

3.4.2 Bachelor of Technology (Civil Engineering)

The BTech (Civil Engineering) programme is offered in partnership with the Department of Civil and Environmental Engineering beginning in August 2017. The curriculum for the part-time BTech Programme is formulated based on the current broad based full-time B.Eng. programme but with stronger emphasis on practice.

As this is a new programme, we are seeking accreditation from the Engineering Accreditation Board (EAB) of the Institution of Engineers Singapore (IES). We expect to be provisionally accredited for the first 2 years after the launch of the programme and full accreditation will be expected in about 3 years thereafter. With successful accreditation, all signatories in the Washington Accord will recognise the substantial equivalence of this programme in satisfying the academic requirements for the practice of engineering at the professional level in many countries including Canada, United States of America, United Kingdom, Hong Kong, New Zealand, Australia and others.

The **educational objectives** of the programme are as follows:

Objective 1: Depth in fundamental knowledge of core civil engineering disciplines

Objective 2: Breadth in integrative skills to apply the knowledge gained

Objective 3: Appreciation of interactions between engineering, business and technology in modern society

Objective 4: Drive for life-long learning and self-development

Objective 5: Understand role as civil engineers in the sustainable developments of society in both national and global contexts.

Objective 6: Ensuring that our graduates are equipped with the basic civil engineering core competencies to meet the requirements for the practice of civil engineering in Singapore in accordance to the Professional Engineers Board.

The **student learning outcomes** are aligned to those required by the Engineering Accreditation Board on outcomes for civil engineering graduates and these are as follows:

- a. **Engineering Knowledge:** An ability to apply scientific and engineering principles as well as contemporary technology to the civil engineering discipline.
- b. **Problem Analysis:** An ability to identify, formulate and solve civil engineering problems.
- c. **Design of Solutions:** An ability to design a system, component, or process in civil engineering to meet desired needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- d. **Investigation:** An ability to conduct complex experiments using research-based knowledge, as well as to analyse and interpret data in civil engineering to make meaningful conclusions.
- e. **Modern Tool Usage:** An ability to use the appropriate techniques, skills, and modern engineering tools to understand complex civil engineering activities necessary for engineering practice with an appreciation of the limitations of the tools employed.

- f. **Engineer and Society:** An ability to work as a civil engineer effectively with an integrated understanding of societal, health, safety, legal, and cultural issues relevant to the professional practice as well as professional, and societal responsibilities.
- g. **Environment and Sustainability:** An ability to assess the impact of the professional civil engineering solutions in societal and environmental contexts within the sustainable development framework.
- h. **Ethics:** An ability to understand the importance of professional ethics and engage in the civil engineering practice with a strong commitment to ethical responsibilities.
- i. **Individual and Team Work:** An ability to understand the importance of working effectively as an individual as well as a member of multidisciplinary teams in professional practice.
- j. **Communication:** An ability to convey technical materials effectively through oral presentations and written communications, and give and receive clear instructions.
- k. **Project Management and Finance:** An ability to manage civil engineering projects using engineering and management principles and economic decision-making, and work in multidisciplinary environments.
- l. **Life-long Learning:** An ability to gain knowledge of contemporary and emerging environmental issues and to engage in, life-long learning in the broadest context of technological change.

Degree Requirements

Candidates must satisfy the following requirements to be conferred the degree of BTech (Civil Engineering):

- Complete a minimum of **160 MCs** with a minimum CAP of 2.00; (Note: 20 MCs of programme requirements and 20 MCs of unrestricted elective requirements will normally be given as Advanced Placement Credits (APCs) to holders of relevant diploma or higher qualifications. Students will be required to complete a minimum of **120 MCs** of modules as listed below);
- Comply with the requirement that the limit on the number of Level-1000 modules to be counted towards fulfilment of graduation requirements being 60 MCs (including the 20 MCs of APCs); and
- Satisfy any other additional requirements that may be prescribed by SCALE, the Faculty of Engineering, or the University.

List of modules - BTech (Civil Engineering), comprise:

1. All modules are 4MCs, except when otherwise stated.
2. A module with module code TCExxxx is equivalent to the module CExxxx, OTxxxx, ESExxxx and TPxxxx offered to the full-time students. Subject to the approval from SCALE and the Department of Civil & Environmental Engineering, a student may select a full-time equivalent module in place of any TCExxxx module.

A. University Level Requirements (20MCs)

- Human Cultures (module with prefix GEH)
- Asking Questions (module with prefix GEQ)
- Quantitative Reasoning (module with prefix GER)

- Singapore Studies (module with prefix GES)
 - Thinking and Expression (module with prefix GET)
- B. Programme Requirements (100MCs), comprising**
1. Faculty Requirements (8MCs)
 - TTG2415 Ethics in Engineering
 - TTG2901 Communications for Engineering Professionals
 2. Major Requirements - Essential Modules (80MCs)
 - TCE1109 Statics and Mechanics of Materials
 - TTG1401 Engineering Mathematics I
 - TCE2112 Soil Mechanics
 - TCE2134 Hydraulics
 - TCE2155 Structural Mechanics and Materials
 - TCE2183 Construction Project Management
 - TCE2184 Infrastructure & the Environment
 - TME2401 Engineering Mathematics II
 - TCE2407 Engineering & Uncertainty Analyses
 - TCE3001 Water Quality Engineering
 - TCE3115 Geotechnical Engineering
 - TCE3116 Foundation Engineering
 - TCE3121 Transportation Engineering
 - TCE3132 Water Resources Engineering
 - TCE3155 Structural Analysis
 - TCE3165 Structural Concrete Design
 - TCE3166 Structural Steel Design and System
 - TCE4103 Design Project
 - TCE4104 BTech Dissertation (8MCs)
 3. Major Requirements - Elective Modules (12MCs, selected from the list below)

Not all elective modules may be offered in any semester/year. An elective module may not be offered if there is insufficient number of students opting for that module at any particular time. Subject to the approval from SCALE and the Department of Civil and Environmental Engineering, a student may select one Level-3000 or higher module from other programmes within the Faculty of Engineering.

Construction

- TCE4282 Building Information Modeling for Project Management
- TCE5604 Advanced Concrete Technology
- TCE5611 Precast Concrete Technology
- TCE5805 Construction Equipment and Methods

Environmental Engineering and Hydraulics

- TCE4247 Treatment Plant Hydraulics
- TCE4401 Water & Wastewater Engineering 2
- TCE4408 Environmental Impact Assessment

Geotechnical Engineering

- TCE5106 Ground Improvement
- TCE5107 Pile Foundations
- TCE5108 Earth Retaining Structures
- TCE5113 Geotechnical Investigation & Monitoring

Offshore Engineering

- TCE5202 Analysis & Design of Offshore Structures
- TCE5206 Offshore Foundations

Structural Engineering

- TCE4257 Linear Finite Element Analysis
- TCE4258 Structural Stability & Dynamics
- TCE5509 Advanced Structural Steel Design
- TCE5510 Advanced Structural Concrete Design

Transportation Engineering

- TCE4221 Design of Land Transport Infrastructures
- TCE5025 Intelligent Transportation Systems
- TCE5026 Transportation Management & Policy

Study Schedule

There is only one intake per academic year in Semester 1 (i.e. August). One sample study schedule for a four-year candidature is shown below. This assumes the students' work and other commitments allow them sufficient time to properly cope with their studies. Students are strongly advised to slow down if necessary so that they progress at their own comfortable pace.

Sample Study Schedule (4-year candidature beginning in Semester 1 of an AY):

1. The number of Modular Credits (MC) of a module is denoted by the number in the bracket.
2. Modules marked with an asterisk (*) are modules stretching over more than one semester and the total number of MCs will only be given upon completion of the module.

1st Year of studies	
Sem 1:	TCE1109 Statics and Mechanics of Materials (4) TCE2112 Soil Mechanics (4) TCE2155 Structural Mechanics and Materials (4)
Sem 2:	TCE2134 Hydraulics (4) TCE3115 Geotechnical Engineering (4) TTG1401 Engineering Mathematics I (4)
SpTerm:	General Education Module 1 (4) General Education Module 2 (4)
2nd Year of studies	
Sem 1:	TCE2183 Construction Project Management (4) TCE2184 Infrastructure & the Environment (4) TME2401 Engineering Mathematics II (4)
Sem 2:	TCE3116 Foundation Engineering (4) TCE3165 Structural Concrete Design (4) TCE3166 Structural Steel Design and System (4)

SpTerm:	General Education Module 3 (4) TCE2407 Engineering & Uncertainty Analyses (4)
3rd Year of studies	
Sem 1:	TCE3001 Water Quality Engineering (4) TCE3132 Water Resources Engineering (4) TCE3155 Structural Analysis (4)
Sem 2:	TTG2901 Communications for Engineering Professionals (4) TCE3121 Transportation Engineering (4) General Education Module 4 (4) (module with prefix GET)
SpTerm:	General Education Module 5 (4) TTG2415 Ethics in Engineering (4)
4th Year of studies	
Sem 1:	TCE4103 Design Project (4) *TCE4104 BTech Dissertation Elective Module 1 (4)
Sem 2:	*TCE4104 BTech Dissertation (8) Elective Module 2 (4) Elective Module 3 (4)