### General Requirements

- **Total Credit Hours**: 132
- **Minimum Retention/Graduation Grade Point Averages**:
  - Overall - Combined and OU: 2.00
  - Major - Combined and OU: 2.00
  - Curriculum - Combined and OU: 2.00
- A minimum grade of C is required for each course in the curriculum.

### Pre-Medical/Biomedical Engineering

- **B163**: Bachelor of Science in Chemical Engineering

### For Students Entering the Oklahoma State System for Higher Education

- **Summer 2018 through Spring 2019**

### Gallogly College of Engineering

- The University of Oklahoma

### Courses Designated as Core I, II, III, IV or Capstone

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 University-Wide General Education Approved Course List.

### Required Courses and Electives

- **Total Credit Hours**: 16
- **Total Credit Hours**: 16
- **Total Credit Hours**: 17
- **Total Credit Hours**: 16

### University-Wide General Education Approved Course List

1. **CHEM 3653**: Intro. to Biochemistry, or
2. **CHEM 3103**: Principles of Physiology
3. **ENGR 2431**: Electromechanical Systems
4. **ENGR 2411**: Freshman Engineering Experience
5. **ENGR 3513**, Intro. to Biochemistry, or
6. **CHEM 3432**: Physical Chemistry Lab
7. **CHEM 3412**: Organic Chemistry II: Biological Emphasis
8. **CHEM 3411**: Introduction to Ordinary Differential Equations
9. **ENGR 2002**: Professional Development
10. **CHEM 3113**: Organic Chemistry Lab: Biological Emphasis

### Additional Electives for Pre-Medical/Biomedical Engineering

- **Approved Elective, Core IV: Western Civ. & Culture**: 3
- **Approved Elective, Core IV: Non-Western Culture**: 1
- **Approved Elective, Core IV: Social Science**: 3
- **Approved Elective, Core IV: Non-Western Culture**: 1
- **Approved Elective, Core IV: Artistic Forms**: 3
- **Approved Elective, Core IV: Artistic Forms**: 3

### Notes

- To be chosen from the University-Wide General Education Approved Course List. Three of these 12 hours must be upper-division (3000-4000). One of these courses should be an English course 2000-level or above. See list in the Class Schedule.

- 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.

- For Students Entering the Oklahoma State System for Higher Education

- **Summer 2018 through Spring 2019**

- **Bachelor of Science in Chemical Engineering**

- **Total Credit Hours**: 16

- **Total Credit Hours**: 16

- **Total Credit Hours**: 17

- **Total Credit Hours**: 16

### Requirement for the Bachelor of Science in Chemical Engineering

- Accredited by the Engineering Accreditation Commission of ABET, [http://www.abet.org](http://www.abet.org)
COURSES IN BIOLOGY (BIO) 1114 Introductory Zoology. Major biological principles and concepts as illustrated in the structure, function and evolution of animals. Emphasis is on self-regulatory mechanisms, especially in the vertebrates. 3-4 hours on adaptive radiation. (F, Sp)

1121 Introductory Zoology Lab. Prerequisite: previous completion or concurrent enrollment in 1114. Laboratory study of structure and development of organ systems. Experiments on physiological processes of selected vertebrates and invertebrates. (F, Sp, Su) [II-LAB]

G3101 Principles of Physiology. Laboratory (2) 5101. Provides students with an introduction to the methods and procedures used in physiological research. Topics covered include data acquisition, analysis and basic statistics, effects of temperature on living systems, nervous system functions, muscle mechanics and physiology, and studies of metabolic rates. Lab is based on laboratory experience, library projects and written research papers are used to introduce students to methods of scientific communication. Laboratory (F, Sp)

G3103 Principles of Physiology. Prerequisite: ZOO/BIO/BIL 1121, or ZOO/BIO/BIL 1114 and ZOO/BIO/BIL 1121; and Biology 1134, or permission of instructor. One semester of physics and organic chemistry strongly recommended. Introduction to fundamental biochemical and physiological concepts with emphasis on the role of enzymes in living systems. Prerequisite: one semester of physics and organic chemistry. (F, Sp, Su) [II-LAB]

3113 Cell Biology (Crosslisted with PBO and MBIO 3113). Prerequisite: 1114, or 1124, or Biology 1134, or Botany 1147, and Chemistry 3021. Introduction to the cell as a unit of life. A chemical and physical comparison of procaractic and eucaryotic cells to include a discussion of cell metabolism, types of metabolic regulation, and an analysis of ultrasound. Emphasis will be placed on the dynamic changes in metabolism and ultrastructure which occur during the life of a cell. (F, Sp)

G3333 Genetics (Crosslisted with PBO 3333). Prerequisite: ZOO/BIO/BIL 1121, or ZOO/BIO/BIL 1114 and ZOO/BIO/BIL 1121; Biology 1134 recommended. Principles of inheritance at, chromosome, and population levels; nature of the genetic material and its involvement in the determination of heritable traits. (F, Sp, Su)

4843 Molecular Biology (Crosslisted with MBIO and PBO 4843; Slashlisted with 5843). Prerequisite: BIOL 1114, or BIOL 1124, or BIOL 1314, or Plant Biology 1114, or Microbiology 3813 and Microbiology 3812, and one course in organic chemistry. Introduction to the characteristics and biological functions of nucleic acids and proteins in living cells on a cellular level. A study of the function of RNA, DNA replication, transcription, protein translation, and the role of nucleic acids in the molecular aspects of microbial genetics transformation, transduction and conjugation; and emphasis on molecular immunology and genetic recombination and DNA technology. No student may earn credit for both 4843 and 5843.

COURSES IN CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING (CH E) 2002 Introduction to Chemical Engineering Computing. Prerequisite: MATH 1823 or 1914 or concurrent enrollment. Introduction to engineering computing and programming using prevalent engineering computing software; program design and development; computer application exercises in engineering. (F, Sp)

2303 Chemical Engineering Fundamentals. Prerequisite: Chemistry 1415 or 1425 or equivalent. Matter balances involving physical equilibria and chemical reaction; energy balances; gas behavior including vapor pressure and Raoul’s Law. (F)

3113 Momentum, Heat and Mass Transfer I. Prerequisite: CHEM 2003; MATH 2443 or 2934 or concurrent enrollment in PHYS 2524; completion or concurrent enrollment in MATH 3113. The common mathematical and physical basis of these processes is presented. Calculation methods for all three processes are developed. Design procedures of equipment for fluid flow, heat transfer and diffusional processes are given. (Sp)

G3123 Momentum, Heat and Mass Transfer II. Prerequisite: CHEM 3113 and MATH 3113 or concurrent enrollment in MATH 3113. The common mathematical and physical basis of these processes is presented. Calculation methods for all three processes are developed. Design procedures of equipment for fluid flow, heat transfer and diffusional processes are given. (Sp)

G3333 Separation Processes. Prerequisite: 3132, 3437, 3723. Coverage of the fundamentals and modeling techniques for separation processes. The calculation of liquid-liquid extraction and distillation/separation columns uses real polar coordinates, infinite sequences and series, vectors in two and three dimensions. (F, Sp, Su)

G3431 Thermodynamics. Prerequisite: CHEM 2003. Introduction to chemical thermodynamics, equilibria, etc. (F, Sp, Su) [II-LAB]

G3433 Introduction to Biochemistry. Prerequisite: CHEM 3013, CHEM 3053, or CHEM 3086. Coverage of the fundamentals of biochemistry, including enzyme kinetics, bioenergetics, intermediary metabolism; and regulatory processes. (F)

COURSES IN ENGINEERING (ENGR) 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 variety of topics including: majors and minors; career planning; advising; and extra-curricular activities. Students also work on multi-disciplinary engineering projects in smaller groups during the last 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. Prerequisite: Physics 2514 and Mathematics 2433 or 2934, or concurrent enrollment in Mathematics 2433 or 2934. Review of fundamentals of statics calculations and their applications to common engineering situations. (Sp)

2431 Electric Circuits. Prerequisite: MATH 2443 or concurrent enrollment in PHYS 2524 or concurrent enrollment in PHYS 2525. 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)

3431 electromechanical Systems. Prerequisite: ENGR 2431. Introduction to basic principles of electromechanical systems. Topics include physical principles of sensing and actuation, types of sensors and actuators, and interfacing and communication protocols. (F)

COURSES IN MATHEMATICS (MATH) 1914 Differential and Integral Calculus I. Prerequisite: satisfactory score on the math assessment. Duplicates three hours of MATH 1823 and one hour of MATH 2423. Limits and continuity, differentiation, applications of differentiation to optimization and curve sketching, integration, the fundamental theorem of calculus, the substitution rule, applications of integration to computation of areas and volumes. (F, Sp, Su) [I-MATH]

2924 Differential and Integral Calculus II. Prerequisite: 1914 with a grade of C or better. Duplicates two hours of 2423 and two hours of 2433. The natural logarithmic and exponential functions, inverse trigonometric functions, techniques of integration and applications of integration; improper integrals. (F, Sp, Su) [II-MATH]

2934 Differential and Integral Calculus III. Prerequisite: 2924 with a grade of C or better. Duplicates one hour of 2433 and three hours of 2434. Vectors and vector functions, functions of several variables, partial differentiation and gradients, multiple integration, line and surface integrals, Green’s Theorem, Stokes’ Theorem and the Divergence Theorem. (Sp, Su)

G3113 Introduction to Ordinary Differential Equations. Prerequisite: MATH 2423 or MATH 2924. Duplicates two hours of 3413. First order ordinary differential equations, linear differential equations with constant coefficients, two-by-two linear systems, Laplace transformations, phase planes and stability. (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, statics and dynamics of rigid bodies, centroids, moments of inertia, gravitational potential, oscillations, wave motion, fourier series. (F, Sp, Su)

2524 General Physics for Engineering and Science Majors. Prerequisite: PHYS 2514 and MATH 2423 or MATH 2924 with grade of C or better. Not open to students with credit in PHYS 1215. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)