CHEMICAL ENGINEERING, BS

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext) section of the Guide.

General Education

• Breadth—Humanities/Literature/Arts: 6 credits
• Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
• Breadth—Social Studies: 3 credits
• Communication Part A Part B *
• Ethnic Studies *
• Quantitative Reasoning Part A Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

SUMMARY OF REQUIREMENTS

The following curriculum applies to students admitted to the chemical engineering degree program.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>5</td>
</tr>
<tr>
<td>or MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 234</td>
<td>Calculus--Functions of Several Variables</td>
<td>4</td>
</tr>
<tr>
<td>MATH 320</td>
<td>Linear Algebra and Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 319</td>
<td>Techniques in Ordinary Differential Equations</td>
<td></td>
</tr>
<tr>
<td>STAT 324</td>
<td>Introductory Applied Statistics for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>Total Credits</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

PHYSICS REQUIREMENT

Credit shortages caused by transfer physics courses at fewer than 6 credits for the required courses must be made up with another physics course.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td>5</td>
</tr>
<tr>
<td>or PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 202</td>
<td>General Physics</td>
<td>5</td>
</tr>
<tr>
<td>or PHYSICS 208</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

CHEMISTRY REQUIREMENT

Credit shortages cause by transfer of freshman chemistry courses at fewer than 9 credits must be made up with chemistry, biochemistry, or chemical engineering courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry (preferred)</td>
<td>5-9</td>
</tr>
<tr>
<td>CHEM 103 &amp; CHEM 104</td>
<td>General Chemistry I and General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CHEM 329</td>
<td>Fundamentals of Analytical Science</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 343 &amp; CHEM 345 &amp; CHEM 344</td>
<td>Organic Chemistry I and Organic Chemistry II and Introductory Organic Chemistry Laboratory</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 562</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Total Credits</td>
<td>20-24</td>
<td></td>
</tr>
</tbody>
</table>

LIFE SCIENCE

Students who meet the Introductory Biology requirement with an AP exam are encouraged to take two advanced biology electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Biology requirement (choose one)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 375</td>
<td>Special Topics (Topic: Intro Biology for Engineers)</td>
<td></td>
</tr>
</tbody>
</table>
## Chemical Engineering, BS

### Professional Breadth

Select 6 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Professional Breadth Credits</td>
<td>6</td>
</tr>
</tbody>
</table>

Courses 300+ from the following College of Engineering departments and programs may be used:

- Biomedical Engineering
- Civil and Environmental Engineering
- Electrical and Computer Engineering
- Engineering Mechanics and Astronautics
- Engineering Professional Development
- Geological Engineering
- Industrial Engineering
- Interdisciplinary Courses (Engineering)
- Materials Science and Engineering
- Mechanical Engineering
- Nuclear Engineering
- Engineering Physics

Courses 300+ from the following departments may be used:

- Chemistry
- Computer Sciences
- Math
- Physics

*The following courses may also be used:*

- **Accounting:**
  - ACCT/IS 300: Accounting Principles
  - GEN BUS 310: Fundamentals of Accounting and Finance for Non-Business Majors
  - GEN BUS 311: Fundamentals of Management and Marketing for Non-Business Majors

- **Biochemistry:**
  - BIOCHEM 501: Introduction to Biochemistry
  - BIOCHEM 507: General Biochemistry I
  - BIOCHEM 508: General Biochemistry II
  - BIOCHEM 570: Cell Biology
  - BIOCHEM 581: Advanced Biochemistry

- **Botany:**
  - BSE 364: Engineering Properties of Food and Biological Materials
  - BSE/ENVIR ST 367: Renewable Energy Systems

- **Economics:**
  - ECON 300: Introduction to Finance
  - ECON 301: Principles of Economics
  - ECON 302: Intermediate Microeconomics
  - ECON 303: Intermediate Macroeconomics
  - ECON 330: Advanced Microeconomics
  - ECON 331: Advanced Macroeconomics
  - ECON 332: Econometrics
  - ECON 350: Money and Banking
  - ECON 351: Macroeconomics
  - ECON 352: International Trade and Finance
  - ECON 353: International Finance
  - ECON 354: International Economics
  - ECON 355: International Trade and Finance
  - ECON 356: International Finance
  - ECON 357: International Economics
  - ECON 358: International Trade and Finance
  - ECON 359: International Finance
  - ECON 360: International Economics
  - ECON 361: International Trade and Finance
  - ECON 362: International Finance
  - ECON 363: International Economics
  - ECON 364: International Trade and Finance
  - ECON 365: International Finance
  - ECON 366: International Economics
  - ECON 367: International Trade and Finance
  - ECON 368: International Finance
  - ECON 369: International Economics
  - ECON 370: International Trade and Finance
  - ECON 371: International Finance
  - ECON 372: International Economics
  - ECON 373: International Trade and Finance
  - ECON 374: International Finance
  - ECON 375: International Economics
  - ECON 376: International Trade and Finance
  - ECON 377: International Finance
  - ECON 378: International Economics
  - ECON 379: International Trade and Finance
  - ECON 380: International Finance
  - ECON 381: International Economics
  - ECON 382: International Trade and Finance
  - ECON 383: International Finance
  - ECON 384: International Economics
  - ECON 385: International Trade and Finance
  - ECON 386: International Finance
  - ECON 387: International Economics
  - ECON 388: International Trade and Finance
  - ECON 389: International Finance
  - ECON 390: International Economics
  - ECON 391: International Trade and Finance
  - ECON 392: International Finance
  - ECON 393: International Economics
  - ECON 394: International Trade and Finance
  - ECON 395: International Finance
  - ECON 396: International Economics
  - ECON 397: International Trade and Finance
  - ECON 398: International Finance
  - ECON 399: International Economics

- **Engineering Physics:**
  - GENETICS 466: Principles of Genetics

- **Geology:**
  - M HR 300: Managing Organizations

- **Mathematics:**
  - MICROBIO 303: Biology of Microorganisms

- **Statistics:**
  - STAT/M 424: Statistical Experimental Design

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2 Chemical Engineering electives may be chosen from any of the CBE courses that are not required, numbered 300 or above (excluding seminar courses). A maximum of two credits of co-op work (CBE 1 Cooperative Education Program) may be used to meet the CBE elective requirement. Qualified undergraduates may take graduate-level (600 or 700) courses to fulfill this requirement.
Students may petition the department to allow other courses related to engineering professional practice. To request that a course not listed above be used, the student should fill out the Professional Breadth Requirement Course Request form available online and submit it to the advisor. The department will then determine if the course can be counted toward the Professional Breadth Requirement. Petitions must be submitted before the beginning of the semester in which the course is to be taken.

3 The objective of this requirement is to provide students with skills to interact with professionals from other disciplines. Suitable courses for this requirement include courses in engineering (excluding CBE) and science, as well as a variety of other disciplines.

4 Full degree credit is not allowed if a student takes both CBE 440 Chemical Engineering Materials and M S & E 350 Introduction to Materials Science. In this case M S & E 350 Introduction to Materials Science will be awarded only 1 degree credit.

**COMMUNICATION SKILLS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 100</td>
<td>Introduction to College Composition</td>
<td>3</td>
</tr>
<tr>
<td>or COM ARTS 100</td>
<td>Introduction to Speech Composition</td>
<td>5</td>
</tr>
<tr>
<td>or LSC 100</td>
<td>Science and Storytelling</td>
<td>3</td>
</tr>
<tr>
<td>or ESL 118</td>
<td>Academic Writing II</td>
<td>3</td>
</tr>
<tr>
<td>INTEREGR 397</td>
<td>Engineering Communication</td>
<td>3</td>
</tr>
</tbody>
</table>

For Part A of the General Education Communication Requirement (3 cr) students must select one course with an "a" designation in "g" of the "geBLC" information in the Course Guide. Some students will be exempt from this requirement based on their placement test scores or advanced placement in English.


**LIBERAL STUDIES ELECTIVES**

Students must complete 16 credits of liberal studies according to the College of Engineering requirements.

1. Liberal studies elective courses must be classified as either Humanities, Social Studies, or Literature courses (identified by the letters H, S, L, or Z in "B" of the "geBLC" information in the Guide). At least six credits must have a breadth designation of Humanities (H, L, or Z), and at least three credits must have a designation of Social Studies (S or Z). Foreign language courses count as H credits.

2. A three-credit ethnic studies course must be selected from the College of Letters & Science. Acceptable courses are identified by the letter "e" in Guide. If appropriate, the ethnic studies course may be among those used to satisfy the concentration requirement.

3. A minimum of two liberal studies courses must be taken from the same subject area (https://registrar.wisc.edu/subjectareas/) (the description before the course number). At least one of these two courses must be at an intermediate or advanced level (designated in Guide).

4. Retroactive credits (retrocredits) may be awarded for world languages work done in high school. Criteria for awarding retrocredits is described in the L&S policy section of GUIDE (https://guide.wisc.edu/undergraduate/letters-science/#Credit-by-exam-retrocredits).
   a. Retrocredits do not count toward the 16 liberal-studies credits required.
   b. Retrocredits may be used to satisfy the concentration and depth requirements as stated in number three above and count as degree credits.

5. English composition courses, English as a Second Language courses, and basic communications arts courses are not accepted as liberal studies electives.

**FREE ELECTIVES**

Students fulfilling their course requirements with fewer than 132 credits must take additional free-elective credits to comply with the 132-credit minimum graduation requirement.

**COURSE SUBSTITUTION REGULATIONS**

1. Any student may, with advisor approval, replace up to 12 credits of required courses in the curriculum, except CBE 424 Operations and Process Laboratory, by an equal number of credits of other courses within the limitations listed under (3) below.

2. Any student who wishes to amend the curriculum by more than 12 credits or wishes to appeal the advisor's decision in (1) or to request exception to (3) below must submit a written request to the chair of the department, who will bring it to the department faculty for consideration.

3. Restrictions on course substitutions are as follows:
   a. Physics courses may be replaced by science or engineering courses.
   b. Chemistry/life science courses must be replaced by courses with significant chemistry/life science content.
   c. Engineering courses must be replaced by engineering courses.
   d. Lab courses must be replaced by courses with an equal number of hours of lab courses.
   e. English as a Second Language courses, and MATH 112 Algebra, MATH 113 Trigonometry, and MATH 114 Algebra and Trigonometry may not be used for course substitutions.

**HONORS IN UNDERGRADUATE RESEARCH PROGRAM**

The Honors in Research program in Chemical Engineering is designed for students who wish to have a more in-depth research experience and is particularly recommended for students considering enrollment in a PhD program. To be accepted into the Honors in Research program, students must have completed at least two semesters on the UW-Madison campus with a cumulative GPA of at least 3.5 and should find a faculty mentor. Students register for 1-3 credits of CBE 489 Honors in Research and are expected to complete at least 8 credits of CBE 489 over 2-3 semesters. Students must also write a senior thesis and present the work to a committee of faculty. Students meeting all requirements, and maintaining a cumulative GPA of at least 3.3, will receive the Honors in Research designation upon graduation.
UNIVERSITY DEGREE REQUIREMENTS

Total Degree
To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency
Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work
Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.