### GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CHEM 131, General Chemistry (Core II)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1914, Differential and Integral Calculus I (Core I)</td>
<td>5</td>
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<tr>
<td>HIST 1483, U.S., 1492-1865, or 1493, U.S., 1865-Present (Core IV)</td>
<td>3</td>
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<tr>
<td>ENGR 1411, Freshman Engineering Experience</td>
<td>1</td>
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</tbody>
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**Total Credit Hours:** 16

- **FRESHMAN**
  - **FIRST SEMESTER**: ENGL 1113, Prin. of English Composition (Core I) 3, CHEM 131, General Chemistry (Core II) 3, MATH 1914, Differential and Integral Calculus I (Core I) 5, HIST 1483, U.S., 1492-1865, or 1493, U.S., 1865-Present (Core IV) 3, ENGR 1411, Freshman Engineering Experience 1
  - **SECOND SEMESTER**: ENGL 1213, Prin. of English Composition (Core I), or EXP 1213, Expository Writing (Core I) 3

**Total Credit Hours:** 16

- **SOPHOMORE**
  - **FIRST SEMESTER**: PHYS 2524, General Physics for Engineering & Science Majors 4, CH E 2002, Intr. to Chemical Engineering Computing 2, CHEM 3053, Organic Chemistry I: Biological Emphasis 3

**Total Credit Hours:** 16

- **JUNIOR**
  - **FIRST SEMESTER**: CHEM 3423, Physical Chemistry I 3, CHEM 3421, Physical Chemistry Lab 1, CH E 3123, Momentum, Heat & Mass Transfer II 3, CH E 3473, Chemical Engineering Thermodynamics 3, CH E 3723, Numerical Methods for Engineering Computation 3, PSC 1113, American Federal Government (Core III) 3
  - **SECOND SEMESTER**: ENGL 3153, Technical Writing 3, CH E 3313, Structure and Properties of Materials 3, CH E 3333, Separation Processes 3, CH E 4342, Unit Operations Lab 3, CHE 4473, Kinetics 3, "Approved Elective, Core IV: Social Science" 3

**Total Credit Hours:** 16

- **SENIOR**
  - **FIRST SEMESTER**: CHEM 3653, Introduction to Biochemistry (additional work is required to earn graduate credit) 3, CHEM 3753, Introduction to Biochemical Methods 3, CHEM 4133, Process Dynamics and Control 3, CH E 4253, Chemical Engineering Design I 3, CH E 4262, Chemical Engineering Design Lab 2, MBIO 5620, Investigations in Microbiology (enrollment in MBIO 5620 is required in place of 3813) 3, ENGR 2431, Electrical Circuits 1, ENGR 3431, Electromechanical Systems 1
  - **SECOND SEMESTER**: CHEM 3753, Introduction to Biochemical Methods 3, "Approved Elective, Core IV: Non-Western Culture" 3

**Total Credit Hours:** 16

- **FIFTH YEAR**
  - **FIRST SEMESTER**: BIOE 5203, Bioengineering Principles (alternate fall only) 3, BIOE 5980, Research for Master’s Thesis 3
  - **SECOND SEMESTER**: Graduate-level Bioengineering Elective 3, Graduate-level Elective in Engineering, Science, or Math 3, BIOE 5980, Research for Master’s Thesis 4

**Total Credit Hours:** 8

**NOTE:** Engineering transfer students may take ENGR 3511 in place of ENGR 1411.

Courses designated as Core I, II, III, IV or Capstone are part of the General Education curriculum. Students must complete a minimum of 40 hours of General Education courses, chosen from the approved list.

To be chosen from the **University-Wide General Education Approved Course List**. Three of these 12 hours must be upper-division (3000-4000). See list in the Class Schedule.

In the College of Engineering, in order to progress in your curriculum, and as a specific graduation requirement, a grade of C or better is required in each course in the curriculum. Please refer to the General Catalog for additional enrollment limitations.

Students must successfully complete prerequisite courses (with a minimum C grade) before proceeding to the next course.

- Two college-level courses in a single foreign language are required; this may be satisfied by successful completion of 2 years in a single foreign language in high school. Students who must take foreign language at the University will have an additional 6-10 hours of coursework.

**Technical Writing** is a corequisite for CH E 3432.

It is recommended that ENGR 2411, 2431, and 3431 be taken in the same semester. The courses are offered in sequential five-week blocks during the semester.

†Chemical engineering courses are sequential and usually offered only in the semester shown above. (Exceptions: BIOE 5203 is taught Alt. fall semesters, and BIOE 5243 is taught Alt. spring semesters.) Note prerequisites on the back of this page.

‡Technical Writing is a corequisite for CH E 3432.

*Note: Bioengineering Principles and Bioengineering Elective courses are sequential and usually offered only in the semester shown above.
1411 Freshman Engineering Experience. Prerequisite: declared major in Engineering or permission of instructor. Required of all entering freshmen with a declared Engineering major. Lecture hours cover a broad range of topics including: majors in Engineering; career planning; advising; and extra-curricular activities. Students also work on multi-disciplinary engineering projects in smaller groups during the lab hour. (F)

2002 Professional Development. Prerequisite: sophomore standing. Develop an understanding of engineering ethics, teamwork, leadership, and professional responsibility through the concepts of contemporary, social, and global issues. (F, Sp)

2411 Applied Engineering Statics. Prerequisites: Physics 2514 and Mathematics 2423 or 2924 or concurrent enrollment in Mathematics 2443 or 2924. Review of fundamentals of statics calculations and their applications to common engineering situations. (Sp)

2431 Electrical Circuits. Prerequisites: Mathematics 2423 or 2924 and Physics 2524 or concurrent enrollment. Introduction to basic principles of electrical circuits. Topics include DC circuits analysis, DC transients, static electrical fields, static magnetic fields, capacitors, inductors, and filters. (F, Sp)†G3421 Physical Chemistry Laboratory. Prerequisites: CHEM 1415 or CHEM 1425, MATH 2423 or MATH 2924 or concurrent enrollment. States of matter, chemical thermodynamics, equilibria, etc. (F, Sp, Su)

2524 General Physics for Engineering and Science Majors. Prerequisites: 2514 and Mathematics 2423 or Mathematics 2924 with a grade of C or better. Dupe three hours of 2423 and two hours of 2433. Further applications of integration, the natural logarithmic and exponential functions, indeterminate forms, techniques of integration, improper integrals, parametric curves and polar coordinates, infinite sequences and series. (F, Sp)†G3423 Physical Chemistry I. Prerequisite: CHEM 1415 or CHEM 1425, MATH 2423 or MATH 2924 or concurrent enrollment. States of matter, chemical thermodynamics, equilibria, etc. (F, Sp, Su)

3152 Organic Chemistry Laboratory: Biological Emphasis. Prerequisite: CHEM 3053 or concurrent enrollment. Intended for life science majors. Laboratory course designed to accompany CHEM 3053 and CHEM 3153. Selected experiments designed to illustrate the fundamental techniques used in organic chemistry, to develop familiarity with the properties of organic compounds and to introduce analytical techniques including spectroscopy. (F, Sp, Su)

3421 Physical Chemistry Laboratory. Prerequisite: 3423 or concurrent enrollment. Physicochemical measurements and calculations. (F, Sp, Su)†G3423 Physical Chemistry I. Prerequisite: CHEM 1415 or CHEM 1425, MATH 2423 or MATH 2924 or concurrent enrollment. States of matter, chemical thermodynamics, equilibria, etc. (F, Sp, Su)

3563 Introduction to Biomechanics. Prerequisite: 3013, 3053, or 3064. Chemistry of proteins, carbohydrates, lipids, and nucleic acids; enzyme kinetics; biochemical energetics; intermediary metabolism; regulatory processes. (F)

3753 Introduction to Biomechanical Processes. Prerequisite: 3653 or concurrent enrollment. A survey of current and routinely used methods in biomechanics. Students attend lecture twice weekly and a three-hour lab per week. (Laboratory) (Sp)

COURSES IN ENGINEERING (ENGR)

COURSES IN MICROBIOLOGY (MBIO)

2815 Introduction to Microbiology. Prerequisite: one course in college chemistry. Introduction to microorganisms as biological entities. Survey of the roles of microorganisms in the ecosystem. Application of microorganisms to industrial and environmental problems. Discussion of microorganisms as causes of human disease and response of hosts to microbial invasion. This course does not count for major credit in Microbiology or Botany. Laboratory (F, Sp, Su)†G3122 Physical Chemistry II. Prerequisite: credit or concurrent enrollment in 3813. Fundamental microbiological methods: aseptic technique, culture methods, microscopy, metabolic and physiological tests, bacterial isolation and identification, environmental microbiology. (Laboratory (F, Sp, Su))

G5620 Investigations in Microbiology. 1 to 6 hours. Prerequisite: fifteen hours of microbiology or permission. May be repeated with change of subject matter; nine hours for a Masters student and twelve hours for a Ph.D. student. Only six hours allowed with one professor. Fields of study: clinical, industrial microbiology, medical microbiology, medical mycology, microbial ecology, microbial genetics, microbial physiology, ultrastructural morphology, virology and molecular biology. (F, Sp, Su)

COURSES IN PHYSICS (PHYS)

2514 General Physics for Engineering and Science Majors. Prerequisite: Mathematics 1823 or Mathematics 1914 with grade of C or better. Not open to students with credit in 2105. Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, waves. (F, Sp, Su)†G3141/2 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics 2423 or Mathematics 2924 with a grade of C or better. Not open to students with credit in 2115. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)