# Master of Engineering Program in Chemical Engineering (International Program)

**M.Eng. (Chemical Engineering)**

**Plan A Option 2:**

Total credits required: minimum 36 credits

1. **Major courses: minimum 24 credits**
   - Seminar: 2 credits
     - 01202597 Seminar 1,1
   - **Major requirements: 13 credits**
     - 01202511 Advanced Transport Phenomena 3(3-0-6)
     - 01202512 Advanced Chemical Engineering Thermodynamics 3(3-0-6)
     - 01202513 Advanced Mathematics in Chemical Engineering 3(3-0-6)
     - 01202541 Advanced Chemical Reaction Engineering 3(3-0-6)
     - 01202591 Research Methods in Chemical Engineering 1(1-0-2)
   - **Major electives: minimum 9 credits**
     - Students are required to choose at least 3 credits from the list below and/or choose at least 6 credits of 500 level courses from other related fields. He/she must gain approval from advisory committee, Head of Department, and the Dean of the Graduate School.
     - 01202521 Process Analysis and Simulation 3(3-0-6)
     - 01202522 Advanced Process Control 3(3-0-6)
     - 01202523 Computer Process Control 3(3-0-6)
     - 01202524 Chemical Process Optimization 3(3-0-6)
     - 01202525 Chemical Process Evaluation and Design 3(3-0-6)
     - 01202526 Process Synthesis 3(3-0-6)
     - 01202531 Current Topics in Chemical Engineering 3(3-0-6)
     - 01202542 Chemical Reactor Analysis and Design 3(3-0-6)
     - 01202543 Applied Heterogeneous Catalysis 3(3-0-6)
     - 01202551 Biochemical Engineering 3(3-0-6)
     - 01202552 Biological Waste Utilization 3(3-0-6)
     - 01202561 Energy Conservation and Management 3(3-0-6)
     - 01202562 Safety and Environmental Risk Analysis 3(3-0-6)
     - 01202563 Cleaner Technology and Eco-Design 3(3-0-6)
     - 01202564 Principle of Biofuel Engineering 3(3-0-6)
     - 01202571 Advanced Polymer Engineering 3(3-0-6)
     - 01202572 Advanced Ceramic Engineering 3(3-0-6)
     - 01202573 Polymer Characterization 3(3-0-6)
     - 01202574 Polymer Reaction Engineering 3(3-0-6)
     - 01202575 Computational Polymer Science and Engineering 3(3-0-6)
     - 01202581 Residue Oil Upgrading 3(3-0-6)
     - 01202582 Advanced Project and Production Management in Chemical Engineering 3(3-0-6)
     - 01202596 Selected Topic in Chemical Engineering 1-3
01202598 Special Problems 1-3

(2) Thesis: minimum 12 credits
01202599 Thesis 1-12

Course Description

01202511 Advanced Transport Phenomena 3(3-0-6)
Methods of solving transport problems; coupled system where two or more transport processes interact; unsteady state and steady state transport; momentum transfer, heat transfer, and mass transfer.

01202512 Advanced Chemical Engineering Thermodynamics 3(3-0-6)

01202513 Advanced Mathematics in Chemical Engineering 3(3-0-6)
Mathematical formulation and solution of problems drawn from transport phenomena, chemical reaction engineering, and other typical chemical engineering problems employing ordinary or partial differential equations, approximation methods and other advanced mathematical techniques.

01202521 Process Analysis and Simulation 3(3-0-6)
Analysis and formulation of mathematical models of chemical processes for steady-state and dynamic behavior. Use of computer and packaged software for process simulation. Analysis and formulation of mathematical models of chemical processes for steady-state and dynamic behavior. Use of computer and packaged software for process simulation.

01202522 Advanced Process Control 3(3-0-6)
Advanced control techniques. Multivariable systems. Supervisory and optimization control. Case studies involving the application of advanced control to large chemical process systems.

01202523 Computer Process Control 3(3-0-6)

01202524 Chemical Process Optimization 3(3-0-6)

01202525 Chemical Process Evaluation and Design 3(3-0-6)
Computer-aided design of unit operations, chemical reactors and integrated plants. Operability characteristics of chemical processes. Design for optimum operability safety, reliability, control.

01202526 Process Synthesis 3(3-0-6)
Flowsheet invention. Systematic methods for devising chemical process networks. Representation, search strategies and decision rules, measures of quality. Application to
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>01202531</td>
<td>Current Topics in Chemical Engineering</td>
<td>3(3-0-6)</td>
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<tr>
<td></td>
<td>Current Topics in chemical engineering at the master’s degree level. Topics are subject to change each semester.</td>
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<tr>
<td>01202541</td>
<td>Advanced Chemical Reaction Engineering</td>
<td>3(3-0-6)</td>
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<tr>
<td>01202542</td>
<td>Chemical Reactor Analysis and Design</td>
<td>3(3-0-6)</td>
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<td>01202543</td>
<td>Applied Heterogeneous Catalysis</td>
<td>3(3-0-6)</td>
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<td>01202551</td>
<td>Biochemical Engineering</td>
<td>3(3-0-6)</td>
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<tr>
<td>01202552</td>
<td>Biological Waste Utilization</td>
<td>3(3-0-6)</td>
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<td>The utilization of waste or by-product from the biochemical and other industries by physical, chemical and biological processes.</td>
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<td>01202561</td>
<td>Energy Conservation and Management</td>
<td>3(3-0-6)</td>
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<tr>
<td></td>
<td>Energy conservation in industry. Energy audit and analysis in lighting system, air conditioning system, thermal system, air compressor and electrical system. Energy management for optimum efficiency and utilization.</td>
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<tr>
<td>01202562</td>
<td>Safety and Environmental Risk Analysis</td>
<td>3(3-0-6)</td>
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<td>01202563</td>
<td>Cleaner Technology and Eco-Design</td>
<td>3(3-0-6)</td>
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<tr>
<td>01202564</td>
<td>Principle of Biofuel Engineering</td>
<td>3(3-0-6)</td>
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<tr>
<td>01202571</td>
<td>Advanced Polymer Engineering</td>
<td>3(3-0-6)</td>
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|             | Development of polymer materials. Chemical nature and state of aggregation in polymers. Relation of structure to thermal, mechanical, chemical, electrical and optical
Principles of product and structural design.

01202572 Advanced Ceramic Engineering 3(3-0-6)

01202573 Polymer Characterization 3(3-0-6)

01202574 Polymer Reaction Engineering 3(3-0-6)

01202575 Computational Polymer Science and Engineering 3(3-0-6)

01202581 Residue Oil Upgrading 3(3-0-6)

01202582 Advanced Project and Production Management in Chemical Engineering 3(3-0-6)
Sophisticated chemical engineering project planning reflecting considering economics and legal frameworks, organization change and conflict management, product demand forecast, supply and logistics, resource management, and marketing-production linkage.

01202591 Research Methods in Chemical Engineering 1(1-0-2)
 Principle and research methods in chemical engineering, problem analysis for research topic identification, data collection for research planning, identification of techniques. Analysis, interpretation and discussion of research result; report writing for presentation and publication.

01202596 Selected Topic in Chemical Engineering 1-3
Selected topics in chemical engineering at the master’s degree level. Topics are subject to change each semester.

01202597 Seminar 1
Presentation and discussion on current interesting topics in chemical engineering at the master’s degree level.

01202598 Special Problems 1-3
Study and research in chemical engineering at the master’s degree level and compile into a written report.
Research at the master’s degree level and compile into a thesis.