Distribution of Credits

The degree requires a minimum of 21 credit hours of course work in the ME program and a minimum of 31 credits for the MS program and a thesis worth 9 credits in both. It will usually require between 20 and 24 months to complete the requirements for graduation.

The student and graduate adviser, in coordination with the thesis committee, will develop a plan of study tailored to the student’s specific interest and background. It is advisable that this plan be developed no later than the first month of the second semester of graduate work.

The distribution of credits required to complete the degree are:

<table>
<thead>
<tr>
<th>Course type</th>
<th>MS</th>
<th>ME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math and CHEN core courses</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Chemical engineering electives</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Non-chemical engineering electives</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Thesis</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Seminar</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total no. of credits required for graduation</strong></td>
<td>40cr.</td>
<td>30cr.</td>
</tr>
</tbody>
</table>

The core courses for the MS and ME graduate programs will consist of:

- **Mathematics requirement**: one course in advanced mathematics (3 credits ME/MS option); and
- **Chemical engineering core courses**: 4 courses (12 credits MS option) or 2 courses (6 credits ME option).
- **Chemical Engineering Electives**: 10 credits MS option or 6 credits ME option; chemical engineering electives can be chosen from the attached list of courses, that are currently offered at AUB upon consent of the academic advisor.
- **Non-Chemical Engineering Technical Electives**: an additional 2 courses (6 credits MS option and ME option) courses can be chosen from the list of courses that are currently offered at AUB upon consent of the academic advisor.
- **Thesis**: Thesis is a 9-credit course (MS/ME option) based on independent research.
- **Seminar**: The seminar requirement is a zero credit (MS/ME option) course. This is a pass/fail course based on attendance and participation, and is offered in the fall and spring terms. Students must register it every term (except summers).

List of Core Courses

**Mathematics Requirement:**
A mandatory three-credit course in applied mathematics. The math course or math-oriented course offered by other departments must be approved by the graduate student advisor. Additional Math courses may be counted as non-chemical engineering electives. Acceptable courses include, but are not limited to the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVE 710</td>
<td>The Finite Element Method</td>
<td>[3 cr.]</td>
</tr>
<tr>
<td>MATH 350</td>
<td>Discrete Models for Differential Equations</td>
<td>[3 cr.]</td>
</tr>
<tr>
<td>MATH 351</td>
<td>Optimization and Non-Linear Problems</td>
<td>[3 cr.]</td>
</tr>
<tr>
<td>CMPS 354</td>
<td>The Finite Element Method</td>
<td>[3 cr.]</td>
</tr>
</tbody>
</table>
ENMG 604 Deterministic Optimization Models [3 cr.]
MECH 630 Finite Element Methods in Mechanical Engineering [3 cr.]
MECH 663 Computational Fluid Dynamics [3 cr.]

Chemical Engineering Required Courses:
At least four (12 credits for MS degree) or two (6 credits for ME degree) advanced fundamental chemical engineering three-credit courses from the list below. (students cannot receive credits for undergraduate core courses taken during BE in chemical engineering).

CHEN 570 Process Synthesis and Optimization [3 cr.]
CHEN 571 Chemical Product Design [3 cr.]
CHEN 611 Transport Phenomena [3 cr.]
CHEN 617 Chemical Reactor Analysis and Design [3 cr.]

Special Courses and Thesis:
A student should register for the Comprehensive Exam (CHEN 799T) and passes it before being allowed to register his/her thesis. If a student fails CHEN 799T, s/he must register for CHEN 799TR and take the exam during the next term (excluding summer). Once completed, the student can register CHEN 799, then CHEN 799 (A–E) in subsequent terms until completion of his/her thesis.

Students must register the following to complete their thesis requirements

Thesis Proposal
CHEN 799T / CHEN 799TR [0 cr.]

Thesis
CHEN 799 Thesis [9 cr.]

Seminar
CHEN 797 Seminar [0 cr.]

List of Elective Courses

Chemical Engineering Technical Elective Courses:
CHEN 612 Desalination [3 cr.]
CHEN 613 Membrane Separation Processes [3 cr.]
CHEN 615 Advanced Mass Transfer Processes [3 cr.]
CHEN 618 Colloid and Interface Science [3 cr.]
CHEN 620 Reaction Engineering and Reactor Design II [3 cr.]
CHEN 651 Advanced Process Control [3 cr.]
CHEN 670 Advanced Process Flow sheeting [3 cr.]
CHEN 672 Polymer Science [3 cr.]
CHEN 673 Engineering of Drug Delivery Systems [3 cr.]
CHEN 674 Process Operations and Diagnosis [3 cr.]
CHEN 690 Reservoir Engineering [3 cr.]
CHEN 796 Engineering Literature Critique [1 cr.]
CHEN 798 Special Topics in Chemical Engineering I [3 cr.]

Non-Chemical Engineering Technical Elective Courses:
BMEN 600 Biomedical engineering Applications [3 cr.]
BMEN 601 Computational Modeling of Physiological System [3 cr.]
BMEN 605 Biomedical Imaging [3 cr.]
BMEN 606 Nano biosensors [3 cr.]
CIVE 602 Experimental Design and Statistical Methods [3 cr.]
CIVE 651 Experimental Design and Statistical Methods [3 cr.]
CIVE 651 Processes in Water and Wastewater Treatment [3 cr.]
CIVE 652 Landfill Engineering Design [3 cr.]
CIVE 654 Environmental Bioremediation [3 cr.]
CIVE 655 Air Pollution and Control [3 cr.]
CIVE 656 Environmental Impact Assessment [3 cr.]
CIVE 658 Industrial Waste Management [3 cr.]
CIVE 710 The Finite Element Method [3 cr.]
CIVE 740 Transport Phenomena in Surface & Subsurface Waters [3 cr.]
CIVE 755 Air Pollution Modeling [3 cr.]
CMPS 350 Discrete Models for Differential Equations [3 cr.]
Science Majors Wishing to Pursue an MS Degree in Chemical Engineering

Students who have completed a Bachelor of Science degree in chemistry, biology, mathematics, or physics will be accepted as prospective graduate students in the MS program.

It is the responsibility of these students to have completed the equivalent of both MATH 218 and MATH 251 prior to joining the program.

The students will also have to pass the following courses with a minimum cumulative average of 80 before joining the MS program.

Required core chemical engineering courses:

- CHEN 311 Introduction to Fluids Engineering [3 cr.]
- CHEN 312 Separation Processes [3 cr.]
- CHEN 314 Chemical Engineering Thermodynamics [3 cr.]
- CHEN 411 Heat and Mass Transfer Operations [3 cr.]
- CHEN 417 Reaction Engineering and Reactor Design I [3 cr.]

Additionally, one of the following three courses will be required:

- CHEN 351 Instrumentation and Measurement [3 cr.]
- CHEN 451 Process Control (and Process Control Lab) [3 cr.]
- CHEN 470 Chemical Process Design [3 cr.]