscous flow(6 credits)
MECH3023	Building energy management and control systems (6 credits)
MECH3026	Acoustics and noise control (6 credits)
MEDE3001	Tissue Engineering (3 credits)
MEDE3003	Biomaterials (3 credits)
MEDE3005	Transport phenomena in biological systems (6 credits)
MEDE3007	Molecular and cellular biomechanics (6 credits)

Elective MSc(Eng) courses (Up to 6 credits)

MECH6010 Service behavior of materials (3 credits)
MECH6023 Power plant technology (3 credits)
MECH6024 Applied mathematics for engineers (3 credits)
MECH6028 Processing and properties of engineering plastics (3 credits)
MECH6033 Energy conservation and management (3 credits)
MECH6044 Energy and carbon audit (3 credits)
MECH6045 Nanotechnology: fundamentals and applications (3 credits)
MECH6046 Microsystems for energy, biomedical and consumer electronics applications (3 credits)

Free Elective Courses (Up to 12 credits)

Any other two elective courses as approved by the department (12 credits)

Environmental Engineering stream

The third-year syllabuses for Environmental Engineering Stream students shall normally include the following courses:

Project Courses (Total 18 credits)

MECH3008 Design (6 credits)
MECH3022 Project (12 credits)

Discipline Core Courses (Total 12 credits)

MECH2006 Electrical and electronic engineering (6 credits)
MECH3002 Air pollution control (6 credits)

Breadth Course (Total 6 credits)

MECH3010 Engineering and technology management (6 credits)

Elective Courses (27 credits)

Students are required to complete 27 credits of Elective courses in the following manner:

(i) Elective Breadth/Depth Courses (up to 27 credits)
(ii) Elective MSc(Eng) Courses (up to 6 credits)
(iii) Free Elective Courses (up to ~~6~~12 credits)

Elective Breadth/Depth Courses (Up to 27 credits)

BBSE3009	Project management and engineering economics (6 credits)
CIVL3011	Municipal and industrial waste treatment (6 credits)
CIVL3015	Solid and hazardous waste management (6 credits)
CIVL3022	Wind engineering (6 credits)
MECH2016	Fundamentals of aeronautical engineering (6 credits)
MECH2019	Advanced computer programming in mechanical engineering applications (6 credits)
MECH3005	Building services (6 credits)
MECH3007	Computer-aided design and manufacture (CAD/CAM) (6 credits)
MECH3009	Energy conversion systems (6 credits)
MECH3011	Heat transfer (6 credits)
MECH3012	Product design and development (6 credits)
MECH3015	Applied stress and strength analysis (6 credits)
MECH3020	Vibration (6 credits)
MECH3021	Viscous flow (6 credits)
MECH3023	Building energy management and control systems (6 credits)
MECH3026	Acoustics and noise control (6 credits)

Elective MSc(Eng) courses (Up to 6 credits)

MECH6010 Service behavior of materials (3 credits)
MECH6023 Power plant technology (3 credits)

MECH6024 Applied mathematics for engineers (3 credits)
MECH6028 Processing and properties of engineering plastics (3 credits)
MECH6033 Energy conservation and management (3 credits)
MECH6044 Energy and carbon audit (3 credits)
MECH6045 Nanotechnology: fundamentals and applications (3 credits)
MECH6046 Microsystems for energy, biomedical and consumer electronics applications (3 credits)

Free Elective Courses (Up to ~~6~~12 credits)

Any other two elective courses as approved by the department (~~6~~12 credits)

Energy Engineering stream

The third-year syllabuses for Energy Engineering Stream students shall normally include the following courses:

Project Courses (Total 18 credits)

MECH3008 Design (6 credits)
MECH3022 Project (12 credits)

Discipline Core Course (Total 18 credits)

MECH3009	Energy conversion systems (6 credits)
MECH3011	Heat transfer (6 credits)
MECH3023	Building energy management and control systems (6 credits)

Breadth Course (Total 6 credits)

MECH3010 Engineering and technology management (6 credits)

Elective Courses (21 credits)

Students are required to complete 21 credits of Elective courses in the following manner:

(i) Elective Breadth/Depth Courses (up to 21 credits)
(ii) Elective MSc(Eng) Courses (up to 6 credits)
(iii) Free Elective Courses (up to 12 credits)

Elective Breadth/Depth Courses (Up to 21 credits)

BBSE3009	Project management and engineering economics (6 credits)
CIVL3022	Wind engineering (6 credits)
MECH2016	Fundamentals of aeronautical engineering (6 credits)
MECH2019	Advanced computer programming in mechanical engineering applications (6 credits)
MECH3002	Air pollution control (6 credits)
MECH3005	Building services (6 credits)
MECH3007	Computer-aided design and manufacture (CAD/CAM) (6 credits)
MECH3020	Vibration (6 credits)

MECH3021 Viscous flow (6 credits)
MECH3026 Acoustics and noise control (6 credits)

Elective MSc(Eng) courses (Up to 6 credits)

MECH6010 Service behavior of materials (3 credits)
MECH6023 Power plant technology (3 credits)
MECH6024 Applied mathematics for engineers (3 credits)
MECH6028 Processing and properties of engineering plastics (3 credits)
MECH6033 Energy conservation and management (3 credits)
MECH6044 Energy and carbon audit (3 credits)
MECH6045 Nanotechnology: fundamentals and applications (3 credits)
MECH6046 Microsystems for energy, biomedical and consumer electronics applications (3 credits)

Free Elective Courses (Up to 12 credits)

Any other two elective courses as approved by the department (12 credits)

Course Descriptions

Level One

MECH1004 Drawing and elements of design and manufacture (6 credits)

Engineering drawing techniques; orthographic and pictorial projections; dimensioning and tolerancing; limits and fits; screw fasteners; cam; gears; computer aided drafting with 3D CAD modeling; product design; manufacturing processes.

Assessment: 100% continuous assessment

MECH1005 Fundamentals of electrical and electronic engineering (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH1013 Engineering Mechanics (6 credits)

Stress and strain; bending of beams; deflection of beams; thin-walled pressure vessels; kinematics of particles with different forms of acceleration; mechanisms; simple and epicyclic gear trains; momentum and energy conservation, application of kinetic principles to particles and vehicles with mass variation, velocity-dependent resistance and the action of central forces; undamped and damped free vibration.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

MECH1014 Thermofluids (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH1018 Engineering training (6 credits)

Instrumentation; PLC; basic electrical engineering; design and model making; machining and metrology; machining practice.

Assessment: 100% practical work

MECH1019 Properties of materials (6 credits)

Elements of atomic structure and bonding; crystal structure; structure of polymers; solidification and phase diagrams; defects and plastic deformation in the crystalline state; TTT diagrams and heat treatment of steels; metallurgy of fatigue; corrosion resistance and surface treatment; mechanical properties of plastics.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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ENGG1002 Computer programming and applications (6 credits)
ENGG1003 Mathematics I (6 credits)
ENGG1004 Mathematics IA (3 credits)
ENGG1005 Mathematics IB (3 credits)
ENGG1006 Engineering for sustainable development (6 credits)
ENGG1007 Foundations of computer science (6 credits)
ENGG1009 Industrial management and logistics (6 credits)
ENGG1011 Introduction to biomedical engineering (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
ENGG1016 Computer programming and applications I (6 credits)
ENGG1018 Introduction to mechanical engineering (6 credits)

For course descriptions, please refer to the General Engineering Courses in the syllabus for the degree of BEng for details.

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG9001 Practical Chinese for engineering students (3 credits)

For course descriptions, please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

CAES1513 Professional and technical written communication for engineers (3 credits)

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, analyzing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

Assessment: 100% continuous assessment

CCXXxxxx University Common Core Curriculum course (6 credits)
CCXXxxxx University Common Core Curriculum course (6 credits)

2 University Common Core Curriculum Courses from different Areas of Inquiry. Please refer to the University Common Core Curriculum Courses for details.

Level Two

MECH2002 Engineering thermodynamics (6 credits)

Steam and gas power plants; refrigeration; jet propulsion; gas mixture; psychrometry and air-conditioning; introduction to heat transfer and combustion.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2005 Design and manufacture (6 credits)

Material selection; joining and fastening; jigs and fixtures design; power transmission system design; CNC machining; rapid prototyping.

Assessment: 100% continuous assessment

MECH2006 Electrical and electronic engineering (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2007 Mathematics II (6 credits)

Complex variables; Fourier series and Fourier transforms; partial differential equations; introduction to probability and statistics; elementary numerical analysis.

Assessment: 20% continuous assessment, 80% examination.

MECH2008 Mechanics of fluids (6 credits)

Navier-Stokes equations; pipe and channel viscous flows; lubrication; two-dimensional potential flows; boundary layer flows; open-channel flows.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2009 Mechanics of solids (6 credits)

Two-dimensional theory of elasticity; thermal stress and rotating disks; experimental methods; material failure and yielding; introduction to the finite element method; buckling; energy methods; bending of circular plate.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2016 Fundamentals of aeronautical engineering (6 credits)

History of aeronautical science; wing aerodynamics; propulsion; flight mechanics; systems and airframe structures; fatigue-crack growth, crack monitoring, damage tolerance; metallic materials, composites, fibre-reinforced laminates; high-temperature alloys for turbines, creep damage.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2017 Industrial training (6 credits)

Training in industry for a nominal period of at least six weeks during the summer vacation of the Second Year of Study.

Assessment: 100% practical work

MECH2018 Dynamics and control (6 credits)

Advanced rotational motion; balancing of rotating and reciprocating masses; forced vibration of single degree of freedom systems; vibration measurement, isolation and control; torsional vibration of multi-rotor systems; free transverse vibration of shafts; modelling of physical systems; time response analysis of dynamical systems; feedback control systems; control system design and applications; stability; root locus method.

Assessment: 20% practical work, 10% continuous assessment, 70% examination

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MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)

Windows® Form programming in C# with user interface and graphics; group project on the application of computing to the solution of an engineering problem; interfacing a microcontroller with a window program; basic programming technique on numerical computation with SCILab for solving engineering problems.

Assessment: 100% continuous assessment

CIME2001 Water and air quality: concepts and measurement (6 credits)

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

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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Level Three

BBSE3009 Project management and engineering economics (6 credits)

Characteristics of building projects and typical contracts; roles of different building professionals; project planning, scheduling and control; contract documentation and contractual arrangement; estimating and tendering; site organisation and supervision; measurement and valuation of works; claim management and settlement; alternative dispute resolution; 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.

Assessment: 30% continuous assessment, 70% examination

MECH3002 Air pollution control (6 credits)

Micrometeorology, air dispersion; combustion fundamentals; pollutant formation mechanism and control technologies; abatement of volatile organic compounds using incineration techniques; particulate and aerosol abatement technology; particle technology, log-normal distribution; settling chamber, cyclone, electrostatic precipitator, bag filter.

Assessment: 20% continuous assessment, 80% examination

MECH3004 Automatic control (6 credits)

Control of mechanical and electrical 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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3005 Building services (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3007 Computer-aided design and manufacture (CAD/CAM) (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

MECH3008 Design (6 credits)

Students undertake a group design project under supervision from September to April of the following year. Project topics are stipulated by industrial sponsors.

Assessment: 100% practical work

MECH3009 Energy conversion systems (6 credits)

Energy calculations; solar thermal power plant; energy storage; solar photovoltaic systems; wind energy systems; nuclear energy and power plants; nuclear waste management; urban waste.

Assessment: 30% continuous assessment, 70% examination

MECH3010 Engineering and technology management (6 credits)

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.

Assessment: 15% continuous assessment, 85% examination

MECH3011 Heat transfer (6 credits)

Fourier's law; heat-conduction equation; thermal conductivity; conduction; fins; basic convection principles; laminar and turbulent heat transfer in tubes and over plates; Reynolds analogy; types of heat exchangers; overall heat-transfer coefficient; log mean temperature difference; effectiveness-NTU method; heat exchanger design.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3012 Product design and development (6 credits)

Product design and manufacturing process; methods and tools used for designing and developing electromechanical products; tooling design; design for manufacture and assembly, product costing; value engineering.

Assessment: 40% continuous assessment, 60% examination

MECH3014 Materials for engineering applications (6 credits)

Materials for high strength/weight ratio; high temperature service; resistance to corrosion resistance and protection; advanced alloys; composite and ceramic materials; problem based learning module.

Assessment: 15% continuous assessment, 85% examination

MECH3015 Applied stress and strength analysis (6 credits)

Theory of elasticity, plastic analysis, finite element methods for two- and three-dimensional continua; rectangular plate bending; fracture mechanics.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3020 Vibration (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3021 Viscous flow (6 credits)

Continuity and Navier-Stokes equations; laminar boundary layers; elementary concepts of compressible flows and shock waves; stability theory; flow behind bluff bodies; low Reynolds number flows and turbulent flows.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3022 Project (12 credits)

A dissertation or report on a topic consisting of engineering design; laboratory experiments; and/or analytical investigation.

Assessment: 100% practical work

MECH3023 Building energy management and control systems (6 credits)

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.

Assessment: 10% practical work, 20% continuous assessment, 70% examination

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MECH3026 Acoustics and noise control (6 credits)

Human hearing; sound measurement and environmental noise legislation; wave equation, sound radiation by piston and aeroacoustic source mechanisms; sound propagation and reflection in ducts; duct modes; sound absorption mechanisms; sound reverberation in rooms and transmission through walls; physics of active noise control; introduction to vibration isolation.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH6010 Service behaviour of materials

Creep regimes; creep mechanisms; creep resistant alloys; brittle fracture; ductile fracture; brittle-ductile transition; fracture mechanism maps; fatigue; Basquins and Coffin-Manson Laws; Goodman's relation; Palmgren-Miner rule; corrosion; electrochemical principles; forms of corrosion; corrosion control; case studies; introduction to polymer-matrix composites.

Assessment: 100% examination

MECH6024 Applied mathematics for engineers (3 credits)

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.

Assessment: 20% continuous assessment, 80% examination

MECH6028 Processing and properties of engineering plastics (3 credits)

Viscosity of polymer melts, extrusion, injection moulding, blow moulding, rapid prototyping, 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.

Assessment: 100% examination

MECH6045 Nanotechnology: fundamentals and applications (3 credits)

Characteristic length scales, nanomaterials, nanostructures, physical properties of nanostructures, deposition techniques of nanofabrication, high resolution analysis and characterization, scanning probes 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.

Assessment: 10% continuous assessment, 90% examination

MECH6023 Power plant technology (3 credits)

Historical development; energy resources; steam and vapour cycles; boilers; fuels and combustion; steam turbines; gas turbines; principles of nuclear energy; radioactivity; reaction rate and power shape; nuclear reactor thermal-hydraulics; Pressurized Water Reactor power plant and its design limits.

Assessment: 20% continuous assessment, 80% examination

MECH6033 Energy conservation and management (3 credits)

Energy sources and environmental impact; energy in buildings; energy-efficient industrial processes; waste heat recovery; energy storage; energy auditing; economic analysis; energy strategies and management.

Assessment: 30% continuous assessment, 70% examination

MECH6044 Energy and carbon audit (3 credits)

Climate change and potential challenges; greenhouse gas emission and environmental impact; energy and carbon management opportunity; measurement & verification; carbon audit guidelines in Hong Kong; carbon footprint calculator.

Assessment: 40% continuous assessment, 60% examination

MECH6046 Microsystems for energy, biomedical and consumer electronics applications (3 credits)

MEMS and microsystem products, microsensors, microactuators, microfluidic devices, multidisciplinary nature of microsystem design and manufacture, fluid mechanics in microscaled flows, materials for MEMS and microfluidic devices, fluid mechanics in microscaled flows, fabrication techniques of MEMS and microfluidic devices, flow characterization techniques, flow control with microfluidics, microfluidics for life sciences and chemistry.

Assessment: 10% continuous assessment, 90% examination ~~60%~~

CIVL3022 Wind engineering (6 credits)
CIVL3015 Solid and hazardous waste management (6 credits)
CIVL3011 Municipal and industrial wastewater treatment (6 credits)

For course descriptions, please refer to the syllabuses of the Civil Engineering programme.

MEDE3001 Tissue Engineering (3 credits)
MEDE3003 Biomaterials (3 credits)
MEDE3005 Transport phenomena in biological systems (6 credits)
MEDE3007 Molecular and cellular biomechanics (6 credits)

For course descriptions, please refer to the syllabuses of the Medical Engineering programme.

MECHANICAL ENGINEERING (BUILDING SERVICES ENGINEERING)

SYLLABUS

This syllabus applies to students admitted in the academic year 2012-13.

Definitions and Terminology

Each course offered by the Department of Mechanical Engineering shall be classified as either introductory level course of advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are introductory courses whereas advanced courses includes Levels Two and Three courses.

A *Discipline Core Course* is a compulsory course which a candidate must pass in the manner provided in the Regulations. A *Project Course* is also a compulsory course which a candidate must pass. A *Breadth Course* is a Level 1, Level 2 or Level 3 course that is offered normally as an optional course for the curriculum. A *Depth Course* is a Level 3 course offered as an optional course for the curriculum. *Elective course* is a course offered by the Department of Mechanical Engineering, other departments under the Faculty of Engineering, or by other faculties.

The Curriculum

The curriculum comprises of 180 credits of courses as follows:

(a) 24 credits from General Engineering courses, including:
  (i) either ENGG1002 Computer programming and applications (6 credits) or
  ENGG1016 Computer programming and applications I (6 credits); AND
  (ii) either ENGG1003 Mathematics I (6 credits) or
  ENGG1004 Mathematics IA (3 credits) and ENGG1005 Mathematics IB (3 credits); AND
  (iii) ENGG1018 Introduction to mechanical engineering (6 credits); AND
  (iv) Any one General Engineering course offered by other departments of the Faculty of Engineering (6 credits)
(b) 90 credits of Discipline Core courses
(c) 18 credits of Project courses
(d) 21 credits of Elective courses
(e) University requirements (21 credits), including:
  (i) CAES1513 Professional and technical written communication for engineers (3 credits)[32]
  (ii) CAES1515 Professional and technical oral communication for engineers (3 credits)
  (iii) CENG1001 Practical Chinese language course for engineering students (3 credits)[33]
  (iv) 12 credits of courses from the University Common Core Curriculum, selecting no more than one course from each Area of Inquiry
(f) 6 credits of Breadth course

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[32] Students pursuing BEng/BBA should take CAES1907 in lieu of CAES1513

[33] "Putonghua-speaking students should take CUND0002 or CUND0003. Students who have not studied Chinese language during their secondary education / who have not attained the requisite level of competence in the Chinese language to take CENG10xx can apply (i) to take credit-bearing Cantonese or Putonghua language courses offered by the School of Chinese especially for international and exchange students; OR (ii) to be exempted from the Chinese language requirement and take an elective language course in lieu".

To complete the degree curriculum, a candidate must pass at least a total of 180 credits, including all the courses listed under (a) to (e) and satisfy any other requirements as stipulated in the University or Faculty of Engineering regulations.

Degree Classification

The best 180 credits satisfying the Curriculum described above shall be taken into account for degree classification.

Order of Study

There are no course prerequisites but lower level courses should preferably be taken before higher level courses.

First Year

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

General Engineering Courses (Total 24 credits)

Either
ENGG1002 Computer programming and applications (6 credits); or
ENGG1016 Computer programming and applications I (6 credits); AND

Either
ENGG1003 Mathematics I (6 credits) or
both ENGG1004 Mathematics IA (3 credits) and ENGG1005 Mathematics IB (3 credits); AND

ENGG1018 Introduction to mechanical engineering (6 credits); AND
Any one General Engineering Courses (6 credits) from the following:

ENGG1007	Foundation of computer science
ENGG1009	Industrial management and logistics
ENGG1011	Introduction to biomedical engineering
ENGG1015	Introduction to electrical and electronic engineering
ENGG1006	Engineering for sustainable development

Discipline Core Courses (Total 24 credits)

MECH1004 Drawing and elements of design and manufacture (6 credits)
MECH1005 Fundamentals of electrical and electronic engineering (6 credits)
MECH1013 Engineering mechanics (6 credits)
MECH1014 Thermofluids (6 credits)

UG5 requirements (Total 9 credits)

CAES1513 Professional and technical written communication for engineers (3 credits)
CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Practical Chinese language course for engineering students (3 credits)

Optional Elective Course (Total 6 credits)

BBSE1012 Engineering training (6 credits) (Summer semester)

Second Year

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

Discipline Core Courses (Total 48 credits)

BBSE2001 Utility services (6 credits)
BBSE2007 Electrical ~~power supply~~ services and lighting engineering (6 credits)
BBSE2008 Air conditioning and refrigeration engineering (6 credits)
MECH1019 Properties of materials (6 credits)
MECH2002 Engineering thermodynamics (6 credits)
MECH2007 Mathematics II (6 credits)
MECH2008 Mechanics of fluids (6 credits)
MECH2018 Dynamics and control (6 credits)

UG5 requirements (Total 12 credits)

2 University Common Core Curriculum Courses (12 credits)

Optional Elective Courses (Total 12 credits)

BBSE2006 Industrial training (6 credits) (Summer semester)
MECH2016 Fundamentals of aeronautical engineering (6 credits)
MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)

Third Year

The third-year syllabuses for Main Stream students shall normally include the following courses:

Project Courses (Total 18 credits)

BBSE3002 Applied research project (12 credits)
BBSE3008 Design project (6 credits)

Breadth Course (Total 6 credits)

MECH3010 Engineering and technology management (6 credits)

Discipline Core Courses (18 credits)

BBSE3003 Fire protection engineering (6 credits)
BBSE3009 Project management and engineering economics (6 credits)
MECH3023 Building energy management and control systems (6 credits)

Elective Courses (21 credits)

Students are required to complete 21 credits of Elective courses in the following manner:

(i) Elective Breadth/Depth Courses (up to 21 credits)

(ii) Elective MSc(Eng) courses (up to 6 credits)
(iii) Free Elective Course (up to ~~6~~ 12 credits)

Elective Breadth/Depth Courses (Up to 21 credits)

MECH2016 Fundamentals of aeronautical engineering (6 credits)
MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)
MECH3002 Air pollution control (6 credits)
MECH3004 Automatic control (6 credits)
MECH3007 Computer-aided design and manufacture (CAD/CAM) (6 credits)
MECH3009 Energy conversion systems (6 credits)
MECH3011 Heat transfer (6 credits)
MECH3012 Product design and development (6 credits)
MECH3014 Materials for engineering applications (6 credits)
MECH3020 Vibration (6 credits)
MECH3021Viscous flow (6 credits)
MECH3026 Acoustics and noise control (6 credits)

Elective MSc(Eng) courses (Up to 6 credits)

MECH6010 Service behavior of materials (3 credits)
MECH6023 Power plant technology (3 credits)
MECH6024 Applied mathematics for engineers (3 credits)
MECH6028 Processing and properties of engineering plastics (3 credits)
MECH6033 Energy conservation and management (3 credits)
MECH6044 Energy and carbon audit (3 credits)
MECH6045 Nanotechnology: fundamentals and applications (3 credits)
MECH6046 Microsystems for energy, biomedical and consumer electronics applications (3 credits)

Free Elective Courses (Up to ~~6~~ 12 credits)

Any other two elective courses as approved by the department (12 credits)

Minor Programmes

From 2010-11 academic year, candidates from other than the Department of Mechanical Engineering may pursue a Minor in Mechanical Engineering or Minor in Mechanical Engineering – Building Services Engineering. Candidates who are interested in pursuing minor in Mechanical Engineering must satisfy the following prerequisites:

- Passed HKALE Pure Mathematics and
- Passed HKAL/AS Physics/Engineering Science

Minor in Mechanical Engineering

Candidates are required to complete a total of 36 credits of courses comprising:

(a) Introductory courses (12 credits)

Students are required to complete:

MECH1013	Engineering mechanics (6 credits)
MECH1014	Thermofluids (6 credit units)

(b) Advanced Elective courses (24 credits)

Students must complete 24 credits of advanced elective courses to be chosen from the following list:

MECH1004	Drawing and elements of design and manufacture (6 credits)
MECH1019	Properties of materials (6 credits)
MECH2002	Engineering thermodynamics (6 credits**)**
MECH2005	Design and manufacture (6 credits)
MECH2008	Mechanics of fluids (6 credits)
MECH2009	Mechanics of solids (6 credits)
MECH2018	Dynamics and control (6 credits)

Minor in Mechanical Engineering – Building Services Engineering

Candidates are required to complete a total of 36 credits of courses comprising:

(a) Introductory courses (12 credits)

Students are required to complete:

MECH1013	Engineering mechanics (6 credits)
MECH1014	Thermofluids (6 credit units)

(b) Advanced Elective courses (24 credits)

Students must complete 24 credits of advanced elective courses to be chosen from the following list with at least 12 credits of courses selected from those with course code BBSExxxx:

MECH2002	Engineering thermodynamics (6 credits**)**
MECH2008	Mechanics of fluids (6 credits)
BBSE2001	Utility services (6 credits)
BBSE2007	Electrical services and lighting engineering (6 credits)
BBSE2008	Air conditioning and refrigeration engineering(6 credits)
BBSE3003	Fire protection engineering (6 credits)
BBSE3023	Building energy management and control systems (6 credits)

Double –Degree in BEng/BBA

Candidates pursuing studies for the double-degree in BEng/BBA curriculum are required to satisfy all the requirement of the above BEng curriculum and pass 54 credits of courses as listed below:

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information system	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Business Electives (Any 2 courses in Finance, HRM or Marketing major)	12
	Total	**54**

Candidates pursuing studies for the double-degree in BEng/BBA curriculum are granted exemptions from the following courses:

Courses in the BEng curriculum to be exempted	Business courses to be completed
CAES1513 Professional and technical written communication for engineers (3 credits)	CAES1907 Business communication (3 credits)
Two Elective courses in Mechanical Engineering (total 12 credits) (1) BBSE3009 Project management and engineering economics (6 credits) (2) MECH3010 Engineering and technology management (6 credits)	BUSI1003 Introduction to management information system (6 credits) and BUSI1007 Principles of management (6 credits)
Two Elective Courses (~~6~~ 12 credits)	Any two other courses (12 credits)

COURSE DESCRIPTIONS

Level One

BBSE1012 Engineering training (6 credits)

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.

Assessment: 100% practical work

MECH1004 Drawing and elements of design and manufacture (6 credits)

Engineering drawing techniques; orthographic and pictorial projections; dimensioning and tolerancing; limits and fits; screw fasteners; cam; gears; computer aided drafting with 3D CAD modeling; product design; manufacturing processes.

Assessment: 100% continuous assessment

MECH1005 Fundamentals of electrical and electronic engineering (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH1013 Engineering Mechanics (6 credits)

Stress and strain; bending of beams; deflection of beams; thin-walled pressure vessels; kinematics of particles with different forms of acceleration; mechanisms; simple and epicyclic gear trains; momentum and energy conservation, application of kinetic principles to particles and vehicles with mass variation, velocity-dependent resistance and the action of central forces; undamped and damped free vibration.
Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH1014 Thermofluids (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH1019 Properties of materials (6 credits)

Elements of atomic structure and bonding; crystal structure; structure of polymers; solidification and phase diagrams; defects and plastic deformation in the crystalline state; TTT diagrams and heat treatment of steels; metallurgy of fatigue; corrosion resistance and surface treatment; mechanical properties of plastics.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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ENGG1002 Computer programming and applications (6 credits)
ENGG1003 Mathematics I (6 credits)
ENGG1004 Mathematics IA (3 credits)
ENGG1005 Mathematics IB (3 credits)
ENGG1006 Engineering for sustainable development (6 credits)
ENGG1007 Foundations of computer science (6 credits)
ENGG1009 Industrial management and logistics (6 credits)
ENGG1011 Introduction to biomedical engineering (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
ENGG1016 Computer programming and applications I (6 credits)
ENGG1018 Introduction to mechanical engineering (6 credits)

For course descriptions, please refer to the General Engineering Courses in the syllabus for the degree of BEng for details.

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG9001 Practical Chinese for engineering students (3 credits)

For course descriptions, please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

CAES1513 Professional and technical written communication for engineers (3 credits)

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, analyzing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; small-scale project design and implementation. Assessment is wholly by coursework.

Assessment: 100% continuous assessment

CCXXxxxx University Common Core Curriculum course (6 credits)
CCXXxxxx University Common Core Curriculum course (6 credits)

2 University Common Core Curriculum Courses. Please refer to the University Common Core Curriculum Courses for details.

Level Two

BBSE2001 Utility services (6 credits)

Characteristics and design of different utility service installations, cold, hot and flushing water supply systems, steam supply, sanitary and storm water drainage systems, vertical transportation system, communication systems, security and alarm.

Assessment: 15% practical work, 20% continuous assessment, 65% examination

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BBSE2006 Industrial training (6 credits)

Training in industry for a nominal period of at least six weeks during the summer vacation of the Second Year of Study.

Assessment: 100% practical work

BBSE2007 Electrical services and lighting engineering (6 credits)

Electrical power systems and motors; electricity market, system planning and design; electrical power supply and distribution; standby generators and power supplies; introduction and lighting basic concepts; light sources and luminaires; lighting design principles and process; lighting energy management.

Assessment: 15% practical work, 20% continuous assessment, 65% examination

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BBSE2008 Air conditioning and refrigeration engineering (6 credits)

Air conditioning systems, psychrometry, thermal comfort, load and energy calculations, air-side systems, fan design and other major components, air duct design, space air diffusion, water-side systems, piping system design, pump design and operation, indoor air quality, mechanical and natural ventilation, ventilation efficiency, refrigerants and refrigeration systems, refrigeration cycles and principles, design of refrigeration systems, refrigeration system components and performance.

Assessment: 15% practical work, 20% continuous assessment, 65% examination

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MECH2002 Engineering thermodynamics (6 credits)

Steam and gas power plants; refrigeration; jet propulsion; gas mixture; psychrometry and air-conditioning; introduction to heat transfer and combustion.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2007 Mathematics II (6 credits)

Complex variables; Fourier series and Fourier transforms; partial differential equations; introduction to probability and statistics, elementary numerical analysis.

Assessment: 20% continuous assessment, 80% examination

MECH2008 Mechanics of fluids (6 credits)

Navier-Stokes equations; pipe and channel viscous flows; lubrication; two-dimensional potential flows; boundary layer flows; open-channel flows.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2016 Fundamentals of aeronautical engineering (6 credits)

History of aeronautical science; wing aerodynamics; propulsion; flight mechanics; systems and airframe structures; fatigue-crack growth, crack monitoring, damage tolerance; metallic materials, composites, fibre-reinforced laminates; high-temperature alloys for turbines, creep damage.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH2018 Dynamics and control (6 credits)

Advanced rotational motion; balancing of rotating and reciprocating masses; forced vibration of single degree of freedom systems; vibration measurement, isolation and control; torsional vibration of multi-rotor systems; free transverse vibration of shafts; modelling of physical systems; time response analysis of dynamical systems; feedback control systems; control system design and applications; stability; root locus method.

Assessment: 20% practical work, 10% continuous assessment, 70% examination

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MECH2019 Advanced computer programming in mechanical engineering applications (6 credits)

Windows® Form programming in C# with user interface and graphics; group project on the application of computing to the solution of an engineering problem; interfacing a microcontroller with a window program; basic programming technique on numerical computation with SCILab for solving engineering problems.

Assessment: 100% continuous assessment

Level Three

BBSE3002 Applied research project (12 credits)

Engineering design; laboratory experiments; analytical investigation; final year project

Assessment: 100% practical work

BBSE3003 Fire protection engineering (6 credits)

Fire behavior 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; HKFSD and NFPA codes; prescriptive and performance-based approaches; fire risk management.

Assessment: 15% practical work, 20% continuous assessment, 65% examination

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BBSE3008 Design Project (6 credits)

Design project; Innovative Design; Inter-Disciplinary Design; Feasibility Studies; Conceptual Design; Scheme Design; Detail Design; Building Services Systems; Ventilation and Air Conditioning; Fire Protection; Water Supply and Drainage; Electrical Power Supply and Lighting; Vertical Transportation; System Components; Performance Evaluation; Computer Simulation and Modelling; Life-cycle Costing and Economic Analysis.

Assessment: 100% practical work

BBSE3009 Project management and engineering economics (6 credits)

Characteristics of building projects and typical contracts; roles of different building professionals; project planning, scheduling and control; contract documentation and contractual arrangement; estimating and tendering; site organisation and supervision; measurement and valuation of works; claim management and settlement; alternative dispute resolution; 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.

Assessment: 30% continuous assessment, 70% examination

MECH3002 Air pollution control (6 credits)

Micrometeorology, air dispersion; combustion fundamentals; pollutant formation mechanism and control technologies; abatement of volatile organic compounds using incineration techniques; Particulate and aerosol abatement technology; particle technology, log-normal distribution; settling chamber, cyclone, electrostatic precipitator, bag filter.

Assessment: 20% continuous assessment, 80% examination

MECH3004 Automatic control (6 credits)

Control of mechanical and electrical 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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3007 Computer-aided design and manufacture (CAD/CAM) (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

MECH3009 Energy conversion systems (6 credits)

Energy calculations; solar thermal power plant; energy storage; solar photovoltaic systems; wind energy systems; nuclear energy and power plants; nuclear waste management; urban waste.

Assessment: 30% continuous assessment, 70% examination

MECH3010 Engineering and technology management (6 credits)

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.

Assessment: 15% continuous assessment, 85% examination

MECH3011 Heat transfer (6 credits)

Fourier's law; heat-conduction equation; thermal conductivity; conduction; fins; basic convection principles; laminar and turbulent heat transfer in tubes and over plates; Reynolds analogy; types of heat exchangers; overall heat-transfer coefficient; log mean temperature difference; effectiveness-NTU method; heat exchanger design.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3012 Product design and development (6 credits)

Product design and manufacturing process; methods and tools used for designing and developing electromechanical products; tooling design; design for manufacture and assembly, product costing; value engineering.
Assessment: 40% continuous assessment, 60% examination

MECH3014 Materials for engineering applications (6 credits)

Materials for high strength/weight ratio; high temperature service; resistance to corrosion resistance and protection; advanced alloys; composite and ceramic materials; problem based learning module.

Assessment: 15% continuous assessment, 85% examination

MECH3020 Vibration (6 credits)

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.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3021 Viscous flow (6 credits)

Continuity and Navier-Stokes equations; laminar boundary layers; elementary concepts of compressible flows and shock waves; stability theory; flow behind bluff bodies; low Reynolds number flows and turbulent flows.

Assessment: 10% practical work, 10% continuous assessment, 80% examination

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MECH3023 Building energy management and control systems (6 credits)

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.

Assessment: 10% practical work, 20% continuous assessment, 70% examination

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MECH3026 Acoustics and noise control (6 credits)

Human hearing; sound measurement and environmental noise legislation; wave equation, sound radiation by piston and aeroacoustic source mechanisms; sound propagation and reflection in ducts; duct modes; sound absorption mechanisms; sound reverberation in rooms and transmission through walls; physics of active noise control; introduction to vibration isolation.

Assessment: 10% practical work, 10% continuous assessment, 80% examination.

MECH6024 Applied mathematics for engineers (3 credits)

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.

Assessment: 20% continuous assessment, 80% examination.

MECH6028 Processing and properties of engineering plastics (3 credits)

Viscosity of polymer melts, extrusion, injection moulding, blow moulding, rapid prototyping, 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.

Assessment: 100% examination

MECH6010 Service behaviour of materials

Creep regimes; creep mechanisms; creep resistant alloys; brittle fracture; ductile fracture; brittle-ductile transition; fracture mechanism maps; fatigue; Basquins and Coffin-Manson Laws; Goodman's relation; Palmgren-Miner rule; corrosion; electrochemical principles; forms of corrosion; corrosion control; case studies; introduction to polymer-matrix composites.

Assessment: 100% examination

MECH6023 Power plant technology (3 credits)

Historical development; energy resources; steam and vapour cycles; boilers; fuels and combustion; steam turbines; gas turbines; principles of nuclear energy; radioactivity; reaction rate and power shape; nuclear reactor thermal-hydraulics; Pressurized Water Reactor power plant and its design limits.

Assessment: 20% continuous assessment, 80% examination

MECH6033 Energy conservation and management (3 credits)

Energy sources and environmental impact; energy in buildings; energy-efficient industrial processes; waste heat recovery; energy storage; energy auditing; economic analysis; energy strategies and management.

Assessment: 30% continuous assessment, 70% examination

MECH6044 Energy and carbon audit (3 credits)

Climate change and potential challenges; greenhouse gas emission and environmental impact; energy and carbon management opportunity; measurement & verification; carbon audit guidelines in Hong Kong; carbon footprint calculator.

Assessment: 40% continuous assessment, 60% examination

MECH6045 Nanotechnology: fundamentals and applications (3 credits)

Characteristic length scales, nanomaterials, nanostructures, physical properties of nanostructures, deposition techniques of nanofabrication, high resolution analysis and characterization, scanning probes 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.

Assessment: 10% continuous assessment , 90% examination

MECH6046 Microsystems for energy, biomedical and consumer electronics applications (3 credits)

MEMS and microsystem products, microsensors, microactuators, microfluidic devices, multidisciplinary nature of microsystem design and manufacture, fluid mechanics in microscaled flows, materials for MEMS and microfluidic devices, fluid mechanics in microscaled flows, fabrication techniques of MEMS and microfluidic devices, flow characterization techniques, flow control with microfluidics, microfluidics for life sciences and chemistry.

Assessment: 10% continuous assessment, 90% examination

MEDICAL ENGINEERING

SYLLABUS

This syllabus applies to students admitted in the academic year 2012-13.

Definitions and Terminology

Each course offered for the BEng in Medical Engineering curriculum shall be classified as either introductory level course or advanced level course, and be assigned a Level --- One, Two or Three, in which Level One courses are generally classified as introductory courses whereas advanced courses includes Level Two and Three courses.

A *Compulsory course* is a course which a student must study. A *Core Engineering course* is a Compulsory course which a student must pass in the manner as stipulated in the Regulations.

The Projects shall include MEDE2008 Integrated Project and MEDE3002 Final-year Project.

The *training course* in this curriculum consists of MEDE1010 Engineering Training and MEDE2010 Professional Training (Internship).

An Elective course in Medical Engineering is a Level 2 or Level 3 course offered as an optional course for the curriculum.

Loading

The normal load for a student is 60 credits of courses (excluding summer semester) per academic year with 30 credits in each semester. Students are allowed to increase the loading by not more than 6 credits in a semester or decrease the loading by the equivalent number of credits which they have previously taken as additional loading and passed.

Curriculum Requirement

The curriculum comprises 186 credits of courses as follows:

(a) 108 credits of Core Engineering courses
(b) 30 credits of Compulsory courses
(c) at least 15 credits of elective courses in Medical Engineering
(d) 21 credits of courses satisfying the UG5 requirements:
    (i) Professional and technical communication for medical engineering students[34] (3 credits)
    (ii) Professional and technical oral communication for engineers (3 credits)
    (iii) Practical Chinese language course for engineering students[35] (3 credits)

[34] Students pursuing the double degrees in BEng/BBA are required to take CAES1907 in lieu of CAES1511.

[35] Putonghua-speaking students should take CUND0002 or CUND0003. Students who have not studied Chinese language during their secondary education / who have not attained the requisite level of competence in the Chinese language to take CENG1001 can apply (i) to take credit-bearing Cantonese or Putonghua language courses offered by the School of Chinese especially for

(iv) Two courses from the Common Core Curriculum, selecting no more than one course from each Area of Inquiry (12 credits)

(e) 6 credits of Complementary Studies courses[36]

(f) Engineering training[3] (3 credits)

(g) Professional training[3] (3 credits)

To complete the degree requirement, a student must obtain at least 186 credits including all courses listed under (a) to (g).

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. Medical Engineering elective course can be taken in any order as long as pre-requisites are met.

Degree Classification

The best 180 credits including the courses below shall be taken into account:

(i) 6 credits of Complementary Studies courses;

(ii) 21 credits of courses satisfying the UG5 requirements;

(iii) 108 credits of Core Engineering Courses;

(iv) the remaining courses with the best results including at least 15 credits of elective courses in Medical Engineering and 30 credits of Compulsory courses.

The programme structure is as follows:

FIRST YEAR

Core Engineering Courses (Total 36 credits)
(The number in brackets is the number of credits of the particular course)

ENGG1011	Introduction to biomedical engineering (6 credits)
ENGG1015	Introduction to electrical and electronic engineering (6 credits)
ENGG1018	Introduction to mechanical engineering (6 credits)
MEDE0001	Life science I (Biochemistry) (6 credits)
either	
ENGG1002	Computer programming and applications (6 credits)
or	
ENGG1016	Computer programming and applications I (6 credits)

either

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international and exchange students; OR (ii) to be exempted from the Chinese language requirement and take an elective course in lieu.

[36] Students pursuing the studies of double degrees in BEng/BBA are allowed a waiver from taking these courses, the credits of which will be replaced by the required courses in Finance, HRM or Marketing major offered by the Faculty of Business and Economics to satisfy the Medical Engineering Curriculum requirement.

ENGG1003 Mathematics I (6 credits)
or
ENGG1004 Mathematics IA (3 credits) and
ENGG1005 Mathematics IB (3 credits)

UG5 Requirements (Total 21 credits)

CAES1511 Professional and technical communication for medical engineering students[1] (3 credits)
CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Practical Chinese language course for engineering students[2] (3 credits)
Two Common Core Curriculum Courses (12 credits)

Engineering Training (Total 3 credits)

MEDE1010 Engineering training[3] (3 credits)

SECOND YEAR

Core Engineering Courses (Total 54 credits)

MECH2007 Mathematics II (6 credits)
MEDE0002 Life science II (Cell Biology & Physiology) (6 credits)
MEDE2001 Biomechanics for medical engineering (6 credits)
MEDE2002 Electromagnetics in biomedicine (6 credits)
MEDE2005 Thermofluids for medical engineering (6 credits)
MEDE2007 Medical imaging (6 credits)
MEDE2008 Integrated project (6 credits)
MEDE2202 Biomaterials I (6 credits)
MEDE2203 Biomedical signals and linear systems (6 credits)

Complementary Studies Course (Total 6 credits)

MEDE2814 Engineering management and society[3] (6 credits)

Professional Training (Total 3 credits)

MEDE2010 Professional training [3] (3 credits)

THIRD YEAR

Core Engineering Courses (Total 18 credits)

MEDE3002 Medical engineering final year project (12 credits)
LIFE2004 Life sciences III (Physiology) (6 credits)

Compulsory Courses [3] (Total 30 credits)

MEDE2006 Statistical planning and analysis for biomedical studies (3 credits)
MEDE2009 Biophotonics (6 credits)
MEDE3001 Tissue engineering (3 credits)
MEDE3003 Biomaterials II (3 credits)
MEDE3005 Transport phenomena in biological systems (6 credits)

MEDE3006 Medical devices (3 credits)
MEDE3007 Molecular and cellular biomechanics (6 credits)

Elective Course in Medical Engineering[3] (Total 15 credits)
Recommended Elective Course

BIOC3608 Sequence bioinformatics (6 credits)
ELEC1401 Computer organization and microprocessors (6 credits)
ELEC2815 Economics, finance and marketing for engineers (6 credits)
ELEC6067 Magnetic resonance imaging (MRI) technology & applications (3 credits)
ELEC6079 Biomedical ultrasound (3 credits)
MECH6045 Nanotechnology: fundamentals and applications (3 credits)

Additional Elective Course

Group A: Biomechanics, Biomaterials and Tissue Engineering
MECH2005 Design and manufacture (6 credits)
MECH2018 Dynamics and control (6 credits)
MECH6024 Applied mathematics for engineers (3 credits)

Group B: Medical Electronics and Biomedical Imaging
ELEC2204 Digital signal processing (6 credits)
ELEC2205 Control and instrumentation (6 credits)
ELEC2302 Digital system design (6 credits)
ELEC2601 Human computer interaction (6 credits)
ELEC3222 Robotics (6 credits)
ELEC3225 Digital imaging processing (6 credits)
CSIS0278 Introduction to database management systems (6 credits)

The list of Elective courses in Medical Engineering 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.

Double degrees in BEng/BBA option

Students pursuing studies for the double degrees in BEng/BBA curriculum are required to satisfy all the requirements of the above BEng curriculum and pass 54 credits of courses as listed below:

Course Code	**Course**	**Credits**
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information system	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6
	Business Electives (Any 2 courses in Finance, HRM or Marketing major)	12
	Total	**54**

Exemption rule for students pursuing the BEng/BBA double degrees option:

For students pursuing the double degrees in BEng/BBA option, they are deemed to have satisfied the following courses:

6 credits of Complementary Studies
9 credits of Elective course in Medical Engineering
3 credits of Engineering training
3 credits of Professional training (Internship)
3 credits of Compulsory course

after they have successfully completed all the courses from the following list:

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1003	Introduction to management information systems	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
FINA1003	Corporate finance	6
BUSI0027	Management accounting I	6

Exemption rule for students pursuing the minor in FBE:

Students pursuing studies for Minor in Business/Economics/Finance are required to satisfy all the requirement of the above BEng curriculum and pass 36 credits of courses as prescribed by the Faculty of Business and Economics (information also available from http://engg.hku.hk/).

Furthermore, such students are deemed to have satisfied 6 credits of Elective (ELEC2815 Economics, finance and marketing for engineers) and 3 credits of Engineering Training (MEDE1010) after they have successfully completed 12 credits of courses from the following list.

Course Code	Course	Credits
BUSI1002	Introduction to accounting	6
BUSI1004	Marketing	6
BUSI1007	Principles of management	6
ECON1001	Introduction to economics I	6
ECON1002	Introduction to economics II	6
ECON2101	Microeconomic theory	6
ECON2113	Microeconomic analysis	6
FINA1003	Corporate finance	6
FINA2802	Investments and portfolio analysis	6

COURSE DESCRIPTIONS

LEVEL ONE

ENGG1002 Computer programming and applications (6 credits)
ENGG1003 Mathematics I (6 credits)
ENGG1004 Mathematics IA (3 credits)
ENGG1005 Mathematics IB (3 credits)
ENGG1011 Introduction to biomedical engineering (6 credits)
ENGG1015 Introduction to electrical and electronic engineering (6 credits)
ENGG1016 Computer programming and applications I (6 credits)
ENGG1018 Introduction to mechanical engineering (6 credits)

Please refer to the General Engineering courses in the syllabus for the degree of BEng for details.

MEDE0001 Life science I (Biochemistry) (6 credits)

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.

Assessment: 30% continuous assessment, 70% examination

CAES1511 Professional and technical communication for medical engineering students (3 credits)

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 Centre for Applied English Studies 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.

Assessment: 100% continuous assessment

CAES1515 Professional and technical oral communication for engineers (3 credits)
CENG1001 Practical Chinese language course for engineering students (3 credits)

Please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

MEDE1010 Engineering training (3 credits)

Design & model making, computational fluid dynamics (CFD), material processing, rapid prototyping, machining & metrology, CAD/CAM, soldering, wire wrapping, printed circuit boards (PCBs), use of wire wrapping tools, virtual instrumentation.

Assessment: 75% practical work, 25% continuous assessment

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12 credits of courses from the Common Core Curriculum

LEVEL TWO

MECH2007 Mathematics II (6 credits)

Complex variables; Fourier series and Fourier transforms; partial differential equations; introduction to probability and statistics; elementary numerical analysis.

Assessment: 20% continuous assessment, 80% examination

MEDE0002 Life science II (Cell Biology and Physiology) (6 credits)

This course aims to provide a basic understand of the structure and function of cells and tissues within our body, including the structures and functions of the cell; the general organisation of epithelium and glands; the different types and functions of the connective tissues; the general organisation of the nervous tissues, muscle and skin tissues, bone marrow and lymphatic tissues. The second part of the course will provide the students with integrated knowledge of human physiology and pathophysiology that is relevant to medical engineering in such areas as organization of the body, homeostasis and excitable tissues; the cardiovascular system; the renal system, and some common disorders of the cardiovascular and renal systems.

Assessment: 20% continuous assessment, 80% examination

MEDE2001 Biomechanics for medical engineering (6 credits)

Stress and strain; bending and deflection of beams; structural failure and viscoelasticity; Kinematics of particles, momentum and energy principles; free vibration and kinematics of mechanisms; human gait and motion; bone fracture & fixation.

Assessment: 10% practical work, 20% continuous assessment, 70% examination

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MEDE2002 Electromagnetics in biomedicine (6 credits)

The aim of this course is two-folded. First, fundamental physics and mathematics in electricity and magnetism are discussed. Vector analysis is included. Topics on electricity include electric field, Gauss's

law, divergence theorem, electric potential, capacitor, dielectrics, Poisson's and Laplace's equations, and work and electrostatic energy. Topics on magnetism include magnetic field, Ampere's circuital law, Stokes theorem, magnetic flux, magnetic materials, and Faraday's law. Finally, Maxwell equations and transmission lines are explained. Second, emphasis is placed on the biological aspects of electromagnetism. Sections on biomedical applications of electromagnetism cover the biomedical instrument – linear accelerator (cyclotron, proton treatment facility). Sections on bioelectromagnetism and bioelectromagnetics cover electromagnetic fields generated by biological systems and the biological interaction with electromagnetic fields.

Assessment: 20% continuous assessment, 80% examination

MEDE2005 Thermofluids for medical engineering (6 credits)

Concepts and definitions in engineering thermodynamics; thermodynamic properties; first law of thermodynamics; basic concepts in fluid mechanics for medical engineering; dimensional analysis and similarity; introduction to mass transport; introduction to diffusion

Assessment: 10% practical work, 20% continuous assessment, 70% examination

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MEDE2007 Medical imaging (6 credits)

Medical imaging is an indispensible technology in modern healthcare and biomedical research. It provides in vivo anatomical, physiological and functional information of the human body in normal, developing and pathological states. The rapid development in this field not only leads to better disease diagnosis and more accurate treatment efficacy assessment, but also paves the way for better understanding of living biological systems.

This course will focus mainly on the principles of conventional (X-ray and Ultrasound) and modern (Computerized Tomography – CT; Magnetic Resonance Imaging – MRI; Nuclear Imaging and Optical Imaging) imaging techniques applied to biological systems and in medical diagnoses and the interpretations of these images.

At the end of the course, students should gain a clear understanding in the physics, working principles and mathematics involved in the various imaging modalities covered. They should also be able to appreciate the interdisciplinary nature of the subject and learn the latest development or advancement in the field of medical imaging.

Assessment: 15% continuous assessment, 85% examination

MEDE2008 Integrated project (6 credits)

This project is broadly centered around the topic of biomedical circuits. Its overall aim is to provide biomedical or electronic engineering students with a hands-on opportunity to develop an electrocardiogram (ECG) amplifier circuit from scratch and thereby learn more about the technical details of bio-potential measurement devices. Upon completing this course, the student should be able to explain to others the practical importance and technical details of amplifier circuits used for ECG potential measurements; to develop an ECG amplifier on a breadboard as well as a standalone package using basic

electronic parts such as op-amp chips, resistors, and capacitors. Understand how proper design of circuits can play an important role in measuring bio-potentials and assist in medical diagnoses accordingly.

Assessment: 100% practical work

MEDE2202 Biomaterials I (6 credits)

Bonds and crystal structure; defects in crystalline solids; diffusion; solidification; phase diagram; strength of materials; plastic deformation; recrystallization; grain growth; fracture of materials; fatigue life and fatigue crack growth; creep; corrosion; structure and properties of polymers; analytical and testing techniques; definitions in biomaterials science and engineering; history of biomaterials; structure and properties of biological materials; materials in biomedical applications.

Assessment: 15% practical work, 85% examination

MEDE2203 Biomedical signals and linear systems (6 credits)

Signals and linear system theory is fundamental to all engineering discipline, especially in the field of electrical, computer and medical engineering. This is a first course in signals and linear systems for engineering students without any pre-requisite knowledge in signal theory or signal processing other than some knowledge in fundamental calculus and use of complex numbers. The course uses simple real life examples of signals and systems to illustrate how signal theory can be used in practical application, and will including an introduction to MATLAB as a tool for signal analysis and system modelling.

This course aims to help students gain a firm understanding of the fundamentals of signal and linear systems concepts and theory using adequate mathematical and computing techniques to tackle simple signal processing problems. It serves as a pre-requisite course for many other courses including Digital Signal Processing, Control and Instrumentation, Communication Systems, and Digital Image Processing.

Specifically, the course covers the following topics: time-domain signal representation, periodic and aperiodic signals; spectral representation of signals, Fourier series and Fourier transform; system responses and linear system modelling; sampling, aliasing and analog-to-digital conversion; z-transform and concepts of poles and zeros; convolution; FIR filters and digital filtering; IIR filters and frequency response of digital filters; continuous-time systems and Fourier transform properties; application examples of signal analysis and processing.

At the end of the course, students should have a clear understanding of the fundamentals of signals and system theory to enable them to perform simple signal analysis and processing using both analytical method as well as using computing tools, link the mathematical representation of signals to some very simple real life signals and vice versa, and appreciate the applications of linear systems theory in solving some simple real life problems. In addition, students should be aware of the complexity of real life problems and the need to continue investigation in practice after graduation.

Assessment: 20% practical work, 10% continuous assessment, 70% examination

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MEDE2814 Engineering management and society (6 credits)

The aims are to develop basic understanding of organization and management skills, professional ethics and legal foundation for the engineering discipline. Topics on engineering organization, project management and managerial skills, decision making processes, contingency and crisis management, leadership, corporate culture and philanthropy will be discussed. In order to provide a clear and right insight for engineering students to interact and contribute to the society, topics related to professional conduct, social responsibility, sustainability and safety issues, technology and environment, professional ethics are included. For the legal foundation, topics such as contract, intellectual property, tort, professional negligence and related law issues are discussed.

Assessment: 50% continuous assessment, 50% examination

MEDE2010 Professional training (3 credits)

This course aims to provide our students with on-the-job training in local or non-local companies or organizations so that they can integrate theory learning with practical applications; understand real-life organizational structure and business operation; learn how to build human relations with seniors and co-workers; and enrich personal resume for becoming engineering professional.

Assessment: 100% continuous assessment

LEVEL THREE

LIFE2004 Life Sciences III (Physiology) (6 credits)

To provide the students with integrated knowledge of human physiology and pathophysiology that is relevant to medical engineering in such areas as (1) blood, blood clotting and immune response, (2) breathing and gas transport, (3) generation and transmission of nerve impulses, muscle contraction, bone, (4) the brain and its functions, autonomic system and reflexes, and (5) some disorders of the above.

Assessment: 0% practical work, 30% continuous assessment, 70% examination

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MEDE2006 Statistical planning and analysis for biomedical studies (3 credits)

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

Assessment: 20% continuous assessment, 80% examination

MEDE2009 Biophotonics (6 credits)

This is an introductory course in biophotonics covering: (1) The essential concepts of (i) basic ray optics, (ii) wave optics, e.g. interference and diffraction, and (iii) photon optics, e.g. laser principles. (2)

Interaction of light with biological cells/tissues and its significances and implications in optical bioimaging and other optical diagnostic and therapeutic applications. (3) State-of-the-art biophotonic instrumentations and technologies: optical bioimaging and microscopy (optical coherence tomography (OCT), fluorescence microscopy, multiphoton and other nonlinear optical microscopy), lab-on-chip biosenors, laser therapy, optical-fiber-based micro-endoscopy.

Assessment: 30% practical work, 30% continuous assessment, 40% examination

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MEDE3001 Tissue engineering (3 credits)

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.

Assessment: 20% practical work, 80% examination

MEDE3002 Medical engineering final year project (12 credits)

This course is a core course for all final year medical engineering students. It requires students to apply the knowledge they acquired throughout their academic studies to solving real-life medical engineering problems. Students are provided with an opportunity to pursue their own research interest under the supervision of teachers from both Engineering & Medicine. At the end of the course, students are required to present a dissertation or report on a topic consisting of design, experimental or analytical investigations. They will develop the ability to formulate and solve problems in medical engineering.

Assessment: 100% continuous assessment

MEDE3003 Biomaterials II (3 credits)

To provide students with criteria for and medical use of various biomaterials in human body tissue repair; to keep students updated with the most recent developments in the biomaterials and tissue engineering field and also future directions; to equip students with a broad knowledge of prosthetic medical devices; to make students aware of prosthetic medical device regulations and standards for materials and dev ices as well as ethical issues

Pre-requisite: MEDE2004 / MEDE2202
Assessment: 20% practical work, 80% examination

MEDE3005 Transport phenomena in biological systems (6 credits)

Basic equations of fluid mechanics; fluid flow in the circulation and tissues; transport in porous media; mass transport in biological systems; kinetics; heat conduction; heat convection; heat exchangers..

Pre-requisite: MEDE2005 or equivalent
Assessment: 20% continuous assessment, 80% examination

MEDE3006 Medical devices (3 credits)

Provides a practical introduction to various medical devices in modern healthcare industries, including the basic principles and applications of commonly used medical instruments and devices, monitoring and analysis equipment, therapeutic equipment, software systems, and the safety and regulatory issues.

Assessment: 20% practical work, 40% continuous assessment, 40% examination

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MEDE3007 Molecular and cellular biomechanics (6 credits)

The focus of this course is on the physics of molecular biology and the mechanics of the cell. Topics include: (1) Biopolymer (actin filaments, microtubules, DNA etc.) conformations and dynamics (random walk model of polymers, worm-like chain model, persistence length, entropic driven elasticity); (2) Basic statistical mechanics and thermodynamics of solutions (entropy of mixing, Osmotic pressure); (3) Mechanics of the cell (membrane elasticity, cell shape, cell adhesion); and (4) Introduction to intermolecular interactions (electrostatic force, van der Waals force).

Assessment: 40% continuous assessment, 60% examination

Elective Courses in Medical Engineering

BIOC3608 Sequence bioinformatics (6 credits)

Please refer to the information provided by the Department of Biochemistry

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CSIS0278 Introduction to database management systems (6 credits)

Please refer to syllabus of the Computer Science programme

ELEC1401 Computer organization and microprocessors (6 credits)
ELEC2204 Digital signal processing (6 credits)
ELEC2205 Control and instrumentation (6 credits)
ELEC2302 Digital system design (6 credits)
ELEC2601 Human computer interaction (6 credits)
ELEC2815 Economics, finance and marketing for engineers (6 credits)
ELEC3222 Robotics (6 credits)
ELEC3225 Digital imaging processing (6 credits)

Please refer to the syllabuses of the BEng programmes offered by the Department of Electrical and Electronic Engineering for details.

ELEC6067 Magnetic resonance imaging (MRI) technology and applications (3 credits)

With advances in engineering and computing, an extraordinary body of imaging technologies and applications has developed over the last 25 years. Among the various in vivo imaging modalities available or under development today, magnetic resonance imaging (MRI) is one of the most versatile and valuable one.

This course is basically divided into two parts, covering a variety of MR related topics in detail. The first part of the course will focus on the fundamental principles and hardware of MRI while the second part will be on the advanced MRI applications.
At the end of the course, students should gain a thorough understanding in the principles of MRI and MR systems. They will also learn the latest state-of-the-art applications of MRI in research and clinical practices.

Assessment: Please refer to the information provided by the Department of Electrical and Electronic Engineering

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ELEC6079 Biomedical ultrasound (3 credits)

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 2007 – Medical Imaging, or equivalent) is highly preferred.

Assessment: Please refer to the information provided by the Department of Electrical and Electronic Engineering

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MECH6045 Nanotechnology: fundamentals and applications (3 credits)

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.

Assessment: Please refer to the information provided by the Department of Mechanical Engineering

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MECH2005 Design and manufacture (6 credits)
MECH2018 Dynamics and control (6 credits)
MECH6024 Applied mathematics for engineers (3 credits)

Please refer to the syllabuses of the BEng programmes offered by the Department of Mechanical Engineering for details.
