3.4.1 Bachelor of Technology (Chemical Engineering)

The BTech (Chemical Engineering) programme is offered in partnership with the Department of Chemical and Biomolecular Engineering. The programme is accredited by the Engineering Accreditation Board (EAB) of the Institution of Engineers Singapore (IES). Via this accreditation, all signatories in the Washington Accord 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 BTech (Chemical Engineering) programme are to:

- develop knowledge and skills required for immediate employment as a professional engineer in Chemical Engineering;
- develop an understanding of and an ability to apply basic mathematics, chemical, physical and information sciences to the practice of Chemical Engineering;
- prepare students for future career paths and life-long learning; and
- enable students to better contribute to national development in the context of globalisation.

The programme aims to achieve the following learning outcomes:

- Core: Understanding of and ability to apply the science, mathematics and engineering knowledge fundamental to the discipline.
- Breadth: Basic competence in a range of technical areas relevant to Chemical Engineering.
- Depth: Be able to understand and apply in-depth knowledge of one or more specialisations within Chemical Engineering.
- Design: An enhanced ability to perform engineering design by the process of creative thinking, synthesis and integration of interdisciplinary knowledge.

Degree Requirements

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

- Complete a minimum of 161 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 121 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 (Chemical Engineering), comprise:

1. All modules are 4MCs, except when otherwise stated.
2. A module with module code TCNxxxx is equivalent to the module CNxxxx/CNxxxxR offered to full-
time students. Subject to the approval from SCALE and the Department of Chemical and Biomolecular Engineering, a student may select a full-time equivalent module in place of any TCNxxxx 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 (89MCs), comprising
   1. Faculty Requirements (4MCs)
      - TTG2415 Ethics in Engineering

   2. Major Requirements - Essential Modules (65MCs)
      - TCN1005 MatLab Programming for Chemical Engineers
      - TCN1111 Chemical Engineering Principles
      - TTG1401 Engineering Mathematics 1
      - TCN1422 Materials for Chemical Engineers
      - TCN2116 Chemical Kinetics and Reactor Design
      - TCN2121 Chemical Engineering Thermodynamics
      - TCN2122 Fluid Mechanics
      - TCN2125 Heat and Mass Transfer
      - TCN2411 Mathematics for Chemical Engineers 2
      - TCN3121 Process Dynamics and Control
      - TCN3124 Particle Technology
      - TCN3132 Separation Processes (5MCs)
      - TCN3135 Process Safety, Health and Environment (3MCs)
      - TCN3421 Process Modelling & Numerical Simulation
      - TCN4122 Process Synthesis and Simulation (3MCs)
      - TCN4124 Design Project (6MCs)

   3. Major Requirements - Elective Modules (20MCs, 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 Chemical and Biomolecular Engineering, a student may select one Level-3000 or higher module from other programmes within the Faculty of Engineering.
      - TCN4119 BTech Dissertation (8MCs)
      - TCN4203 Polymer Engineering
      - TCN4205 Pinch Analysis and Process Integration
      - TCN4208 Biochemical Engineering
      - TCN4210 Membrane Science and Engineering
      - TCN4211 Petrochemicals & Processing Technology
      - TCN4215 Food Technology and Engineering
      - TCN4216 Electronic Materials Science
C. Unrestricted Elective Modules (12MCs)

Study Schedule

There are two intakes per academic year, in Semester 1 (i.e. August) and in Semester 2 (i.e. January). The respective sample study schedules for a four-year candidature are presented below. These assume 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.

A. 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.

<table>
<thead>
<tr>
<th>1st Year of studies</th>
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</thead>
<tbody>
<tr>
<td><strong>Sem 1:</strong></td>
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<tr>
<td>TTG1401 Engineering Mathematics 1 (4)</td>
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<tr>
<td>TCN1005 MATLAB Programming for Chemical Engineers (4)</td>
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<tr>
<td>GE Requirements 1 (4)</td>
</tr>
<tr>
<td><strong>Sem 2:</strong></td>
</tr>
<tr>
<td>TCN1422 Materials for Chemical Engineers (4)</td>
</tr>
<tr>
<td>TCN1111 Chemical Engineering Principles (4)</td>
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<tr>
<td>GE Requirements 2 (4)</td>
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<tr>
<td><strong>SpTerm:</strong></td>
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<tr>
<td>TCN2411 Mathematics for Chemical Engineers 2 (4)</td>
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<td>GE Requirements 3 (4)</td>
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<tr>
<th>2nd Year of studies</th>
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<tbody>
<tr>
<td><strong>Sem 1:</strong></td>
</tr>
<tr>
<td>TCN4217 Processing of Microelectronic Materials</td>
</tr>
<tr>
<td>TCN4227 Advanced Process Control</td>
</tr>
<tr>
<td>TCN4229 Computer Aided Chemical Engineering</td>
</tr>
<tr>
<td>TCN4231 Downstream Processing of Biochemical and Pharmaceutical Products</td>
</tr>
<tr>
<td>TCN4233 Good Manufacturing Practices in Pharmaceutical Industry</td>
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<tr>
<td>TCN4238 Chemical &amp; Biochemical Process Modeling</td>
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<tr>
<td>TCN4240 Unit Operations and Processes for Effluent Treatment</td>
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<tr>
<td>TCN4242 Optimization of Chemical Processes</td>
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<tr>
<td>TCN4246 Chemical and Bio-Catalysis</td>
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<tr>
<td>Semester</td>
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</tbody>
</table>
| **Sem 1:** | GE Requirements 4 (4)  
TCN2121 Chemical Engineering Thermodynamics (4)  
TCN2122 Fluid Mechanics (4) |
| **Sem 2:** | TCN2116 Chemical Kinetics & Reactor Design (4)  
TCN2125 Heat and Mass Transfer (4)  
TCN3124 Particle Technology (4) |
| **SpTerm:** | TCN3135 Process Safety, Health and Environment (3)  
GE Requirements 5 (4) |

**3rd Year of studies**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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</table>
| **Sem 1:** | TCN3121 Process Dynamics & Control (4)  
TCN3132 Separation Processes (5)  
TCN3421 Process Modeling & Numerical Simulation (4) |
| **Sem 2:** | *TCN4119 BTech Dissertation /Technical Elective Module (4)  
Technical Elective Module 1 (4)  
Technical Elective Module 2 (4) |
| **SpTerm:** | TTG2415 Ethics in Engineering (4)  
*TCN4119 BTech Dissertation |

**4th Year of studies**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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</thead>
</table>
| **Sem 1:** | *TCN4119 BTech Dissertation (8) /Technical Elective Module (4)  
TCN4122 Process Synthesis and Simulation (3)  
*TTG3001 Industrial Practice /Unrestricted Elective Module (4) |
| **Sem 2:** | *TCN4124 Final Year Design Project  
*TTG3001 Industrial Practice (12) /Unrestricted Elective Module (4)  
Technical Elective Module 3 (4) |
| **SpTerm:** | *TCN4124 Final Year Design Project (6)  
*Unrestricted Elective Module (4) |

**B. Sample Study Schedule (4-year candidature beginning in Semester 2 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.
<table>
<thead>
<tr>
<th><strong>1st Year of studies</strong></th>
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</table>
| Sem 2: | TCN1111 Chemical Engineering Principles (4)  
TTG1401 Engineering Mathematics 1 (4)  
TCN1422 Materials for Chemical Engineers (4) |
| SpTerm: | General Education Module 1 (4)  
TCN2411 Mathematics for Chemical Engineers 2 (4) |
| Sem 1: | TCN1005 MatLab Programming for Chemical Engineers (4)  
TCN2121 Chemical Engineering Thermodynamics (4)  
TCN2122 Fluid Mechanics (4) |

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<tr>
<th><strong>2nd Year of studies</strong></th>
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</table>
| Sem 2: | TCN2116 Chemical Kinetics & Reactor Design (4)  
TCN2125 Heat and Mass Transfer (4)  
TCN3124 Particle Technology (4) |
| SpTerm: | General Education Module 2 (4)  
TCN3135 Process Safety, Health and Environment (3) |
| Sem 1: | TCN3121 Process Dynamics & Control (4)  
TCN3132 Separation Processes (5)  
TCN3421 Process Modelling & Numerical Simulation (4) |

<table>
<thead>
<tr>
<th><strong>3rd Year of studies</strong></th>
<th></th>
</tr>
</thead>
</table>
| Sem 2: | General Education Module 3 (4)  
*TCN4119 BTech Dissertation / Technical Elective Module (4)  
Technical Elective Module 1 (4) |
| SpTerm: | General Education Module 4 (4)  
TTG2415 Ethics in Engineering (4)  
*TCN4119 BTech Dissertation |
| Sem 1: | *TTG3001 Industrial Practice / Unrestricted Elective Module (4)  
*TCN4119 BTech Dissertation (8) / Technical Elective Module (4)  
TCN4122 Process Synthesis and Simulation (3) |

| **4th Year of studies** |  |
| Sem 2: | General Education Module 5 (4)  
*TTG3001 Industrial Practice (12) / Unrestricted Elective Module (4)  
*TCN4124 Final Year Design Project |
| SpTerm: | *TCN4124 Final Year Design Project (6)  
Unrestricted Elective Module (4) |
| Sem 1: | Technical Elective Module 2 (4)  
Technical Elective Module 3 (4) |