REGULATIONS FOR THE DEGREE OF BACHELOR OF ENGINEERING (BEng)

These regulations apply to students admitted to the four-year BEng curriculum in the academic year 2018-19 and thereafter.
(See also General Regulations and Regulations for First Degree Curricula)

Admission to the Degree

EN 1 To be eligible for admission to the degree of Bachelor of Engineering (BEng), a candidate shall

(a) comply with the General Regulations;
(b) comply with the Regulations for First Degree Curricula; and
(c) satisfy all the requirements of the curriculum in accordance with these regulations and the syllabuses.

Period of Study

EN 2 The curriculum for the BEng degree shall normally require eight semesters of full-time study, extending over not fewer than four 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 six academic years, unless otherwise permitted by the Board of the Faculty of Engineering.

Curriculum Requirements and progression in curriculum

EN 3

(a) Candidates shall satisfy the requirements prescribed in UG5 of the Regulations for First Degree Curricula;
(b) Candidates shall take not fewer than 240 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;
(c) Candidates shall normally select not fewer than 24 credits nor 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 outstanding credits required to complete the curriculum requirements is fewer than 24 credits;
(d) 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 the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load of 288 credits for the normative period of study as specified in EN2, save as provided for under EN3(e);
(e) Where candidates are required to make up for failed credits, the Board of the Faculty may give permissions for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load of 432 credits for the maximum period of registration specified in EN2.

EN 4 Candidates with unsatisfactory academic progress may be required by the Board of the Faculty to take a reduced study load.

Selection of Courses

EN 5 Candidates shall select their courses in accordance with these regulations and the guidelines specified in the syllabuses before the beginning of each semester. 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.

Assessment and Grades

EN 6 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. Only passed courses will earn credits. Grades shall be awarded in accordance with UG8 of the Regulations for First Degree Curricula.

EN 7 Written examinations or tests shall normally be held at the end of each semester unless otherwise specified in the syllabuses.

EN 8 Candidates are required to make up for failed courses in the following manner:

a) 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
b) re-submitting failed coursework, without having to repeat the same course of instruction; or
c) repeating the failed course by undergoing instruction and satisfying the assessments; or
d) for elective courses, taking another course in lieu and satisfying the assessment requirements.

EN 9 Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

EN 10 There shall be no appeal against the results of examinations and all other forms of assessment.

EN11 Unless otherwise permitted by the Board of the Faculty, a candidate will be recommended for discontinuation of his/her 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 such a number of credits in the two given semesters; or
(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.

Absence from Examination

EN 12 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 seven calendar days 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.

Advanced Standing

EN 13 Advanced standing may be granted to candidates in recognition of studies completed successfully before admission to the University in accordance with UG2 of the Regulations for First Degree Curricula. The amount of credits to be granted for advanced standing shall be determined by the Board of the Faculty, in accordance with the following principles:

(a) a minimum of four semesters of study at this University shall be required before a candidate is considered for the award of the degree; and
(b) at least half of the credits requirements of the degree curriculum shall be accumulated through study at this University, or from transfer of credits for courses completed at other institutions in accordance with UG4(d) of the Regulations for First Degree Curricula.

Credits granted for advanced standing shall not normally be included in the calculation of the GPA unless permitted by the Board of the Faculty but will be recorded on the transcript of the candidate.

Degree Classification

EN 14 To be eligible for the award of the BEng degree, candidates shall have:

(a) achieved a Graduation GPA of 1.00 or above
(b) satisfied all the requirements in UG5 of the Regulations for First Degree Curricula;
(c) passed not fewer than 240 credits, comprising
    i) introductory courses, including Engineering Core courses;
    ii) advanced courses;
    iii) capstone experience;
    iv) a Chinese language enhancement course[1];

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[1] Students are required to successfully complete the 6-credit Faculty-specific Chinese language enhancement course, except for:

(a) Putonghua-speaking students who should take CUND9002 (Practical Chinese and Hong Kong Society) or CUND9003 (Cantonese for Non-Cantonese Speaking Students); and
(b) students who have not studied Chinese language during their secondary education or who have not attained the requisite level of competence in the Chinese language to take the Chinese language enhancement course should seek approval from the Board of the Faculty of Engineering for exemption from the Chinese language requirement, and
    (i) take a 6-credit Cantonese or Putonghua language course offered by the School of Chinese especially for international and exchange students; OR
    (ii) take an elective course in lieu.

v) two English language enhancement courses, including Core University English[2] and English in the Discipline;
vi) Common Core courses;
vii) all required courses as prescribed in respective syllabuses;
viii) elective courses; and
ix) non-credit bearing courses as required by the University.

EN 15 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 in accordance with the following Graduation GPA (GGPA) scores, with all courses taken (including failed courses) carrying weightings which are proportionate to their credit values [3]:

Class of honours	***GGPA 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

EN 16 Honours classification may not be determined solely on the basis of a candidate's Graduation 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 Graduation GPA falls below the range stipulated in EN15 of the higher classification by not more than 0.1 Grade Point.

EN 17 A list of candidates who have successfully completed all degree requirements shall be posted on Faculty notice boards.

[2] Candidates who have achieved Level 5 or above in English Language in the Hong Kong Diploma of Secondary Education Examination, or equivalent, are exempted from this requirement, and Core English is optional. Those who do not take this course should take an elective course in lieu, see Regulation UG6.

[3] For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core courses with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

COMPUTER SCIENCE (Subject to Approval)

SYLLABUS

The syllabus applies to students admitted in the academic year 2022-23 and thereafter under the four-year curriculum.

Definition and Terminology

Each course offered by the Department of Computer Science shall be classified as either introductory level course or advanced level course.

A Discipline Core course is a compulsory course which a candidate must pass in the manner provided for in the Regulations.

A Discipline Elective course refers to any technical course offered by the Department of Computer Science for the fulfillment of the curriculum requirements of the degree of BEng in Computer Science that are not classified as discipline core course.

Curriculum

The Curriculum comprises 240 credits of courses as follows:

Engineering Core Courses
Students are required to complete at least 42 credits of Engineering Core Courses.

Discipline Core Courses
Students are required to complete ALL discipline core courses (54 credits), comprising 24 credits of introductory core courses and 30 credits of advanced core courses.

Discipline Elective Courses
Students are required to complete at least 36 credits of discipline elective courses offered by the Department of Computer Science.

Elective Courses
Students are required to complete 42 credits of elective course(s) offered by either the Department of Computer Science, or other departments within or outside of the Faculty of Engineering.

University Requirements
Students are required to complete:

a) 12 credits in English language enhancement, including 6 credits in "CAES1000 Core University English" and 6 credits in "CAES9542 Technical English for Computer Science";
b) 6 credits in Chinese language enhancement course "CENG9001 Practical Chinese for Engineering Students";
c) 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry with not more than 24 credits of courses being selected within one academic year except where candidates are required to make up for failed credits; and
d) non-credit bearing courses as required by the University.

Capstone Experience
Students are required to complete the 12-credit "COMP4801 Final year project" to fulfill the capstone experience requirement for the degree of BEng in Computer Science.

Internship

Students are required to complete the non-credit bearing internship "COMP3410 Internship", which normally takes place after their third year of study.

Degree Classification

The degree of Bachelor of Engineering shall be awarded in five divisions in accordance with EN 15 of the Regulations for the Degree of Bachelor of Engineering and UG 9 of the Regulations for First Degree Curricula.

The details of the distribution of the above course categories are as follows:

The curriculum of BEng (Computer Science) comprises 240 credits of courses with the following structure:

UG 5 Requirements (54 credits)

Course Code	Course	No. of credits
CAES1000	Core University English	6
CAES9542	Technical English for Computer Science	6
CENG9001	Practical Chinese for Engineering Students	6
CC##XXXX	University Common Core Course (6 courses)*	36
XXXXxxxx	Non-credit bearing courses as required by the University	0
Total for UG5 Requirements		54

* Students have to complete 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry with not more than 24 credits of courses being selected within one academic year except where candidates are required to make up for failed credits.

Engineering Core Courses (42 credits)

Course Code	Course	No. of credits
MATH1851	Calculus and ordinary differential equations	6
MATH1853	Linear algebra, probability and statistics	6
ENGG1300	Fundamental mechanics	6
ENGG1310	Electricity and electronics	6
ENGG1320	Engineers in the modern world	6
ENGG1330	Computer programming I	6
ENGG1340	Computer programming II	6
Total for Engineering Core Courses		42

Discipline Core Courses (54 credits)

Introductory Courses (24 credits)

Course Code	Course	No. of credits
COMP2119	Introduction to data structures and algorithms	6
COMP2120	Computer organization	6
COMP2121	Discrete mathematics	6
COMP2396	Object-oriented programming and Java	6
Total for Introductory Discipline Core Courses		24

Advanced Courses (30 credits)

Course Code	Course	No. of credits
COMP3230	Principles of operating systems	6
COMP3251 / COMP3252	Algorithm design / Algorithm design and analysis	6
COMP3278	Introduction to database management systems	6
COMP3297	Software engineering	6
COMP3314	Machine learning	6
Total for Advanced Discipline Core Courses		30

Capstone Experience and Internship (12 credits)

Course Code	Course	No. of credits
COMP3410	Internship*	0
COMP4801	Final year project+	12
Total for Capstone Experience and Internship		12

*Internship
+Capstone Experience
*Students who are selected to participate in the Undergraduate Research Fellowship Programme are required to complete COMP3413 Research internship and are not required to complete COMP3410 Internship.

Discipline Elective Courses (36 credits)

Course Code	Course	No. of credits
COMP2501	Introduction to data science and engineering	6
COMP3160	Web3.0 for Social Impact: An Innovative and Experiential Venture	6
COMP3231	Computer architecture	6
COMP3234	Computer and communication networks	6
COMP3235	Compiling techniques	6
COMP3258	Functional programming	6
COMP3259	Principles of programming languages	6
COMP3270	Artificial intelligence	6
COMP3271	Computer graphics	6
COMP3311	Legal aspects of computing	6
COMP3316	Quantum information and computation	6
COMP3317	Computer vision	6
COMP3320	Electronic commerce technology	6
COMP3322	Modern technologies on World Wide Web	6
COMP3323	Advanced database systems	6
COMP3329	Computer game design and programming	6
COMP3330	Interactive mobile application design and programming	6
COMP3340	Applied deep learning	6
COMP3351	Advanced algorithm analysis	6
COMP3352	Algorithmic game theory	6
COMP3353	Bioinformatics	6
COMP3354	Statistical learning	6
COMP3355	Cyber security	6
COMP3356	Robotics	6
COMP3357	Cryptography	6

COMP3358	Distributed and parallel computing	6
COMP3360	Data-driven computer animation	6
COMP3361	Natural language processing	6
COMP3362	Hands-on AI: experimentation and applications	6
COMP3364	Digital forensics	6
COMP3365	Cyber attack and defense	6
COMP3366	Quantum algorithms and computer architecture	6
COMP3405	Engineering quality software	6
COMP3407	Scientific computing	6
COMP3413	Research internship	6
COMP3414	Experiential learning on artificial intelligence and robotics	6
COMP3516	Data analytics for IoT	6
IMSE3137	Virtual reality for systems engineering	6
IMSE3139	Cyber-physical systems	6
Complete at least six discipline elective courses for a total of 36 credits		36

Elective Courses (42 credits)

At least 42 credits of courses offered by either the Department of Computer Science, or other departments within or outside of the Faculty of Engineering.

Focus

A student may choose to claim any of the following six Focuses, provided that he/she must have fulfilled the requirements specified under the corresponding Focus.

[AI & Robotics]
Students are required to complete FOUR courses in the below list to claim this Focus.

- COMP3270 Artificial intelligence
- COMP3317 Computer vision
- COMP3340 Applied deep learning
- COMP3356 Robotics
- COMP3360 Data-driven computer animation
- COMP3361 Natural language processing
- COMP3362 Hands-on AI: experimentation and applications
- COMP3414 Experiential learning on artificial intelligence and robotics

[Big Data Analytics]
Students are required to complete FOUR courses in the below list to claim this Focus.

- COMP2501 Introduction to data science and engineering
- COMP3270 Artificial intelligence
- COMP3323 Advanced database systems / FITE3010 Big data and data mining
- COMP3353 Bioinformatics
- COMP3361 Natural language processing
- COMP3516 Data analytics for IoT

[Cyber Security]
Students are required to complete ALL the courses from List (a) and ONE course from List (b) to claim this Focus.

List (a)
- COMP3355 Cyber security

- COMP3357 Cryptography
- COMP3365 Cyber attack and defense

List (b)
- COMP3316 Quantum information and computation
- COMP3364 Digital forensics
- FITE2010 Distributed ledger and blockchain
- FITE3012 E-payment and crypto-currency

[Financial Computing]
Students are required to complete FOUR courses in the below list to claim this Focus.

- COMP3320 Electronic commerce technology
- COMP3322 Modern technologies on World Wide Web
- COMP3355 Cyber security
- FITE2010 Distributed ledger and blockchain
- FITE3010 Big data and data mining
- FITE3012 E-payment and crypto-currency

[Systems & Networking]
Students are required to complete FOUR courses in the below list to claim this Focus.

- COMP3231 Computer architecture
- COMP3234 Computer and communication networks
- COMP3322 Modern technologies on World Wide Web
- COMP3323 Advanced database systems
- COMP3330 Interactive mobile application design and programming
- COMP3358 Distributed and parallel computing
- COMP3405 Engineering quality software
- COMP3407 Scientific computing
- COMP3516 Data analytics for IoT

[Theoretical Computer Science]
Students are required to complete FOUR courses in the below list to claim this Focus.

- COMP3235 Compiling techniques
- COMP3258 Functional programming
- COMP3259 Principles of programming languages
- COMP3316 Quantum information and computation
- COMP3351 Advanced algorithm analysis
- COMP3352 Algorithmic game theory
- COMP3357 Cryptography
- COMP3366 Quantum algorithms and computer architecture

Remarks: In principle, double counting is not permissible. A particular elective course shall be counted towards one Focus only.

Elective MSc(CompSc) courses

Students may take up to two 6-credit MSc(CompSc) courses offered by the Department of Computer Science as elective courses, subject to the approval of the Head of the Department.

Summary of curriculum structure of BEng (Computer Science)

Course Categories	No. of credits
UG5 Requirements	54
Engineering Core Courses	42
Discipline Core Courses (Introductory)	24
Discipline Core Courses (Advanced)	30
Capstone Experience and Internship	12
Discipline Elective Courses	36
Elective Courses	42
Total	**240**

A sample study plan is given as follows:

FIRST YEAR

Engineering Core Courses (42 credits)		
MATH1851	Calculus and ordinary differential equations	6
MATH1853	Linear algebra, probability and statistics	6
ENGG1300	Fundamental mechanics	6
ENGG1310	Electricity and electronics	6
ENGG1320	Engineers in the modern world	6
ENGG1330	Computer programming I	6
ENGG1340	Computer programming II	6
University Requirements (UG5) (18 credits)		
CAES1000	Core University English	6
CC##XXXX	Two Common Core Courses	12

SECOND YEAR

Introductory Discipline Core Courses (24 credits)		
COMP2119	Introduction to data structures and algorithms	6
COMP2120	Computer organization	6
COMP2121	Discrete mathematics	6
COMP2396	Object-oriented programming and Java	6
Discipline Elective Courses (6 credits)		**6**
Elective Courses (6 credits)		**6**
University Requirements (UG5) (24 credits)		
CC##XXXX	Four Common Core Courses	24

THIRD YEAR

Advanced Discipline Core Courses (30 credits)		
COMP3230	Principles of operating systems	6
COMP3251 /	Algorithm design /	6
COMP3252	Algorithm design and analysis	
COMP3278	Introduction to database management systems	6
COMP3297	Software engineering	6

COMP3314	Machine learning	6
Internship (0 credit)		
COMP3410	Internship	0
University Requirements (UG5) (6 credits)		
CENG9001	Practical Chinese for Engineering Students (This course should be enrolled in the third year)	6
Discipline Elective Courses (12 credits)		**12**
Elective Courses (12 credits)		**12**
FOURTH YEAR		
Discipline Elective Courses (18 credits)		**18**
Capstone Experience (12 credits)		
COMP4801	Final year project	12
University Requirements (UG5) (6 credits)		
CAES9542	Technical English for Computer Science	6
Elective Courses (24 credits)		**24**

Non-credit bearing courses as required by the University
Students will have the flexibility to take the courses in any semester throughout the period of studies.

MAJOR IN COMPUTER SCIENCE
(for non-BEng(CompSc) students)

The curriculum comprises 84 credits of courses with the following structure:

Prerequisite: Level 3 or above in Mathematics in the Hong Kong Diploma of Secondary Education (HKDSE) Examination, or equivalent

Introductory Courses (30 credits)

Course Code	Course	No. of credits
COMP1117	Computer programming	6
COMP2113	Programming technologies	6
COMP2119	Introduction to data structures and algorithms	6
COMP2120	Computer organization	6
COMP2121	Discrete mathematics	6
Total for Introductory Courses		30

Elective courses (48 credits)

12 credits of courses to be chosen from the following list:

Course Code	Course	No. of credits
COMP3230	Principles of operating systems	6
COMP3234	Computer and communication networks	6

COMP3278	Introduction to database management systems	6
COMP3297	Software engineering	6

36 credits of courses to be chosen from the following lists:

Introductory Courses

Course Code	Course	No. of credits
COMP2396	Object-oriented programming and Java	6
COMP2501	Introduction to data science and engineering	6

Advanced Courses

Course Code	Course	No. of credits
COMP3230	Principles of operating systems	6
COMP3234	Computer and communication networks	6
COMP3278	Introduction to database management systems	6
COMP3297	Software engineering	6
COMP3231	Computer architecture	6
COMP3235	Compiling techniques	6
COMP3251 / COMP3252	Algorithm design / Algorithm design and analysis	6
COMP3258	Functional programming	6
COMP3259	Principles of programming languages	6
COMP3270	Artificial intelligence	6
COMP3271	Computer graphics	6
COMP3311	Legal aspects of computing	6
COMP3314	Machine learning	6
COMP3316	Quantum information and computation	6
COMP3317	Computer vision	6
COMP3320	Electronic commerce technology	6
COMP3322	Modern technologies on World Wide Web	6
COMP3323	Advanced database systems	6
COMP3329	Computer game design and programming	6
COMP3330	Interactive mobile application design and programming	6
COMP3340	Applied deep learning	6
COMP3351	Advanced algorithm analysis	6
COMP3352	Algorithmic game theory	6
COMP3353	Bioinformatics	6
COMP3354	Statistical learning	6
COMP3355	Cyber security	6
COMP3356	Robotics	6
COMP3357	Cryptography	6
COMP3358	Distributed and parallel computing	6
COMP3360	Data-driven computer animation	6
COMP3361	Natural language processing	6
COMP3362	Hands-on AI: experimentation and applications	6
COMP3364	Digital forensics	6
COMP3365	Cyber attack and defense	6
COMP3366	Quantum algorithms and computer architecture	6
COMP3405	Engineering quality software	6
COMP3407	Scientific computing	6

COMP3516	Data analytics for IoT	6
Total for Elective Courses		48

Capstone Experience (6 credits to be chosen from the following list)

Course Code	Course	No. of credits
COMP3297	Software engineering*	6
COMP4805	Project	6
Total for Capstone Experience		6

*If students choose to complete "COMP3297 Software engineering" for fulfilling the requirement of capstone experience, COMP3297 will not be counted towards the category of Elective Courses.

Notes:

1. In principle, double counting is not permissible.
   - 1.1 BEng students who have completed ENGG1330 are deemed to have completed COMP1117, they are not permitted to take COMP1117 and are required to complete one more elective in Computer Science as replacement.
   - 1.2 BEng students who have completed ENGG1340 are deemed to have completed COMP2113, they are not permitted to take COMP2113 and are required to complete one more elective in Computer Science as replacement.
   - 1.3 Non-BEng students who have completed COMP1117 to fulfil the requirement of their primary major are required to complete one more elective in Computer Science.
   - 1.4 Students who have completed MATH3600 Discrete mathematics are deemed to have completed COMP2121, they are not permitted to take COMP2121 and are required to complete one more elective in Computer Science as replacement.
2. Course enrollment in elective courses is subject to the approval of the Department of Computer Science, in consideration of class quota and other academic issues.

MINOR IN COMPUTER SCIENCE
(This minor option is not available for BEng(CE) and BEng(CompSc) students)

The curriculum comprises 42 credits of courses with the following structure, in which students are required to complete 18 credits of Core Courses and 24 credits of Elective Courses.

Prerequisite: Level 3 or above in Mathematics in the Hong Kong Diploma of Secondary Education (HKDSE) Examination, or equivalent

Core Courses (18 credits)

Introductory Courses

Course Code	Course	No. of credits
COMP1117	Computer programming	6
COMP2113	Programming technologies	6
COMP2119	Introduction to data structures and algorithms	6
Total for Core Courses		18

Elective Courses (24 credits to be chosen from the following lists of Introductory Courses or Advanced Courses)

Introductory Courses

Course Code	Course	No. of credits
COMP2120	Computer organization	6
COMP2121	Discrete mathematics	6
COMP2396	Object-oriented programming and Java	6
COMP2501	Introduction to data science and engineering	6

Advanced Courses

Course Code	Course	No. of credits
COMP3230	Principles of operating systems	6
COMP3231	Computer architecture	6
COMP3234	Computer and communication networks	6
COMP3235	Compiling techniques	6
COMP3251 / COMP3252	Algorithm design / Algorithm design and analysis	6
COMP3258	Functional programming	6
COMP3259	Principles of programming languages	6
COMP3270	Artificial intelligence	6
COMP3271	Computer graphics	6
COMP3278	Introduction to database management systems	6
COMP3297	Software engineering	6
COMP3311	Legal aspects of computing	6
COMP3314	Machine learning	6
COMP3316	Quantum information and computation	6
COMP3317	Computer vision	6
COMP3320	Electronic commerce technology	6
COMP3322	Modern technologies on World Wide Web	6
COMP3323	Advanced database systems	6
COMP3329	Computer game design and programming	6
COMP3330	Interactive mobile application design and programming	6
COMP3340	Applied deep learning	6
COMP3351	Advanced algorithm analysis	6
COMP3352	Algorithmic game theory	6
COMP3353	Bioinformatics	6
COMP3354	Statistical learning	6
COMP3355	Cyber security	6
COMP3356	Robotics	6
COMP3357	Cryptography	6
COMP3358	Distributed and parallel computing	6
COMP3360	Data-driven computer animation	6
COMP3361	Natural language processing	6
COMP3362	Hands-on AI: experimentation and applications	6
COMP3364	Digital forensics	6
COMP3365	Cyber attack and defense	6

COMP3366	Quantum algorithms and computer architecture	6
COMP3405	Engineering quality software	6
COMP3407	Scientific computing	6
COMP3516	Data analytics for IoT	6
Total for Elective Courses		24

Notes:

1. In principle, double counting is not permissible.

   1.1 BEng students who have completed ENGG1330 are deemed to have completed COMP1117, they are not permitted to take COMP1117 and are required to complete one more elective in Computer Science as replacement.

   1.2 BEng students who have completed ENGG1340 are deemed to have completed COMP2113, they are not permitted to take COMP2113 and are required to complete one more elective in Computer Science as replacement.

   1.3 Non-BEng students who have completed COMP1117 to fulfil the requirement of their primary major are required to complete one more elective in Computer Science.

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

COURSE DESCRIPTIONS

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

Engineering Core Courses

MATH1851 Calculus and ordinary differential equations (6 credits)
MATH1853 Linear algebra, probability and statistics (6 credits)
ENGG1300 Fundamental mechanics (6 credits)
ENGG1310 Electricity and electronics (6 credits)
ENGG1320 Engineers in the modern world (6 credits)
ENGG1330 Computer programming I (6 credits)
ENGG1340 Computer programming II (6 credits)

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

University Requirements on Language Enhancement Courses

CAES1000. Core University English (6 credits)
CENG9001. Practical Chinese for Engineering Students (6 credits)

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

CAES9542. Technical English for Computer Science (6 credits)

Running alongside Computer Science, Financial Technology, Data Science related final-year / capstone project courses, this one-semester, 6-credit course will build and consolidate students' ability to compose technical reports, and make technical oral presentations. The focus of this course is on helping students to report on the progress of their Final Year Project in an effective, professional manner in both written and oral communication. Topics include accessing, abstracting, analyzing, organizing and summarizing information; making effective grammatical and lexical choices; technical report writing; and technical presentations. Assessment is wholly by coursework.

Co-requisite: COMP3522 or COMP4801 or FITE4801 Assessment:
100% continuous assessment.

University Common Core Curriculum

Successful completion of 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry with not more than 24 credits of courses being selected within one academic year except where candidates are required to make up for failed credits:

- Science, Technology and Big Data
- Arts and Humanities
- Global Issues
- China: Culture, State and Society

COMP1117 Computer programming (6 credits)

This is an introductory course in computer programming. Students will acquire basic Python programming skills, including syntax, identifiers, control statements, functions, recursions, strings, lists, dictionaries, tuples and files. Searching and sorting algorithms, such as sequential search, binary search, bubble sort, insertion sort and selection sort, will also be covered.

Mutually exclusive with: ENGG1111 or ENGG1330
Assessment: 50% continuous assessment, 50% examination

COMP2113. Programming technologies (6 credits)

This course covers intermediate to advanced computer programming topics on various technologies and tools that are useful for software development. Topics include Linux shell commands, shell scripts, C/C++ programming, and separate compilation techniques and version control. This is a self-learning course; there will be no lecture and students will be provided with self-study materials. Students are required to complete milestone-based self-assessment tasks during the course. This course is designed for students who are interested in Computer Science / Computer Engineering.

Prerequisite: COMP1117 or ENGG1330
Mutually exclusive with: ENGG1340 or COMP2123
Assessment: 70% continuous assessment, 30% examination

COMP2119. 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: COMP2113 or COMP2123 or ENGG1340
Assessment: 40% continuous assessment, 60% examination

COMP2120. Computer organization (6 credits)

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: COMP1117 or ENGG1330
Mutually exclusive with: ELEC2441
Assessment: 50% continuous assessment, 50% examination

COMP2121. 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.

Mutually exclusive with: MATH3600
Assessment: 50% continuous assessment, 50% examination

COMP2396. 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: COMP2113 or COMP2123 or ENGG1340
Mutually exclusive with: ELEC2543 or FITE2000
Assessment: 50% continuous assessment, 50% examination

COMP2501. Introduction to data science and engineering (6 credits)

The course introduces basic concepts and methodology of data science. The goal of this course is to provide students with an overview and practical experience of the entire data analysis process. Topics include: data source and data acquisition, data preparation and manipulation, exploratory data analysis, statistical and predictive analysis, data visualization and communication.

Prerequisite: COMP1117 or ENGG1330
Mutually exclusive with: STAT1005 or STAT1015
Assessment: 50% continuous assessment, 50% examination

COMP3160. Web3.0 for Social Impact: An Innovative and Experiential Venture (6 credits)

This interdisciplinary course, jointly offered by the School of Computing and Data Science and the Department of Politics and Public Administration, explores how Web 3.0 technologies—including blockchain, AI, and decentralized systems—can drive meaningful social change through innovation and entrepreneurship. Students from computer science, AI, data science, and social science will collaborate to examine real-world applications of Web 3.0 in sustainability, economic development, community well-being, and governance. The first part of the course provides an accessible introduction to foundational Web 3.0 technologies, along with case studies from Hong Kong and beyond, while the second part focuses on practical implementation—covering product design, proof of concept development, financial and social valuation, fundraising, and project management. Through hands-on workshops led by Web 3.0 practitioners (developers, incubators, investors, and policymakers), students will gain firsthand insights and present their final projects to a panel of impact investors and domain experts.

Assessment: 100% continuous assessment

COMP3230. 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: COMP2113 or COMP2123 or ENGG1340; and COMP2120 or ELEC2441
Mutually exclusive with: ELEC3541
Assessment: 50% continuous assessment, 50% examination

COMP3231. 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; GPU architecture and programming; introduction to advanced topics.

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

COMP3234. Computer and communication networks (6 credits)

Network structure and architecture; reference models; stop and wait protocol; sliding window protocols; virtual circuits and datagrams; IP addressing and routing; flow control; congestion control; local area networks; transport protocols and application layer; and examples of network protocols.

Prerequisites: COMP2113 or COMP2123 or ELEC2543 or ENGG1340; and COMP2120 or ELEC2441
Mutually exclusive with: ELEC3443
Assessment: 50% continuous assessment, 50% examination

COMP3235. 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: COMP2119 or FITE2000
Assessment: 50% continuous assessment, 50% examination

COMP3251. Algorithm design (6 credits)

The course introduces various algorithm design techniques, including divide and conquer, greedy, and dynamic programming, and studies selected topics on graph algorithms. These techniques can be used to design better algorithms in various areas of computer science. The course also gives an overview of NP-complete problems.

Prerequisite: COMP2119
Mutually exclusive with: COMP3250 or COMP3252
Assessment: 50% continuous assessment, 50% examination

COMP3252. Algorithm design and analysis (6 credits)

The course studies principles of algorithm design and the analysis of sophisticated algorithms (regarding proof of correctness and time complexity). Topics include divide-and-conquer, dynamic programming, greedy algorithms, graph algorithms, network flow, geometric algorithms, and NP-completeness. The course puts emphasis on mathematical rigor; it expects students to figure out the mathematics and logic that make algorithms work. Students can form pairs to discuss the assignments and are required to write rigorous proofs of correctness and analysis independently.

Prerequisite: COMP2119 (Grade B or above) or special approval by instructor
Mutually exclusive with: COMP3250 or COMP3251
Assessment: 50% continuous assessment, 50% examination

COMP3258. Functional programming (6 credits)

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

Prerequisite: COMP2121
Assessment: 50% continuous assessment, 50% examination

COMP3259. 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.

Prerequisite: COMP2119 or FITE2000
Assessment: 40% continuous assessment, 60% examination

COMP3270. 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.

Prerequisite: COMP2119 or FITE2000
Mutually exclusive with: ELEC4544 or IIMT3688
Assessment: 50% continuous assessment, 50% examination

COMP3271. 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: COMP2119
Assessment: 50% continuous assessment, 50% examination

COMP3278. 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.

Prerequisite: COMP2119 or COMP2502 or ELEC2543 or FITE2000
Mutually exclusive with: IIMT3601
Assessment: 50% continuous assessment, 50% examination

COMP3297. Software engineering (6 credits)

This course introduces the fundamental principles and methodologies of modern software engineering. It covers the software process, and development activities including requirements engineering, software design, testing, deployment and evolution. The course emphasizes the use of contemporary tools, frameworks and techniques. It features a complete agile development project in which students work in teams to engineer and cloud-deploy a software service to satisfy their clients' needs.

Prerequisite: COMP2113 or COMP2123 or ENGG1340
Mutually exclusive with: IIMT3602
Assessment: 50% continuous assessment, 50% examination

COMP3311. 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: COMP2113 or COMP2123 or ENGG1340
Assessment: 30% continuous assessment, 70% examination

COMP3314. Machine learning (6 credits)

This course introduces algorithms, tools, practices, and applications of machine learning. Topics include core methods such as supervised learning (classification and regression), unsupervised learning (clustering, principal component analysis), Bayesian estimation, neural networks; common practices in data pre-processing, hyper-parameter tuning, and model evaluation; tools/libraries/APIs such as scikit-learn, Theano/Keras, and multi/many-core CPU/GPU programming.

Prerequisites: MATH1853 or MATH2014; and COMP2119 or ELEC2543 or FITE2000
Assessment: 50% continuous assessment, 50% examination

COMP3316. Quantum information and computation (6 credits)

This course offers an introduction to the interdisciplinary field of quantum information and computation. We will start from the basic rules of quantum theory and become familiar with the counterintuitive notions of quantum superposition and entanglement. In particular, we will see how quantum systems could be used to detect an object without directly interacting with it (Elitzur-Vaidman bomb tester), to increase the amount of bits that can be sent through a transmission line (dense coding), and to increase the chance to win certain games (CHSH game and GHZ game). Once the basics have been covered, we will provide an overview of quantum computation and of major quantum algorithms such as Grover's search algorithm and Shor's factoring algorithm for prime factorization. Finally, we will introduce the upgraded framework of quantum theory, and use it to explore applications to quantum error correction, quantum state discrimination, quantum cryptography, and quantum teleportation.

Prerequisite: MATH1853 or MATH2014 or MATH2101 or equivalent (e.g., PHYS2155)
Assessment: 50% continuous assignment, 50% examination

COMP3317. 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.

Prerequisites: COMP2119; and MATH1853 or MATH2014 or MATH2101
Assessment: 50% continuous assessment, 50% examination

COMP3320. 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: COMP3278
Assessment: 50% continuous assessment, 50% examination

COMP3322. Modern technologies on World Wide Web (6 credits)

Selected network protocols relevant to the World Wide Web (e.g., HTTP, DNS, IP); World Wide Web; technologies for programming the Web (e.g, HTML, style sheets, PHP, JavaScript, Node.js.; other topics of current interest (AJAX, HTML5, web services, cloud computing).

Prerequisite: COMP1117 or ENGG1330
Mutually exclusive with: IIMT3663
Assessment: 60% continuous assessment, 40% examination

COMP3323. 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: COMP3278
Mutually exclusive with: FITE3010
Assessment: 50% continuous assessment, 50% examination

COMP3329. Computer game design and programming (6 credits)

This course introduces the concepts and techniques for computer game design and development. Topics include: game history and genres, game design process, game engine, audio and visual design, 2D and 3D graphics, physics, optimization, camera, network, artificial intelligence and user interface design. Students participate in group projects to gain hands-on experience in using common game engine in the market.

Prerequisite: COMP2113 or COMP2123 or ENGG1340
Assessment: 70% continuous assessment, 30% examination

COMP3330. Interactive mobile application design and programming (6 credits)

This course aims at introducing the design and development issues of mobile apps. Students will learn the basic principles, constraints and lifecycle of mobile apps. Then they will learn how to use modern object-oriented languages for the development and different design patterns. Next they will learn various development issues such as graphics, touch events, handling of concurrency, sensors, location services and server connection. Students will also participate in both individual assignments and group project to practice ideation, reading, writing, coding and presentation throughout this course.

Prerequisite: COMP2396 or FITE2000
Assessment: 70% continuous assessment, 30% examination

COMP3340. Applied deep learning (6 credits)

An introduction to algorithms and applications of deep learning. The course helps students get hands-on experience of building deep learning models to solve practical tasks including image recognition, image generation, reinforcement learning, and language translation. Topics include: machine learning theory; optimization in deep learning; convolutional neural networks; recurrent neural networks;

generative adversarial networks; reinforcement learning; self-driving vehicle.

Prerequisites: COMP2119 or ELEC2543 or FITE2000; and MATH1853 or MATH2014
Mutually exclusive with: ELEC4544
Assessment: 50% continuous assessment, 50% examination

COMP3351. 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: COMP3250 or COMP3251 or COMP3252; or basic knowledge in probability and algorithms
Assessment: 50% continuous assessment, 50% examination

COMP3352. Algorithmic game theory (6 credits)

Strategic behaviors of users are of increasingly importance in today's computational problems, from data analysis (where a user may manipulate his data) to routing (where a user may strategically choose a path instead of the one that the algorithm specifies). This is an undergraduate advanced algorithm course that covers various topics at the interface of theoretical computer science and economics, seeking to provide the basic concepts and techniques, both economic and algorithmic ones, that would allow to students to design algorithms that achieve the desirable outcomes in the presence of strategic behaviors of users.

This course focuses on three topics: 1) mechanism design, a study on incentivizing users to truthfully report their data for a given computational task; 2) price of anarchy in games, a systematic approach to quantify the inefficiency caused by users' strategic behaviors; and 3) algorithms and complexity theory for learning and computing Nash and market equilibria. The course will also cover some selected advanced topics such as the use of data of past user behaviors in auction design, and case studies of some important applications including online advertisement auctions and kidney exchange market.

Prerequisites: MATH1853 or MATH2014 or MATH2101; and COMP2119
Assessment: 50% continuous assessment, 50% examination

COMP3353. Bioinformatics (6 credits)

The goal of the course is for students to be grounded in basic bioinformatics concepts, algorithms, tools, and databases. Students will be leaving the course with hands-on bioinformatics analysis experience and empowered to conduct independent bioinformatics analyses. We will study: 1) algorithms, especially those for sequence alignment and assembly, which comprise the foundation of the rapid development of bioinformatics and DNA sequencing; 2) the leading bioinformatics tools for comparing and analyzing genomes starting from raw sequencing data; 3) the functions and organization of a few essential bioinformatics databases and learn how they support various types of bioinformatics analysis.

Prerequisite: COMP1117 or ENGG1330
Assessment: 70% continuous assessment, 30% examination

COMP3354. Statistical learning (6 credits)

The challenges in learning from big and complicated data have led to significant advancements in the statistical sciences. This course introduces supervised and unsupervised learning, with emphases on the theoretical underpinnings and on applications in the statistical programming environment R. Topics include linear methods for regression and classification, model selection, model averaging, basic expansions and regularization, kernel smoothing methods, additive models and tree-based methods. We will also provide an overview of neural networks and random forests.

Prerequisite: MATH1853 or MATH2101 or STAT1602 or STAT1603
Assessment: 50% continuous assessment, 50% examination

COMP3355. Cyber security (6 credits)

This course introduces the principles, mechanisms and implementation of cyber security and data protection. Knowledge about the attack and defense are included. Topics include notion and terms of cyber security; network and Internet security, introduction to encryption: classic and modern encryption technologies; authentication methods; access control methods; cyber attacks and defenses (e.g. malware, DDoS).

Prerequisite: COMP2119 or ELEC2543 or FITE2000
Mutually exclusive with: ELEC4641
Assessment: 50% continuous assessment, 50% examination

COMP3356. Robotics (6 credits)

This course provides an introduction to mathematics and algorithms underneath state-of-the-art robotic systems. The majority of these techniques are heavily based on probabilistic reasoning and optimization – two areas with wide applicability in modern AI. We will also cover some basic knowledge about robotics, namely geometry, kinematics, dynamics, control of a robot, as well as the mathematical tools required to describe the spatial motion of a robot will be presented. In addition, we will cover perception, planning, and learning for a robotic system, with the obstacle avoidance and robotic arm manipulation as typical examples.

Prerequisites: MATH1853 or MATH2014; and COMP2121 or STAT2601; and COMP2119 or FITE2000
Assessment: 50% continuous assessment, 50% examination

COMP3357. Cryptography (6 credits)

This course offers a gentle introduction to the field of cryptography. We will start from the basic principles of confidentiality, integrity and authentication. After that, we will go through some fundamental cryptographic primitives like hash function, symmetric key encryption, public key encryption and digital signatures. Finally, we will introduce the basics of quantum cryptography including quantum key distribution and random number generation.

Prerequisite: MATH1853 or MATH2014 or MATH2101 or equivalent (e.g., PHYS2155)
Assessment: 50% continuous assessment, 50% examination

COMP3358. Distributed and parallel computing (6 credits)

This course introduces the basic concepts and modern software architectures on distributed and parallel computing. Topics include: computer network primitives, distributed transactions and two-phase commits, webservices, parallelism and scalability models, distributed consistency models, distributed fault-tolerance, actor and monads, Facebook photo cache, Amazon key-value stores, Google Map-reduce, Spark, and TensorFlow.

Prerequisite: COMP3230 or COMP3234
Assessment: 50% continuous assessment, 50% examination

COMP3360. Data-driven computer animation (6 credits)

Basics of character animation, keyframe animation, motion capture, inverse kinematics, physically based character animation, Basics of physically-based animation, rigid body dynamics, point-based dynamics, hair animation, cloth simulation, facial animation, crowd simulation, mesh-shape editing, performance capture, skinning, data-driven character control, data-driven cloth animation, data-driven facial animation, data-driven skinning.

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

COMP3361. Natural language processing (6 credits)

Natural language processing (NLP) is the study of human language from a computational perspective. The course will be focusing on machine learning and corpus-based methods and algorithms. We will cover syntactic, semantic and discourse processing models. We will describe the use of these methods and models in applications including syntactic parsing, information extraction, statistical machine translation, dialogue systems, and summarization. This course starts with language models (LMs), which are both front and center in natural language processing (NLP), and then introduces key machine learning (ML) ideas that students should grasp (e.g. feature-based models, log-linear models and then the neural models). We will land on modern generic meaning representation methods (e.g. BERT/GPT-3) and the idea of pretraining / finetuning.

Prerequisites: COMP3314 or COMP3340; and MATH1853
Assessment: 50% continuous assessment, 50% examination

COMP3362. Hands-on AI: experimentation and applications (6 credits)

This course comprises two main components: students first acquire the basic know-how of the state-of-the-art AI technologies, platforms and tools (e.g., TensorFlow, PyTorch, scikit-learn) via example-based modules in a self-paced learning mode. Students will then identify a creative or practical data-driven application and implement an AI-powered solution for the application as the course project. Students will be able to experience a complete AI experimentation and evaluation cycle throughout the project.

Prerequisite: COMP3314
Mutually exclusive with: COMP3359
Assessment: 100% continuous assessment

COMP3364. Digital forensics (6 credits)

This course first provides an overview on common cyber crime with examples, then introduces digital

evidence, and the fundamental principles of digital investigation and forensics. Topics include basic forensic science principles (e.g. Locard's exchange principle), the process of collecting and preserving digital evidence, analyzing digital evidence, and prepare forensic examination reports. In the course, students will learn proper process, techniques and tools for digital investigation and forensic examination.

Prerequisites: COMP3230 and COMP3355
Assessment: 50% continuous assessment, 50% examination

COMP3365. Cyber attack and defense (6 credits)

This course teaches students some basic hands-on cyber defense skills such as how to configure a firewall, install intrusion detection tools, use existing tools (e.g. Metasploit) for penetration test, monitor a system for possible attacks, and how to handle cyber incidents. On the other hand, we also teach students how to conduct certain ethical hacking such as password cracking, network hacking, and operating system hacking, so as to better protect a system. Students are expected to do a lot of practical exercises.

Prerequisites: COMP3230, COMP3234 and COMP3355
Assessment: 50% continuous assessment, 50% examination

COMP3366. Quantum algorithms and computer architecture (6 credits)

Quantum computing can perform hard computational tasks that are far beyond the reach of conventional computers. This course will focus on quantum computing and its realization, offering a tour through the most important concepts and the most recent progresses. The course consists of four major parts: basics of quantum computing, quantum algorithms, quantum machine learning, and quantum error correction. The course starts with an introduction to the essential ingredients of quantum circuits. We will get familiar with quantum computing by going through representative quantum algorithms and visiting more advanced topics in quantum machine learning. We will then discuss how to build a quantum computer: various ways of implementing quantum computations and coping with noises will be discussed. Finally, we will conclude the course with an overview of recent progresses and with a perspective on the future of quantum computing. Tutorials will also be offered on quantum programming, where we will design our own quantum algorithms that address practical problems.

Prerequisites: COMP2119 and MATH1853
Assessment: 50% continuous assessment, 50% examination

COMP3405. Engineering quality software (6 credits)

This course examines current engineering techniques, practices and processes underlying the development, evolution, and operation of quality software. Topics include: software quality models and metrics; architecture and design patterns for quality; code quality and its assessment; software refactoring and evolution; functional testing at unit, feature and system levels; acceptance testing; performance testing; security testing; test automation; DevOps measurement and quality; and process quality and improvement.

Prerequisite: COMP3297
Assessment: 50% continuous assessment, 50% examination

COMP3407. Scientific computing (6 credits)

This course provides an overview and covers the fundamentals of scientific and numerical computing. It focuses on topics in numerical analysis and computation, with discussions on applications of scientific computing.

Prerequisites: COMP1117 or ENGG1330; and COMP2121
Assessment: 50% continuous assessment, 50% examination

COMP3516. Data analytics for IoT (6 credits)

This course introduces basic concepts, technologies, and applications of the Internet of Things (IoT), with a focus on data analytics. The course covers a range of enabling techniques in sensing, computing, analytics, learning for IoT and connects them to exciting applications in smart homes, healthcare, security, etc. The lectures cover the pipeline of data generation, data acquisition, data transportation, data analysis and learning, and data applications, with various topics from the fundamentals (e.g., signal processing, statistical analysis, machine learning) to real-world systems. Billions of things are connected today, and this course helps students to understand how IoT will evolve into AIoT (Artificial Intelligence of Things).

Prerequisite: COMP2119
Assessment: 60% continuous assessment, 40% examination

IMSE3137. Virtual reality for systems engineering (6 credits)

Fundamental of virtual reality, concepts of virtual, augmented and mixed reality, visualization and interacting with complex information and systems with virtual reality, applications of virtual reality technology in engineering systems design and analysis, immersive and interactive virtual environments; innovation and consciousness with virtual reality system development and deployment, ethical issues and social impacts of adopting virtual reality in system development. Designing and building virtual systems with immersive virtual reality systems including CAVE-like environment and VR headsets.

Assessment: 80% continuous assessment, 20% examination

IMSE3139. Cyber-physical systems (6 credits)

Cyber systems: integration of computation, communication and control; Physical systems: natural and man-made systems governed by the laws of physics; Concept and characteristics of cyber-physical systems (CPSs): integration of cyber systems and physical systems; Architecture of CPSs: integration of cyber components with physical processes, interfaces, converters and networks in CPSs; Technologies of CPSs: distributed computing and networking, internet-of-things (IoT), sensing and smart identification, embedded technologies, data collection, control and signal processing, and location tracking; Applications of CPSs: smart manufacturing, smart supply chains, healthcare and medical services; smart buildings and smart cities; Trends of CPSs: challenges, research and development of software, hardware and applications. The course includes lectures and projects.

Assessment: 100% continuous assessment

COMP3410. Internship (0 credit) *[for intakes of 2018 and thereafter]*

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: intellectual property, privacy, social context of computing, risks, safety and security concerns for computer professionals, professional and ethical responsibilities, and continuing professional development.

Assessment: 100% continuous assessment

COMP3413. 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

COMP3414. Experiential learning on artificial intelligence and robotics (6 credits)

This is a multidisciplinary experiential learning course designed for engineering students to learn about artificial intelligence (AI) and robotics. Students will learn AI and robot related technical disciplines (such as machine vision, embedded system design, mechanical control, inertial navigation, human-computer interaction, etc.) through designing and building intelligent robots, and forming teams to participate in robotics competitions such as RoboMaster Robotics Competition and AI Driving Olympics (AI-DO), etc.

Assessment: 100% continuous assessment

COMP4801. 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.

Mutually exclusive with: COMP4802
Assessment: 100% continuous assessment

COMP4804. Computing and data analytics project (6 credits)
[for candidates pursuing the degree BEng(EngSc) – Computing and Data Analytics]

Students during the final year of their studies undertake a substantial project, taking it from initial concept through to final delivery, and integrating their knowledge and skills on computing and data analytics.

Assessment: 100% continuous assessment

COMP4805. Project (6 credits)
[for non-BEng(CompSc) candidates pursuing Computer Science as second major]

Students during the final year of their studies undertake a substantial project, taking it from initial concept through to final delivery, and integrating their knowledge and skills on computing.

Assessment: 100% continuous assessment