**Engineering (Undesignated)**

The Case School of Engineering offers undesignated degrees at the undergraduate and graduate level.

### Bachelor of Science in Engineering (Undesignated)

The Engineering (Undesignated) program prepares students who seek a technological background but do not wish to pursue pure engineering careers. For example, some needs in the public sector, such as pollution remediation, transportation, low-cost housing, elective medical care, and crime control could benefit from engineering expertise. To prepare for careers in fields that address such problems, the Engineering (Undesignated) program allows students to acquire some engineering background, and combine it with a minor in such programs as management, history of technology and science, or economics. This is not an ABET accredited program.

A student electing an undesignated degree must submit a clear statement of career goals supported by a proposed course schedule with written justification for the selections. These documents are to be submitted to the office of the dean in the Case School of Engineering. The program must be approved by the Associate Dean in the Case School of Engineering in consultation with representatives of the major and minor departments. A total of at least 129 semester credits are required for graduation.

Since each student’s program is unique, no typical curriculum can be shown. Every program must fulfill the requirements described below.

In addition to Engineering Core (http://bulletin.case.edu/undergraduatestudies/csedegree) and CWRU General Education (http://bulletin.case.edu/undergraduatestudies/degreeprograms) requirements, the program requires the following:

A minimum of two engineering elective courses selected from two of the following four groups:

- **Thermodynamics or Physical Chemistry**
  - ECHE 363: Thermodynamics of Chemical Systems 3
  - EMAC 351
  - EMAC 352: Physical Chemistry for Engineering and Polymer Physics and Engineering 6
  - CHEM 301
  - CHEM 302: Introductory Physical Chemistry I and Introductory Physical Chemistry II 6

- **Signals, systems or control**
  - ECHE 367: Process Control 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECS 246</td>
<td>Signals and Systems</td>
<td>3-4</td>
</tr>
<tr>
<td>or EBME 308</td>
<td>Biomedical Signals and Systems</td>
<td></td>
</tr>
<tr>
<td>EECS 304</td>
<td>Control Engineering I with Laboratory</td>
<td>3</td>
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</tbody>
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**Materials science**

- EBME 306: Introduction to Biomedical Materials 3
- EECS 321: Semiconductor Electronic Devices 4
- EMAC 270: Introduction to Polymer Science and Engineering 3
- EMSE 276: Materials Properties and Design 3
- EMSE 343: Materials for Electronics and Photonics 3

**Economics, production systems or decision theory**

- EECS 350: Operations and Systems Design 3
- EECS 352: Engineering Economics and Decision Analysis 3
- OPRE 345: Decision Theory 3

**Major Field**

The major field within the Engineering (Undesignated) requirements must contain a minimum of 24 credit-hours of work in one of the following engineering fields:

- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Engineering Physics
- Materials Science and Engineering
- Polymer Science and Engineering
- Systems and Control Engineering

This work includes a senior project laboratory (3 credits minimum) and usually a course with a physical measurements laboratory.

**Minor Field**

The minor field within the Engineering (Undesignated) requirements must contain a minimum of 15 credit-hours. Minors should be developed with the help of the Associate Dean in the Case School of Engineering. Minor fields must be approved by the department offering the minor.

### Bachelor of Science in Engineering (Undesignated)

#### Suggested Program of Study

The following is a suggested program of study, individual student programs will vary according to specialty track and individual interest. Current students should always consult their advisers and their individual graduation requirement plans as tracked in SIS (http://sis.case.edu) (Student Information System).

**First Year**

<table>
<thead>
<tr>
<th>Units</th>
<th>Fall</th>
<th>Spring</th>
</tr>
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<tbody>
<tr>
<td>Open elective or Humanities/Social Science <strong>a</strong></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

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**a** Open elective or Humanities/Social Science is a minimum of 3 units in the student’s first year of study.
Principles of Chemistry for Engineers (CHEM 111)** 4
Elementary Computer Programming (ENGR 131)** or Introduction to Programming in Java (EECS 132) or General Physics I - Mechanics (PHYS 121)
FSCC 100 SAGES First Seminar* 4
Calculus for Science and Engineering I (MATH 121)** 4
PHED Physical Education Activities*
Humanities/Social Science or open elective** 3
Chemistry of Materials (ENGR 145)** 4
Calculus for Science and Engineering II (MATH 122)** 4
General Physics I - Mechanics (PHYS 121)** or Elementary Computer Programming (ENGR 131)
PHED Physical Education Activities*
Year Total: 15-14

Second Year

USXX SAGES University Seminar* 3
Statics and Strength of Materials (ENGR 200)** 3
Computers in Mechanical Engineering (EMAE 250) or Introduction of Scientific Computing (MATH 330)
Calculus for Science and Engineering III (MATH 223)** 3
General Physics II - Electricity and Magnetism (PHYS 122)** 4
USXX SAGES University Seminar* 3
Thermodynamics, Fluid Dynamics, Heat and Mass Transfer (ENGR 225)** 4
Introduction to Circuits and Instrumentation (ENGR 210)** 4
Elementary Differential Equations (MATH 224)** 3
Introduction to Modern Physics (PHYS 221)** 3
Year Total: 16 17

Third Year

Humanities or Social Science** 3
Major Concentration Course 3
Major Concentration Course 3
Minor Concentration Course 3
Engineering elective 3
Open elective 3
Professional Communication for Engineers (ENGL 398)** 2
Professional Communication for Engineers (ENGR 398)** 1
Major Concentration Course 3
Major Concentration Course 3
Minor Concentration Course 3
Engineering elective 3
Year Total: 18 15

Fourth Year

Humanities or Social Science elective** 3
Exxx 398 Engineering Senior Project** 3
Major Concentration Course 3

Minor Concentration Course 3
Minor Concentration Course 3
Humanities or Social Science elective** 3
Major Concentration Course 3
Major Concentration Course 3
Minor Concentration Course 3
Open elective 3
Year Total: 15 15

Total Units in Sequence: 129

Hours required for graduation: 129

* University general education requirement
** Engineering general education requirement
a One of these courses must be a humanities/social science course.

Cooperative Education (http://engineering.case.edu/coop)

Opportunities are available for students to alternate studies with work in industry or government as a co-op student, which involves paid full-time employment over seven months (one semester and one summer). Students may work in one or two co-ops, beginning in the third year of study. Co-ops provide students the opportunity to gain valuable hands-on experience in their field by completing a significant engineering project while receiving professional mentoring. During a co-op placement, students do not pay tuition, but maintain their full-time student status while earning a salary. Learn more at engineering.case.edu/coop. Alternatively or additionally, students may obtain employment as summer interns.

Five-Year Combined BS/MS Program

This program offers outstanding undergraduate students the opportunity to obtain an MS degree, with a thesis, in one additional year of study beyond the BS degree. (Normally, it takes two years beyond the BS to earn an MS degree.) In this program, an undergraduate student can take up to 9 credit hours that simultaneously satisfy undergraduate and graduate requirements. Typically, students in this program start their research leading to the MS thesis in the fall semester of the senior year. The BS degree is awarded at the completion of the senior year.

Application for admission to the five year BS/MS program is made after completion of five semesters of course work. Minimum requirements are a 3.2 grade point average and the recommendation of a faculty member of the department. Interested students should contact the Associate Dean of Academics, Case School of Engineering.

Master of Science in Engineering (Undesignated)

A student working toward an undesignated Master of Science degree in engineering must select a department. The student is responsible for submitting a Planned Program of Study via the Student Information System where it will be routed for appropriate approvals. The Planned Program of Study must contain a minimum of 9 semester hours of course work in the department approving the program. A minimum of 18 semester hours of course work for the degree must be at the 400
level or higher. The student must also meet all the requirements of the designated Master of Science degree in engineering.