

## **CIVIL ENGINEERING**

### **SYLLABUS**

The syllabus applies to students admitted in the academic year 2012-13 and thereafter under the four-year curriculum.

#### Definition and Terminology

Each course offered by the Department of Civil Engineering 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 Disciplinary Elective course refers to any technical course offered by the Department of Civil Engineering for the fulfillment of the curriculum requirements of the degree of BEng in Civil Engineering that are not classified as discipline core course.

### **Curriculum**

The Curriculum comprises 240 credits of courses as follows:

#### General Engineering Courses

Students are required to complete at least 36 credits of General Engineering Course.

#### Discipline Core Courses

Students are required to complete ALL discipline core courses (78 credits), comprising 24 credits of introductory core courses and 54 credits of advanced core courses.

#### Disciplinary Elective Courses

Students are required to complete at least 36 credits of advanced disciplinary elective courses offered by the Department of Civil Engineering.

#### Elective Courses

Students are required to complete 18 credits of elective courses offered by either the Department of Civil Engineering, 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 “CAES9540 Technical English for Civil Engineering”;
- b) 6 credits in Chinese language enhancement course “CENG9001 Practical Chinese for Engineering Students”; and
- c) 36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and no more than two courses from each Area of Inquiry during the whole period of study.

#### Capstone Experience

Students are required to complete the 12-credit “CIVL4102 Final Year Project” to fulfill the capstone experience requirement for the degree of BEng in Civil Engineering.

Internship

Students are required to complete the 6-credit internship “CIVL2109 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 EN16 of the Regulations for the Degree of Bachelor of Engineering and UG9 of the Regulations for the First Degree Curricula.

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

The curriculum of BEng (Civil Engineering) 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
CAES9540	Technical English for Civil Engineering	6
CENG9001	Practical Chinese for Engineering Students	6
CC##XXXX	University Common Core Course (6 courses)*	36
<b>Total for UG5 Requirements</b>		<b>54</b>

\* Students can select not more than one course from each Area of Inquiry within one academic year and at least one and no more than two courses from each Area of Inquiry during the whole period of study.

**Faculty General Engineering Courses (36 credits)**

Course Code	Course	No. of credits
MATH1851	Calculus and Ordinary Differential Equations	6
MATH1853	Linear Algebra, Probability & Statistics	6
ENGG1111/ ENGG1112	Computer Programming and Applications/ Computer Programming and Applications I	6
PHYS1050	Physics for engineering students	6
ENGG1201	Engineering for sustainable development	6
ENGG120#	Any one of the General Engineering Courses offered by other Departments of the Faculty of Engineering*	6
<b>Total for Faculty General Engineering Courses</b>		<b>36</b>

\*Choose one General Engineering Course from the following list:

ENGG1202	Foundation of computer science
ENGG1203	Introduction to electrical and electronic engineering
ENGG1204	Industrial management and logistics
ENGG1205	Introduction to mechanical engineering
ENGG1206	Introduction to biomedical engineering

**Discipline Core Engineering Courses (78 credits)****Introductory Courses (24 credits)**

Course Code	Course	No. of credits
CIVL1105	Environmental engineering	6
CIVL1113	Engineering mechanics & materials	6

CIVL1114	Surveying & drawing	6
MECH2407	Multivariable Calculus & Partial Differential Equations	6
<b>Total for Introductory Discipline Core Engineering Courses</b>		<b>24</b>

**Advanced Courses (54 credits)**

Course Code	Course	No. of credits
CIVL2102	Engineering geology and rock mechanics	6
CIVL2103	Fluid mechanics	6
CIVL2104	Hydraulics and hydrology	6
CIVL2105	Theory and design of structures I	6
CIVL2106	Soil mechanics	6
CIVL2107	Theory and design of structures II	6
CIVL2108	Principles of civil engineering management	6
CIVL2111	Transportation engineering	6
CIVL4101	Capstone design project	6
<b>Total for Advanced Discipline Core Engineering Courses</b>		<b>54</b>

**Capstone Experience and Internship (18 credits)**

Course Code	Course	No. of credits
CIVL4102	Final Year Project <sup>+</sup>	12
CIVL2109	Internship*	6
<b>Total for Capstone Experience and Internship</b>		<b>18</b>

+Capstone Experience

\*Training

**Disciplinary Elective Courses (36 credits)**

Course Code	Course	No. of credits
CIVL2110	Experiential learning	6
CIVL3101	Advanced engineering mechanics	6
CIVL3103	Construction project management	6
CIVL3106	Engineering hydraulics	6
CIVL3107	Environmental impact assessment of civil engineering projects	6
CIVL3108	Foundation engineering	6
CIVL3111	Municipal and industrial wastewater treatment	6
CIVL3112	Prestressed concrete structures	6
CIVL3114	Slope engineering	6
CIVL3115	Solid and hazardous waste management	6
CIVL3116	Steel structures	6
CIVL3118	Theory and design of structures III	6
CIVL3119	Traffic engineering	6
CIVL3120	Transportation infrastructure engineering	6
CIVL3121	Water resources engineering	6
CIVL3122	Wind engineering	6
CIVL3125	Law for civil engineers	6
CIVL3126	Engineering practice in Mainland China	6
CIVL3127	Building practice in the built environment	6
CIVL3128	Structural dynamics and earthquake engineering	6
CIVL3129	Numerical analysis in geotechnical engineering	6
CIVL3130	Structural fire engineering	6

CIVL3131	Earth retaining systems	6
CIVL3132	Geotechnical testing instrumentation and monitoring	6
CIVL3133	Ground improvement	6
CIVL3134	Environmental geotechnology	6
<b>Complete six disciplinary elective courses for a total of 36 credits</b>		<b>36</b>

### Elective Courses (18 credits)

At least 18 credits of courses offered by either the Department of Civil Engineering, or other departments within or outside of the Faculty of Engineering.

### Summary of curriculum structure of BEng (Civil Engineering)

Course Categories	No. of credits
UG5 Requirements	54
General Engineering Courses	36
Discipline Core Engineering Courses (Introductory)	24
Discipline Core Engineering Courses (Advanced)	54
Capstone Experience and Internship	18
Disciplinary Elective Courses	36
Elective Courses	18
<b>Total</b>	<b>240</b>

The proposed syllabus by study year is as follows:

### FIRST YEAR

#### General Engineering Courses (36 credits)

MATH1851	Calculus and Ordinary Differential Equations
MATH1853	Linear Algebra, Probability & Statistics
ENGG1111/	Computer Programming and Applications/
ENGG1112	Computer Programming and Applications I
PHYS1050	Physics for engineering students
ENGG1201	Engineering for sustainable development
ENGG120X	Any one of the General Engineering Courses offered by other Departments of the Faculty of Engineering

#### University Requirements (UG5) (24 credits)

CAES1000	Core University English
CC##XXXX	Three Common Core Curriculum Courses

### SECOND YEAR

#### Introductory Core Courses (24 credits) CIVL1105

	Environmental engineering
CIVL1113	Engineering mechanics & materials
CIVL1114	Surveying & drawing
MECH2407	Multivariable Calculus & Partial Differential Equations

#### Advanced Core Courses (18 credits)

CIVL2103	Fluid mechanics
CIVL2105	Theory and design of structures I
CIVL2106	Soil mechanics

**University Requirements (UG5) (18 credits)**

CC##XXXX Three Common Core Curriculum Courses

**THIRD YEAR****Advanced Core Courses (36 credits)**

CIVL2102 Engineering geology and rock mechanics  
 CIVL2104 Hydraulics and hydrology  
 CIVL2107 Theory and design of structures II  
 CIVL2108 Principles of civil engineering management  
 CIVL2111 Transportation engineering

**Internship (6 credits)**

CIVL2109 Internship

**University Requirements (UG5) (6 credits)**

CENG9001 Practical Chinese for Engineering Students

**Disciplinary Elective Courses (18 credits)****FOURTH YEAR****Advanced Core Courses (6 credits)**

CIVL4101 Capstone design project

**Disciplinary Elective Courses (18 credits)****Capstone Experience (12 credits)**

CIVL4102 Final Year Project

**University Requirements (UG5) (6 credits)**

CAES9540 Technical English for Civil Engineering

**Elective Courses (18 credits)****COURSE DESCRIPTIONS**

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

**Faculty General Engineering Courses**

ENGG1111 Computer programming (6 credits)  
 ENGG1112 Computer programming I (6 credits)  
 MATH1851 Calculus and ordinary differential equations (6 credits)  
 MATH1853 Linear algebra, probability & statistics (6 credits)  
 PHYS1050 Physics for engineering students (6 credits)  
 ENGG1201 Engineering for sustainable development (6 credits)  
 ENGG1202 Foundation of computer science (6 credits)  
 ENGG1203 Introduction to electrical and electronic engineering (6 credits)  
 ENGG1204 Industrial management and logistics (6 credits)  
 ENGG1205 Introduction to mechanical engineering (6 credits)  
 ENGG1206 Introduction to biomedical engineering (6 credits)

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

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### **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.

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### **CAES9540. Technical English for Civil Engineering (6 credits)**

This one semester 6-credit English course will be offered to final year Civil Engineering students. It will run alongside the Civil Engineering core course “Final Year Project”. The main course objective is to provide students with training on report writing and oral presentation skills. Students will learn to write a technical report in a professional and effective manner through drafting and revision of their work. They will also be trained to give a technical presentation that focuses on explaining technical information to the general audience, handling over in a group presentation and designing appropriate visual aids to both professional and non-expert audiences. Assessment is by coursework and a final test.

Assessment: 100% continuous assessment

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### **University Common Core Curriculum**

36 credits of courses in the University Common Core Curriculum, in which students can select not more than one course from the same Area of Inquiry within one academic year and at least one and no more than two courses from each Area of Inquiry during the whole period of study:

- Scientific and Technology Literacy
  - Humanities
  - Global Issues
  - China: Culture, State and Society
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### **Introductory Discipline Core Engineering Courses**

#### **CIVL1105. Environmental engineering (6 credits)**

This is an introductory course on environmental engineering. Students are taught in 31 hours of lecture plus 8 hours of interactive problem-based tutorial (IPBT). The IPBT is designed to train students in small groups for using the knowledge and engineering principles learned from the course to solve practical environmental engineering related problems.

Assessment: 20% practical work, 80% examination

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**CIVL1113. Engineering mechanics and materials (6 credits)**

The Engineering Mechanics part of this course aims to provide students with a firm foundation of engineering mechanics, which is needed for their later studies in structural engineering and geotechnical engineering. This part covers equilibrium of forces; bending moment, shear and axial forces; beam theory for bending and shear; shear centre; deflection of beams; analysis of stress and strain; and energy methods.

The Materials part of this course aims to provide students with a general knowledge of common construction materials and some background knowledge of material science. This part covers major applications and required properties of construction materials; structural steel; concrete; masonry; timber; bituminous materials; crystalline structure; elastic and plastic deformation; phase diagram; alloying; material forming and heat treatment; and corrosion.

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

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**CIVL1114. Surveying and drawing (6 credits)**

The Surveying part of this course aims to provide students with an overview on the surveying principles in determination of the differences in levelling between stations and of the coordinates of stations. Students will be introduced to basic surveying instruments and techniques through lectures and field work. The aim of the Drawing part of this course is to familiarize the students with the techniques for reading and production of both hand drawings and computer aided drafting (CAD) drawings. Students are expected to understand and appreciate the importance of surveying and drawing in the construction industry in order to prepare them for an engineering career.

Assessment: 35% practical work, 65% continuous assessment

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**MECH2407. Multivariable Calculus & Partial Differential Equations (6 credits)**

This course aims to further develop the foundation of mathematics used in engineering discipline. Students will be explored to Fourier series representations, multivariable functions, vector analysis and elementary partial differential equations. Through the development of solution methods, students will enrich their experience in critical analysis and problem solving.

Assessment: 20% continuous assessment, 80% examination

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**Advanced Discipline Core Engineering Courses****CIVL2102. Engineering geology and rock mechanics (6 credits)**

This course provides an introduction to engineering geology, acquainting the students with the fundamental aspects of rock mechanics, and developing the students' capability of applying the concepts and knowledge to solve practical problems in rock engineering.

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

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**CIVL2103. Fluid mechanics (6 credits)**

The course introduces the fundamental concepts of fluid flow, and examples of engineering fluid mechanics.

The course helps students to develop a sound understanding of control volume analysis, and its use with mass, momentum, and energy conservation principles. The course prepares students for dimensional analysis for the use of scale models in wind tunnel and hydraulic model testing.

Assessment: 30% continuous assessment, 70% examination

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**CIVL2104. Hydraulics and hydrology (6 credits)**

This course is to consolidate the principles of fluid mechanics learnt in CIVL2103, to apply them to civil engineering hydraulic problems, and to provide an understanding of the basic concepts of the hydrological cycle including its relevance and application to civil engineering field.

Pre-requisite: CIVL2103 Fluid mechanics

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

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**CIVL2105. Theory and design of structures I (6 credits)**

This is the first of three consecutive courses on Theory and Design of Structures. This course provides students with the basic knowledge in structural theory and design. Apart from introducing students to statically determinate structures, it also provides the background for future study of statically indeterminate structures.

Prerequisite: CIVL1113 Engineering mechanics and materials

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

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**CIVL2106. Soil mechanics (6 credits)**

Soil mechanics is a branch of engineering mechanics that describes the behaviour of soils. Example applications are building and bridge foundations, retaining walls, dams, and buried pipeline systems. This course aims to deliver an introduction of the engineering properties of soil. It will equip students with the basic analytical and theoretical background for treating geomechanics in a wide variety of context. These include soil classification, effective stress principle, seepage analysis, consolidation analysis, and stability analysis. Students will also learn common laboratory testing methods for soil, and to perform essential calculations for predicting soil behaviour commonly required in workplace. This course will also prepare them for more advanced geotechnical modules (such as Foundation Engineering, Slope Engineering) in their degree programme.

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

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**CIVL2107. Theory and design of structures II (6 credits)**

This course is the second of three consecutive courses on Theory and Design of Structures. This course aims to provide students with knowledge and understanding in behaviour, analysis and design of statically indeterminate structures.



Prerequisite: CIVL2105 Theory and design of structures I  
Assessment: 30% continuous assessment, 70% examination

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### **CIVL2108. Principles of civil engineering management (6 credits)\***

Civil engineering projects are characterised by their uniqueness, complexity and uncertainty, and these have posed immense challenges to our industry. To satisfy the client and project requirements, a good management skill and knowledge is of paramount importance. While engineers play a key role in relevant government departments, client organisations, design offices and contracting firms, they can help improve the efficiency, safety and quality of civil engineering projects and maximise the chance of project success. Therefore, the aims of this course are to introduce the basic concepts of various aspects of management and to explain how to apply these management principles to plan, organise and control a civil engineering project.

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.

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### **CIVL2111. Transportation engineering (6 credits)**

This course is an introductory course of Transportation Engineering, and covers the causes and motivations of the movements of people and goods, the basic characteristics of different transportation modes, land use and transportation planning, equilibrium analysis, cost-benefit analysis, travel demand modeling and forecasting, highway alignment and geometric design, transportation surveys, and traffic impact assessment. Hong Kong examples will be used if possible.

Assessment: 20% continuous assessment, 80% examination

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### **CIVL4101. Capstone Design Project (6 credits)**

All modern engineering projects require substantial design and communication skills from engineers. With the demand for quality infrastructural projects, many professional engineers are required to participate in interdisciplinary teams throughout various project stages. Therefore this course aims to train future civil engineers to handle civil engineering projects through synergetic teamwork within a multi-disciplinary working environment. The course will start by introducing the importance of engineering design and communication skills, and then will equip students with the general knowledge of project design across different disciplines by a series of guest lectures. Student will be divided into small project groups. Each group will be allocated a real-life project and supervised by one of the departmental teaching staff (staff tutor) and an industrial tutor. The students will work closely with their staff tutor and industrial tutor throughout the project period, together with the specific technical advisors, to carry out feasibility study, preliminary design and detail design of their project. The project will be assessed by a series of oral presentations and written reports from the project team.

Assessment: 100% continuous assessment

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**Capstone Experience and Internship****CIVL2109. Internship (6 credits)**

The course is to provide industrial training to engineering students. The students will have an opportunity to gain practical experience in civil engineering and related professions.

The course requires students to complete a period of approved internship in industry, of not less than 4 weeks during the summer vacation normally after the end of the second semester of the student's second academic year of study. The students are required to complete the internship to the satisfaction of an engineering professional, who will act as the students' supervisors during the internship.

Assessment: 100% continuous assessment

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**CIVL4102. Final Year Project (12 credits)**

The primary aim of the project is to give each individual student an opportunity to handle a practical engineering problem and to present the findings in a precise and concise report. An important part of the project lies in the way in which the students plan and carry out the task, and apply their engineering knowledge sensibly and diligently to solve the problem. The way in which the students present their findings is equally important.

Assessment: 100% continuous assessment

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**Disciplinary Elective Courses****CIVL2110. 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

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**CIVL3101. Advanced engineering mechanics (6 credits)**

CIVL3101 Advanced Engineering Mechanics aims to introduce to the fundamentals of engineering mechanics and how this is linked to engineering solutions by advanced computation techniques based on the finite element method. Equilibrium in elasticity problems and continuity equation for steady-state field problems are discussed, and by means of the virtual work principle, finite element formulation will be systematically established. Using simple 3-node triangular element as an example, engineering problems in structural mechanics and fluid flow are analysed. A computer demonstration will be presented to show students how complex practical engineering problems are tackled, and allow them to develop the ability to analyse realistic engineering problems by themselves and appreciate the capability and limitations of modern computational tools for engineering solutions.

Assessment: 30% continuous assessment, 70% examination

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**CIVL3103. Construction project management (6 credits)**

This course conveys knowledge of the fundamentals of construction project management, including core principles and their basic applications, that can be further built upon during career development. Topics span both the management of civil engineering designs and the management of construction projects. The course imparts important basics of the planning and control of time and money, and links these to achieving better value for stakeholders, including quality and life cycle considerations.

The course is designed to enable civil engineering undergraduates to appreciate and assimilate key principles and good practices for the effective, efficient and ethical management of construction projects. It also aims to equip young civil engineers with the basic knowledge that will enable them to perform well and contribute meaningfully in multi-disciplinary project teams that may include financial and legal professionals, apart from those from other core construction industry disciplines

Assessment: 30% continuous assessment, 70% examination

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**CIVL3106. Engineering hydraulics (6 credits)**

The course Engineering Hydraulics covers three major parts: Open Channel Flow, Storm Drainage Design and Environmental Hydraulics.

In Open Channel Flow, emphasis will be placed on the 'gradually varied' open channel flow (GVF), which deals with the classification of GVF profiles and different methods of computation of flow profiles. Some examples of 'rapidly varied' flow, such as energy dissipators and vertical drop structures, will also be given.

In Storm Drainage Design, the classification of drainage and sewerage systems will be introduced. Students will learn the design of urban stormwater drainage system.

In Environmental Hydraulics, students will appreciate the assimilative capacity (self purification) of the natural environment, through the study of basic concepts of turbulent mixing and dispersion of pollutants in water. Examples will be given to demonstrate the use of advective diffusion equation to solve actual environmental problems.

Prerequisite: CIVL2104 Hydraulics and hydrology

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

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**CIVL3107. Environmental impact assessment of civil engineering projects (6 credits)**

This course will introduce concepts on environmental protection legislation, environmental impact assessment process, environmental impacts during construction and operation of projects, mitigation measures, modelling, environmental monitoring and audit, and case studies.

Prerequisite: CIVL1105 Environmental engineering and CIVL2103 Fluid mechanics

Assessment: 30% continuous assessment, 70% examination

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**CIVL3108. Foundation engineering (6 credits)**

Foundation engineering deals with the investigation, design and construction of the foundations of engineering structures, which is of prime importance. This course addresses the site investigation of a geotechnical project, follows by the design and construction of shallow and deep foundations in

accordance with both ultimate and serviceability criteria. In particular the design and construction practices in Hong Kong will be addressed. A site visit will be arranged to offer students an opportunity to observe the construction practice in Hong Kong.

Prerequisite: CIVL2106 Soil mechanics

Assessment: 30% continuous assessment, 70% examination

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### **CIVL3111. Municipal and industrial wastewater treatment (6 credits)**

This course focuses on the theory, design and operation of wastewater treatment. Emphasis will be placed upon a fundamental understanding of commonly used treatment technologies. Major sections of the course cover the generation and characteristics of municipal wastewater, sewerage systems, preliminary treatment, primary sedimentation, secondary biological treatment, nutrient removal, disinfection, sludge treatment and disposal, unit process selection and treatment plant design, characteristics of industrial wastewater, and physical, chemical and biological processes used in industrial wastewater treatment.

The course aims to introduce to students the basic concept of wastewater treatment engineering and the knowledge of unit treatment operations and processes. At the end of this course, students who fulfill the requirement of the course will be able to present the principles and theories behind the common wastewater treatment technologies and to conduct preliminary design of sewerage systems and typical physical, chemical and biological units used in conventional wastewater treatment.

Prerequisite: CIVL1105 Environmental engineering and CIVL2103 Fluid mechanics

Assessment: 20% practical work, 80% examination

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### **CIVL3112. Prestressed concrete structures (6 credits)**

This is an elective course to provide students with the basic knowledge for the design of Prestressed Concrete Structures. Apart from introducing students to the fundamental principles of prestressing and application to design of long-span concrete structures, it also provides the background for future study of bridge engineering. Each student is required to submit a comprehensive design of prestressed concrete structure. Students must have taken the pre-requisite CIVL2107 Theory and Design of Structures II before taking this course.

Prerequisite: CIVL2107 Theory and design of structures II

Assessment: 30% continuous assessment, 70% examination

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### **CIVL3114. Slope engineering (6 credits)**

This course is to provide our students with basic knowledge of slope stability analysis and design. It covers slope stability analyses, cases of landslide hazards, landslide investigation, uncertainties in slope stability analysis, landslip preventive measures and design, many case studies and actual examples, a Slope/w software workshop and one field technical trip.

Prerequisite: CIVL2102 Engineering geology and rock mechanics and CIVL2106 Soil mechanics

Assessment: 20% continuous assessment, 80% examination

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**CIVL3115. Solid and hazardous waste management (6 credits)**

Human activities generate solid waste materials that are often discarded because they are considered useless. However, the disposal of these unwanted waste materials has created a heavy burden to our environment and sometimes even threatened the human health due to its hazardous properties. Waste management has become one of the most significant problems of our time because the current ways of life in Hong Kong and in many areas of the world produce enormous amounts of waste, and most people want to preserve their lifestyle, while also protecting the environment and public health. Furthermore, if managed properly, many of these waste materials can be reused or recovered for becoming a resource for industrial production or energy generation. This course is an introduction to the key managing concepts and processing technologies of solid waste. It aims to train future engineers capable of conducting solid waste project planning for industries, businesses, communities and governmental sectors. The discussion of context will stem from solid waste materials generated from municipal sources, and then include selected examples from industrial sources and/or of hazardous properties with local relevance. After the training provided by this course, students are expected to be capable of using different planning tools to manage the reduction of solid waste generation, the reuse and recovery of waste materials, or the safe and economical disposal strategies.

Assessment: 30% continuous assessment, 70% examination

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**CIVL3116. Steel structures (6 credits)**

This course aims to provide students with knowledge and understanding in behaviour and design of steel structures. Students will be exposed to plastic analysis, residual stress, slender sections, plate girders, steel frames, connections and composite structures. Students must have taken the pre-requisite CIVL2107 Theory and Design of Structures II before taking this course.

Prerequisite: CIVL2107 Theory and design of structures II  
Assessment: 20% continuous assessment, 80% examination

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**CIVL3118. Theory and design of structures III (6 credits)**

The theory part of the course introduces the theory and applications of the matrix method for static and stability analyses of two-dimensional structures together with the elastic and plastic torsional analyses of thin-walled sections. The design part of the course introduces the concept and principles of inelastic design of reinforced concrete structures with emphasis on plastic hinge formation and moment redistribution. On practical design aspects, ultimate limit state design as per Hong Kong Concrete Code of special structural members such as two-way slabs, flat slabs, torsion members and slender columns will be discussed and explained. The course also includes a section of serviceability limit state design of large civil water-retaining reinforced concrete structures, such as underground box culverts, open channels, manholes, inspection chambers and water/sewage treatment tanks.

Prerequisite: CIVL2107 Theory and design of structures II  
Assessment: 30% continuous assessment, 70% examination

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**CIVL3119. Traffic engineering (6 credits)**

This course is an introduction to the broad disciplines of traffic engineering and its applications to the management and control of traffic flows in highways and the planning and design of highway junctions and interchanges. This course covers the characteristics of traffic flow, mathematical models

of traffic flow, traffic management schemes, traffic surveys, traffic design for safety, and the planning and design of different types of road junctions, including priority junctions, roundabouts, traffic signal controlled junctions and grade-separated junctions and interchanges. Hong Kong examples will be used if possible.

Assessment: 30% continuous assessment, 70% examination

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### **CIVL3120.    Transportation infrastructure engineering (6 credits)**

This course is an introduction to the theory and practice of transportation infrastructure planning, design and maintenance. Emphasis is placed on facility operational requirements, facility location, demand estimation, capacity assessment, properties of construction materials, design codes and their underlying theories. The different stages of project development, including system planning, feasibility studies, public consultation, project appraisal, detailed design and construction are discussed and illustrated by case studies. Students are required to complete three exercises on infrastructure planning and design.

Prerequisite: CIVL2111 Transportation engineering

Assessment: 30% continuous assessment, 70% examination

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### **CIVL3121.    Water resources engineering (6 credits)**

CIVL3121 is a course that focuses on the concept, theory, design and operation of urban water supply systems. Emphasis will be placed upon a fundamental understanding of commonly used water collection and treatment technologies. Major sections of the course cover water cycle, water consumption and demand, water collection, storage and transportation, drinking water quality, conventional surface water treatment unit operations and processes, advanced water treatment technologies, water stabilisation and corrosion control, urban water distribution and transmission, water reclamation and total water management.

The course aims to introduce to students the basic concept of water resources engineering and the knowledge of urban water supply. At the end of this course, students who fulfill the requirement of the course will be able to present the principles and theories behind the common water collection and treatment technologies and to conduct conceptual design of freshwater collection systems, common surface water treatment processes and urban water distribution systems.

Prerequisite: CIVL1105 Environmental engineering and CIVL2103 fluid mechanics

Assessment: 20% practical work, 80% examination

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### **CIVL3122.    Wind engineering (6 credits)**

The course introduces the effects of wind on buildings, structures and the environment, with emphasis on wind loading of buildings and structures.

The course provides students with the basic scientific knowledge of the engineering description of wind and the engineering phenomena of wind flow around bluff bodies, buildings, bridges and civil engineering structures. The basics of flow-structure interaction and wind-induced vibration of structures are also presented. The course then continues to describe the format and features of a wind loading code and how the code should be interpreted with the knowledge of wind engineering. The course also introduces the effects of wind on pedestrian comfort and pollutant dispersion.

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

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**CIVL3125. Law for civil engineers (6 credits)**

With the changing demands and expectations of civil engineers, law has become an essential part of the body of knowledge important to the discharge of daily tasks of civil engineers. Whether working for sub-contractors, contractors, consultants, governments or private developers, a core competence for the planning, design, construction and maintenance of projects is the ability to apply principles of laws to their works. These enable the proper management of projects and the areas of disputes arising thereunder.

This course aims at introducing the basic principles of laws with particular emphasis on those, which are relevant to the construction industry.

Assessment: 30% continuous assessment, 70% examination

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**CIVL3126. Engineering practice in Mainland China (6 credits)**

To enable students to gain basic understanding of engineering design and construction practice in Mainland China. By introducing some commonly used codes of practice, work procedures, quality control system, engineering requirements, practical design case study, design principles and procedure of foundation, building structures with and without seismic design requirement and bridges/highway structures, students will be better equipped to engage in Mainland engineering projects. At the end of this course, students should be able to understand the work procedure in Mainland China. In design, students should be capable of carrying out correct design of foundations and buildings as per various GB Codes and understand the principle of respective design clauses stipulated in the Codes.

Prerequisite: CENG9001 Practical Chinese for engineering students or CUND9002 Practical Chinese language and Hong Kong society and CIVL2107 Theory and design of structures II

Assessment: 30% continuous assessment, 70% examination

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**CIVL3127. Professional practice in the built environment (6 credits)**

Building construction is one of the major sectors of the construction industry in Hong Kong. Many high-rise buildings were built in the last three decades, calling for sophisticated designs in building layout, structure and foundation. At the same time it demands high technique in construction skill and management. There are government departments ensuring compliance with statutory standards of safety, health and environment of buildings and building works. Civil engineers would join relevant government departments, client organizations, consultant and contracting firms playing a key role in planning, design and construction of buildings. Therefore, the aims of this course are to introduce the basic knowledge and idea of statutory control on building planning, construction and site supervision.

Assessment: 30% continuous assessment, 70% examination

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**CIVL3128. Structural dynamics and earthquake engineering (6 credits)**

Earthquake disaster is increasingly of global concern as it threatens the world's population, economy, and sustainable development. It is the responsibility of civil engineers to design and build

earthquake-resistant structures, in order to minimize the earthquake risk. By reducing losses of lives and properties, socio-economical sustainability can be achieved.

In this course, students will be introduced to the basic science of earthquakes and its effects on the natural and built environment.

Assessment: 30% continuous assessment, 70% examination

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### **CIVL3129. Numerical analysis in geotechnical engineering (6 credits)**

Advances in computer technology greatly enhance the application of numerical methods in geotechnical engineering. The importance of numerical modelling in geotechnical practice has been increased tremendously over the past decade. In this course, the students will be introduced a proper understanding of the subject, covering from fundamentals of the numerical techniques to geotechnical practical considerations. This course first provides students a basic knowledge of numerical techniques including the finite difference and finite element method. The second part of the course focuses on practical considerations required for applying these techniques to geotechnical problems. It will be concluded by a number of geotechnical applications and case histories.

Prerequisite: CIVL2106 Soil mechanics

Assessment: 35% continuous assessment, 65% examination

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### **CIVL3130. Structural fire engineering (6 credits)**

The major aims of this course are to introduce to the students the concept of fire safety engineering and design of fire resistant structures. Students will be given opportunities to learn Eurocode for the design of steel and concrete structures under elevated temperature. At the end of this course, students will be able to understand the fire development and predict gas temperature of fire compartment and temperature of structural members in fire condition. With respect to structural design, students will appreciate the special structural actions that occur under elevated temperature and capable of carrying out fire resistance design of simple steel and reinforced concrete members.

Prerequisite: CIVL2107 Theory and design of structures II

Assessment: 30% continuous assessment, 70% examination

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### **CIVL3131. Earth retaining systems (6 credits)**

Development in urban areas is often limited by the space available, and efficient use of that space requires building underground or near slopes. Earth retaining systems are the engineering solution to this problem. This course introduces civil engineering students to different types of earth retaining systems, and gives them the means of designing earth retaining walls from first principles. At the end of the course, the students will have a good understanding of the forces exerted by the ground on retaining structures, for different cases (e.g. inclined ground, inclined wall, embedded wall, wall friction/adhesion), the different stabilizing methods that can be used (e.g. anchors, nails), and be able to use these calculations to design safe retaining walls.

Prerequisite: CIVL2106 Soil mechanics

Assessment: 30% continuous assessment, 70% examination

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**CIVL3132. Geotechnical testing, instrumentation and monitoring (6 credits)**

Geotechnical testing aims at understanding the behaviour of geomaterials that engineers are dealing with. A proper instrumentation and monitoring scheme provides crucial information for engineers to judge the effectiveness and safety of the engineering design and construction. This course first provides students advanced knowledge on geotechnical testing from both experimental and theoretical perspectives. Students are required to have hands-on experience on a common geotechnical test – multi-stage triaxial test. Then both practical and theoretical aspects of geotechnical instrumentation and monitoring are addressed.

Prerequisite: CIVL2106 Soil mechanics

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

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**CIVL3133. Ground improvement (6 credits)**

Construction is sometimes needed in ground that has marginal or even poor engineering properties. Improving the ground by reinforcing it or by modifying it can prevent excessive deformations or even failure, and improve the economics of projects. This course introduces civil engineering students to ground improvement by modification or reinforcement. At the end of the course, the students will have a good understanding of the different techniques used for ground improvement, and be able to use some of the theories for design.

Prerequisite: CIVL2106 Soil mechanics

Assessment: 20% continuous assessment, 80% examination

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**CIVL3134. Environmental Geotechnology (6 credits)**

Environmental geotechnology can be defined as an interdisciplinary science which covers soil and rock and their interactions with various environmental cycles, including the atmosphere, biosphere, hydrosphere, and lithosphere, as well as the geo-microbiosphere, and human activities, which includes characteristics of tree and vegetation roots and bacterial activities in the subsurface and subsequent response to the engineering behavior of the soil-water system.

The objective of the course is to provide the students with exposure to the geotechnical nature of environmental problems through discussions of contaminant transport in porous media and relationship with remediation technologies for hazardous waste sites and discussions of soil properties relative to waste containment systems, soil stability, and permeability. At the end of the course, the students who fulfill the requirements of this course should be able to understand the importance of Geotechnical Engineering related to environmental issues, to perform preliminary designs of different components of a municipal landfill, and to select appropriate remediation technologies for a contaminated site of a given environmental conditions.

Prerequisite: CIVL2106 Soil mechanics

Assessment: 30% continuous assessment, 70% examination

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**CIVIL ENGINEERING (Environmental Engineering)****SYLLABUS**

The syllabus applies to students admitted in the academic year 2012-13 and thereafter under the four-year curriculum.

### Definition and Terminology

Each course offered by the Department of Civil Engineering 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 Disciplinary Elective course refers to any technical course offered by the Department of Civil Engineering for the fulfillment of the curriculum requirements of the degree of BEng in Civil Engineering-Environmental Engineering that are not classified as discipline core course.

### **Curriculum**

The Curriculum comprises 240 credits of courses as follows:

#### General Engineering Courses

Students are required to complete at least 36 credits of General Engineering Course.

#### Discipline Core Courses

Students are required to complete ALL discipline core courses (84 credits), comprising 24 credits of introductory core courses and 60 credits of advanced core courses.

#### Disciplinary Elective Courses

Students are required to complete at least 36 credits of advanced disciplinary elective courses offered by the Department of Civil Engineering.

#### Elective Courses

Students are required to complete 12 credits of elective course(s) offered by either the Department of Civil Engineering, 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 “CAES9540 Technical English for Civil Engineering”;
- b) 6 credits in Chinese language enhancement course “CENG9001 Practical Chinese for Engineering Students”; and
- c) 36 credits of courses in the Common Core Curriculum, selecting not more than one course from the same Area of Inquiry within one academic year and at least one and no more than two courses from each Area of Inquiry during the whole period of study.

#### Capstone Experience

Students are required to complete the 12-credit “CIVL4102 Final Year Project” to fulfill the capstone experience requirement for the degree of BEng in Civil Engineering-Environmental Engineering.

#### Internship

Students are required to complete the 6-credit internship “CIVL2109 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 EN16 of the Regulations for the Degree of Bachelor of Engineering and UG9 of the Regulations for the First Degree Curricula.

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

The curriculum of BEng (Civil Engineering-Environmental Engineering) 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
CAES9540	Technical English for Civil Engineering	6
CENG9001	Practical Chinese for Engineering Students	6
CC##XXXX	University Common Core Course (6 courses)*	36
<b>Total for UG5 Requirements</b>		<b>54</b>

\* Students can select not more than one course from each Area of Inquiry within one academic year and at least one and no more than two courses from each Area of Inquiry during the whole period of study.

**Faculty General Engineering Courses (36 credits)**

Course Code	Course	No. of credits
MATH1851	Calculus and Ordinary Differential Equations	6
MATH1853	Linear Algebra, Probability & Statistics	6
ENGG1111/ ENGG1112	Computer Programming and Applications/ Computer Programming and Applications I	6
PHYS1050	Physics for engineering students	6
ENGG1201	Engineering for sustainable development	6
ENGG120X	Any one of the General Engineering Courses offered by other Departments of the Faculty of Engineering*	6
<b>Total for Faculty General Engineering Courses</b>		<b>36</b>

\*Choose one General Engineering Course from the following list:

ENGG1202	Foundation of computer science
ENGG1203	Introduction to electrical and electronic engineering
ENGG1204	Industrial management and logistics
ENGG1205	Introduction to mechanical engineering
ENGG1206	Introduction to biomedical engineering

**Discipline Core Engineering Courses (84 credits)****Introductory Courses (24 credits)**

Course Code	Course	No. of credits
CIVL1105	Environmental engineering	6
CIVL1113	Engineering mechanics & materials	6
CIVL1114	Surveying & drawing	6
MECH2407	Multivariable Calculus & Partial Differential Equations	6
<b>Total for Introductory Discipline Core Engineering Courses</b>		<b>24</b>

**Advanced Courses (60 credits)**

Course Code	Course	No. of credits
CIME2101	Water and air quality: concepts and measurement	6

CIVL2102	Engineering geology and rock mechanics	6
CIVL2103	Fluid mechanics	6
CIVL2104	Hydraulics and hydrology	6
CIVL2105	Theory and design of structures I	6
CIVL2106	Soil mechanics	6
CIVL2107	Theory and design of structures II	6
CIVL2108	Principles of civil engineering management	6
CIVL2111	Transportation engineering	6
CIVL4101	Capstone design project	6
<b>Total for Advanced Discipline Core Engineering Courses</b>		<b>60</b>

#### Capstone Experience and Internship (18 credits)

Course Code	Course	No. of credits
CIVL4102	Final Year Project <sup>+</sup>	12
CIVL2109	Internship*	6
<b>Total for Capstone Experience and Internship</b>		<b>18</b>

+Capstone Experience

\*Training

#### Disciplinary Elective Courses (36 credits)

Course Code	Course	No. of credits
CIVL2110	Experiential learning	6
CIVL3103	Construction project management	6
CIVL3106	Engineering hydraulics	6
CIVL3107	Environmental impact assessment of civil engineering projects	6
CIVL3108	Foundation engineering	6
CIVL3111	Municipal and industrial wastewater treatment	6
CIVL3115	Solid and hazardous waste management	6
CIVL3118	Theory and design of structures III	6
CIVL3121	Water resources engineering	6
CIVL3122	Wind engineering	6
<b>Complete six disciplinary elective courses for a total of 36 credits</b>		<b>36</b>

#### Elective Courses (12 credits)

At least 12 credits of courses offered by either the Department of Civil Engineering, or other departments within or outside of the Faculty of Engineering.

Course Code	Course	No. of credits
CIVL3101	Advanced engineering mechanics	6
CIVL3112	Prestressed concrete structures	6
CIVL3114	Slope engineering	6
CIVL3116	Steel structures	6
CIVL3118	Theory and design of structures III	6
CIVL3119	Traffic engineering	6
CIVL3120	Transportation infrastructure engineering	6
CIVL3125	Law for civil engineers	6
CIVL3126	Engineering practice in Mainland China	6
CIVL3127	Building practice in the built environment	6

CIVL3128	Structural dynamics and earthquake engineering	6
CIVL3129	Numerical analysis in geotechnical engineering	6
CIVL3130	Structural fire engineering	6
CIVL3131	Earth retaining systems	6
CIVL3132	Geotechnical testing instrumentation and monitoring	6
CIVL3133	Ground improvement	6
CIVL3134	Environmental geotechnology	6

### Summary of curriculum structure of BEng (Civil Engineering-Environmental Engineering)

Course Categories	No. of credits
UG5 Requirements	54
General Engineering Courses	36
Discipline Core Engineering Courses (Introductory)	24
Discipline Core Engineering Courses (Advanced)	60
Capstone Experience and Internship	18
Disciplinary Elective Courses	36
Elective Courses	12
<b>Total</b>	<b>240</b>

The proposed syllabus by study year is as follows:

#### FIRST YEAR

##### General Engineering Courses (36 credits)

MATH1851	Calculus and Ordinary Differential Equations
MATH1853	Linear Algebra, Probability & Statistics
ENGG1111/	Computer Programming and Applications/
ENGG1112	Computer Programming and Applications I
PHYS1050	Physics for engineering students
ENGG1201	Engineering for sustainable development
ENGG120X	Any one of the General Engineering Courses offered by other Departments of the Faculty of Engineering

##### University Requirements (UG5) (24 credits)

CAES1000	Core University English
CC##XXXX	Three Common Core Curriculum Courses

#### SECOND YEAR

##### Introductory Core Courses (24 credits) CIVL1105

	Environmental engineering
CIVL1113	Engineering mechanics & materials
CIVL1114	Surveying & drawing
MECH2407	Multivariable Calculus & Partial Differential Equations

##### Advanced Core Courses (18 credits)

CIVL2103	Fluid mechanics
CIVL2105	Theory and design of structures I
CIVL2106	Soil mechanics

##### University Requirements (UG5) (18 credits)

CC##XXXX	Three Common Core Curriculum Courses
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**THIRD YEAR****Advanced Core Courses (42 credits)**

CIME2101	Water and air quality: concepts and measurement
CIVL2102	Engineering geology and rock mechanics
CIVL2104	Hydraulics and hydrology
CIVL2107	Theory and design of structures II
CIVL2108	Principles of civil engineering management
CIVL2111	Transportation engineering

**Internship (6 credits)**

CIVL2109	Internship
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**University Requirements (UG5) (6 credits)**

CENG9001	Practical Chinese for Engineering Students
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**Disciplinary Elective Courses (12 credits)****FOURTH YEAR****Advanced Core Courses (6 credits)**

CIVL4101	Capstone design project
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**Disciplinary Elective Courses (24 credits)****Capstone Experience (12 credits)**

CIVL4102	Final Year Project
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**University Requirements (UG5) (6 credits)**

CAES9540	Technical English for Civil Engineering
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**Elective Courses (12 credits)****COURSE DESCRIPTIONS**

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

**Faculty General Engineering Courses**

ENGG1111	Computer programming (6 credits)
ENGG1112	Computer programming I (6 credits)
MATH1851	Calculus and ordinary differential equations (6 credits)
MATH1853	Linear algebra, probability & statistics (6 credits)
PHYS1050	Physics for engineering students (6 credits)
ENGG1201	Engineering for sustainable development (6 credits)
ENGG1202	Foundation of computer science (6 credits)
ENGG1203	Introduction to electrical and electronic engineering (6 credits)
ENGG1204	Industrial management and logistics (6 credits)
ENGG1205	Introduction to mechanical engineering (6 credits)
ENGG1206	Introduction to biomedical engineering (6 credits)

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

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**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.

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**CAES9540. Technical English for Civil Engineering (6 credits)**

This one semester 6-credit English course will be offered to final year Civil Engineering students. It will run alongside the Civil Engineering core course “Final Year Project”. The main course objective is to provide students with training on report writing and oral presentation skills. Students will learn to write a technical report in a professional and effective manner through drafting and revision of their work. They will also be trained to give a technical presentation that focuses on explaining technical information to the general audience, handling over in a group presentation and designing appropriate visual aids to both professional and non-expert audiences. Assessment is by coursework and a final test.

Assessment: 100% continuous assessment

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**University Common Core Curriculum**

36 credits of courses in the University Common Core Curriculum, in which students can select not more than one course from the same Area of Inquiry within one academic year and at least one and no more than two courses from each Area of Inquiry during the whole period of study:

- Scientific and Technology Literacy
  - Humanities
  - Global Issues
  - China: Culture, State and Society
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**Introductory Discipline Core Engineering Courses**

- CIVL1105. Environmental engineering (6 credits)**  
**CIVL1113. Engineering mechanics and materials (6 credits)**  
**CIVL1114. Surveying and drawing (6 credits)**  
**MECH2407. Multivariable Calculus & Partial Differential Equations (6 credits)**

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

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**Advanced Discipline Core Engineering Courses**

- CIVL2102. Engineering geology and rock mechanics (6 credits)**  
**CIVL2103. Fluid mechanics (6 credits)**  
**CIVL2104. Hydraulics and hydrology (6 credits)**

- CIVL2105. Theory and design of structures I (6 credits)**  
**CIVL2106. Soil mechanics (6 credits)**  
**CIVL2107. Theory and design of structures II (6 credits)**  
**CIVL2108. Principles of civil engineering management (6 credits)**  
**CIVL2111. Transportation engineering (6 credits)**  
**CIVL4101. Capstone Design Project (6 credits)**

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

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**CIME2101. Water and air quality: concepts and measurement (6 credits)**

This course will introduce concepts on water/air quality and pollution, the standard methods of water and wastewater examination, air pollution control principles, and measurement techniques for common air pollutants.

Prerequisite: CIVL1105 Environmental engineering

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

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**Capstone Experience and Internship**

- CIVL2109. Internship (6 credits)**  
**CIVL4102. Final Year Project (12 credits)**

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

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**Disciplinary Elective Courses**

- CIVL2110. Experiential Learning (6 credits)**  
**CIVL3103. Construction project management (6 credits)**  
**CIVL3106. Engineering hydraulics (6 credits)**  
**CIVL3107. Environmental impact assessment of civil engineering projects (6 credits)**  
**CIVL3108. Foundation engineering (6 credits)**  
**CIVL3111. Municipal and industrial wastewater treatment (6 credits)**  
**CIVL3115. Solid and hazardous waste management (6 credits)**  
**CIVL3118. Theory and design of structures III (6 credits)**  
**CIVL3121. Water resources engineering (6 credits)**  
**CIVL3122. Wind engineering (6 credits)**

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

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**MINOR IN ENVIRONMENTAL ENGINEERING/GEOTECHNICAL ENGINEERING  
(not applicable to candidates from the Department of Civil Engineering)**

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 48 credits of courses comprising:



## (a) Introductory Courses (18 credits)

Course Code	Course	No. of credits
ENGG1201	Engineering for sustainable development*	6
CIVL1105	Environmental engineering	6
CIVL1106	Fluid mechanics <b>OR</b>	6
CIME2101	Water and air quality: concepts and measurement	6
Total for Introductory Discipline Core Engineering Courses		18

\* Students opting for the Minor cannot use the course ENGG1201 Engineering for sustainable development as satisfying the requirements of the General Engineering Course.

## (b) Disciplinary Elective Courses (30 credits)

Students must complete 30 credits of disciplinary elective courses to be chosen from the following list:

Course Code	Course	No. of credits
CIME2101	Water and air quality: concepts and measurement	6
CIVL2111	Transportation engineering	6
CIVL2104	Hydraulics and hydrology	6
CIVL3106	Engineering hydraulics	6
CIVL3107	Environmental impact assessment of civil engineering projects	6
CIVL3111	Municipal and industrial wastewater treatment	6
CIVL3115	Solid and hazardous waste management	6
CIVL3121	Water resources engineering	6
CIVL3122	Wind engineering	6
CIVL3124	Environmental Geotechnology	6
MECH3420	Air pollution control	6
Total for Disciplinary Elective Courses		30

**COURSE DESCRIPTIONS**

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

**Minor in Geotechnical Engineering**

Candidates are required to complete a total of 48 credits of courses comprising:

## (a) Introductory courses (18 credits)

Course Code	Course	No. of credits
MATH1851	Calculus and Ordinary Differential Equations	6
MATH1853	Linear Algebra, Probability & Statistics	6
CIVL2106	Soil Mechanics	6
Total for Introductory Discipline Core Engineering Courses		18

## (b) Disciplinary Elective Courses (30 credits)

Students must complete 30 credits of disciplinary elective courses to be chosen from the following list:

<b>Course Code</b>	<b>Course</b>	<b>No. of credits</b>
CIVL2102	Engineering geology and rock mechanics	6
CIVL3108	Foundation engineering	6
CIVL3114	Slope engineering	6
CIVL3129	Numerical analysis in geotechnical engineering	6
CIVL3131	Earth retaining systems	6
CIVL3132	Geotechnical testing, instrumentation and monitoring	6
CIVL3133	Ground improvement	6
CIVL3134	Environmental Geotechnology	6
Total for Disciplinary Elective Courses		30

### **COURSE DESCRIPTIONS**

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