CASE SCHOOL OF ENGINEERING
UNDERGRADUATE DEGREE REQUIREMENTS

Bachelor of Science in Engineering Degree
Candidates for the Bachelor of Science in Engineering (BSE) degree, in addition to meeting the general requirements for bachelor’s degrees, including the SAGES and physical education requirements, must also complete the following requirements:

1. A minimum of 128-133 credit-hours as specified by the requirements for each BSE major.
2. The General Education Requirements of the Case School of Engineering listed below.
3. The requirements for the specific engineering major listed below as presented in this Bulletin in the section devoted to each department or program.

Note that most students pursuing a degree from the Case School of Engineering will complete ENGR 398 and ENGL 398 to fulfill the SAGES Departmental Seminar requirement and will complete an engineering senior project in their major to fulfill the SAGES Senior Capstone requirement.

Major Fields Available for the Bachelor of Science in Engineering degree:
• Aerospace Engineering
• Biomedical Engineering
• Chemical Engineering
• Civil Engineering
• Computer Engineering
• Electrical Engineering
• Engineering Physics
• Materials Science and Engineering
• Mechanical Engineering
• Polymer Science and Engineering
• Systems and Control Engineering
• Engineering (undesignated)

With the exception of the undesignated major in engineering, all of the engineering programs listed above are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

General Education Requirements of the Case School of Engineering
These requirements provide a foundation in mathematics and sciences for programs in engineering leading to the Bachelor of Science degree. The CSE general education requirements are also designed to develop communication skills and to provide a body of work in the humanities and social sciences.

Mathematics, Sciences, and Engineering Requirements (44 credit-hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 121</td>
<td>Calculus for Science and Engineering I</td>
</tr>
<tr>
<td>MATH 122</td>
<td>Calculus for Science and Engineering II</td>
</tr>
<tr>
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</tr>
<tr>
<td>MATH 223</td>
<td>Calculus for Science and Engineering III</td>
</tr>
<tr>
<td>or MATH 227</td>
<td>Calculus III</td>
</tr>
<tr>
<td>MATH 224</td>
<td>Elementary Differential Equations</td>
</tr>
<tr>
<td>or MATH 228</td>
<td>Differential Equations</td>
</tr>
</tbody>
</table>

Chemistry

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CHEM 111</td>
<td>Principles of Chemistry for Engineers</td>
</tr>
</tbody>
</table>

Physics

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>PHYS 121</td>
<td>General Physics I - Mechanics</td>
</tr>
<tr>
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<td>Physics and Frontiers I - Mechanics</td>
</tr>
<tr>
<td>PHYS 122</td>
<td>General Physics II - Electricity and Magnetism</td>
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<td>Physics and Frontiers II - Electricity and Magnetism</td>
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Engineering

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ENGR 131</td>
<td>Elementary Computer Programming **</td>
</tr>
<tr>
<td>or EECS 132</td>
<td>Introduction to Programming in Java</td>
</tr>
<tr>
<td>ENGR 145</td>
<td>Chemistry of Materials</td>
</tr>
<tr>
<td>ENGR 200</td>
<td>Statics and Strength of Materials</td>
</tr>
<tr>
<td>ENGR 210</td>
<td>Introduction to Circuits and Instrumentation</td>
</tr>
<tr>
<td>ENGR 225</td>
<td>Thermodynamics, Fluid Dynamics, Heat and Mass Transfer ***</td>
</tr>
</tbody>
</table>

Total Units 44

* The chemistry-materials course sequence CHEM 105-CHEM 106-ENGR 145 may be substituted for the sequence CHEM 111-ENGR 145.
** Computer engineering and the computer-oriented concentrations in biomedical engineering specifically require EECS 132.
*** Students pursuing a polymer science and engineering major or the biomaterials concentration in the biomedical engineering major may substitute EMAC 351 and EMAC 352 for ENGR 225. Students pursuing majors in aerospace or mechanical engineering may substitute EMAE 251, EMAE 252, and EMAE 353 for ENGR 225.

Natural Sciences, Mathematics, or Statistics Requirement (3 credit-hours)
Course designated by major department.

Humanities and Social Sciences (15 credit-hours)

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ENGL 398</td>
<td>Professional Communication for Engineers</td>
</tr>
</tbody>
</table>
ENGR 398  Professional Communication for Engineers  1

Twelve credit-hours comprised of 3- or 4-credit-hour courses  12

Total Units  15

* Humanities: Akkadian (AKKD), Arabic (ARAB), Art History (ARTH), Art Studio (ARTS), Chinese (CHIN), Classics (CLSC), Dance (DANC), English (ENGL), French (FRCH), German (GRMN), Greek (GREK), Hebrew (HBRW), History (HSTY), Italian (ITAL), Japanese (JAPN), Latin (LATN), Linguistics (LING), Music - General (MUGN), Music - History (MUHI), Music - Theory (MUTH), Philosophy (PHIL), Portuguese (PORT), Religious Studies (RLGN), Russian (RUSN), Spanish (SPAN), Theater (THTR), World Literature (WLIT) and/or

Social Sciences: Anthropology (ANTH), Cognitive Science (COGS), Communication Sciences (COSI), Economics (ECON), Political Science (POSC), Psychology (PSCL), Sociology (SOCI), and/or

Other Courses that Meet this Requirement for CSE Degree Candidates: Applied Social Sciences (SASS), Bioethics (BETH)

Bachelor of Science in Computer Science Degree

Candidates for the Bachelor of Science in Computer Science degree, in addition to meeting the general requirements for bachelor’s degrees (http://bulletin.case.edu/undergraduatestudies/degreeprograms), including the SAGES and physical education requirements, must also complete the following requirements:

1. A minimum of 127 credit-hours.
2. The General Education Requirements of the Case School of Engineering as modified for the Bachelor of Science in Computer Science degree and listed below.
3. The requirements for the computer science Bachelor of Science major as presented in this Bulletin.

Note that most students pursuing a degree from the Case School of Engineering will complete ENGR 398 and ENGL 398 to fulfill the SAGES Departmental Seminar requirement and will complete an engineering senior project in their major to fulfill the SAGES Senior Capstone requirement.

General Education Requirements of the Case School of Engineering, modified for the Bachelor of Science in Computer Science degree

These requirements provide a foundation in mathematics and sciences for the Bachelor of Science program in computer science. The CSE general education requirements are also designed to develop communication skills and to provide a body of work in the humanities and social sciences.

Course credit earned by Advanced Placement, International Baccalaureate, proficiency examinations, and transfer may be used to satisfy Case School of Engineering general education requirements.

Mathematics, Sciences, and Engineering Requirements (33 credit-hours)

Mathematics  14

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Chemistry  4

CHEM 111  Principles of Chemistry for Engineers

Physics  8

PHYS 121  General Physics I - Mechanics
or PHYS 123  Physics and Frontiers I - Mechanics

PHYS 122  General Physics II - Electricity and Magnetism
or PHYS 124  Physics and Frontiers II - Electricity and Magnetism

Engineering  7

E ECS 132  Introduction to Programming in Java

ENGR 145  Chemistry of Materials

Total Units  33

* The chemistry-materials course sequence CHEM 105-CHEM 106-ENGR 145 may be substituted for the sequence CHEM 111-ENGR 145.

Natural Sciences, Mathematics, or Statistics Requirement (3 credit-hours)

Course designated by major department.

Humanities and Social Sciences (15 credit-hours)

ENGL 398  Professional Communication for Engineers  2

ENGR 398  Professional Communication for Engineers  1

Twelve credit-hours comprised of 3- or 4-credit-hour courses  12

Total Units  15
Humanities: Akkadian (AKKD), Arabic (ARAB), Art History (ARTH), Art Studio (ARTS), Chinese (CHIN), Classics (CLSC), Dance (DANC), English (ENGL), French (FRCH), German (GRMN), Greek (GREK), Hebrew (HBRW), History (HSTY), Italian (ITAL), Japanese (JAPN), Latin (LATN), Linguistics (LING), Music - General (MUGN), Music - History (MUHI), Music - Theory (MUTH), Philosophy (PHIL), Portuguese (PORT), Religious Studies (RLGN), Russian (RUSN), Spanish (SPAN), Theater (THTR), World Literature (WLIT) and/or
Social Sciences: Anthropology (ANTH), Cognitive Science (COGS), Communication Sciences (COSI), Economics (ECON), Political Science (POSC), Psychology (PSCL), Sociology (SOCI), and/or
Other Courses that Meet this Requirement for CSE Degree Candidates: Applied Social Sciences (SASS), Bioethics (BETH)

**Bachelor of Science in Data Science and Analytics Degree**

Candidates for the Bachelor of Science in Data Science and Analytics degree, in addition to meeting the general requirements for bachelor's degrees (http://bulletin.case.edu/undergraduatestudies/degreeprograms), including the SAGES and physical education requirements, must also complete the following requirements:

1. A minimum of 125 credit-hours.
2. The General Education Requirements of the Case School of Engineering as modified for the Bachelor of Science in Data Science and Analytics degree and listed below.
3. The requirements for the major in data science and analytics as presented in this Bulletin.

Note that most students pursuing a degree from the Case School of Engineering will complete ENGR 398 and ENGL 398 to fulfill the SAGES Departmental Seminar requirement and will complete an engineering senior project in their major to fulfill the SAGES Senior Capstone requirement.

**General Education Requirements of the Case School of Engineering, modified for the Bachelor of Science in Data Science and Analytics degree**

These requirements provide a foundation in mathematics and sciences for the Bachelor of Science program in data science and analytics. The CSE general education requirements are also designed to develop communication skills and to provide a body of work in the humanities and social sciences.

Course credit earned by Advanced Placement, International Baccalaureate, proficiency examinations, and transfer may be used to satisfy Case School of Engineering general education requirements.

**Mathematics, Sciences, and Engineering Requirements (29 credit-hours)**

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Total Units: 29

* The chemistry-materials course sequence CHEM 105-CHEM 106-ENGR 145 may be substituted for the sequence CHEM 111-ENGR 145.

**Natural Sciences, Mathematics, or Statistics Requirement (3 credit-hours)**

Course designated by major department.

**Humanities and Social Sciences (15 credit-hours)**

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Total Units: 15

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