# REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

(Accredited by the Accreditation Board for Engineering and Technology)

## COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1113, Prin. of English Composition (Core I)</td>
<td>3</td>
<td>ENGL 1213, Prin. of English Composition (Core I), or</td>
<td>3</td>
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<tr>
<td>CHEM 1315, General Chemistry (Core II)</td>
<td>5</td>
<td>CHEM 1213, Expository Writing (Core I)</td>
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<tr>
<td>HIST 1483, U.S., 1492-1865, or</td>
<td>3</td>
<td>MATH 2423, Calculus &amp; Analytic Geometry II (Core I)</td>
<td>3</td>
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<tr>
<td>HIST 1493, U.S., 1865-Present (Core IV)</td>
<td>3</td>
<td>PHYS 2514, General Physics for Engineering &amp; Science Majors (Core II)</td>
<td>4</td>
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<tr>
<td>MATH 1823, Calculus &amp; Analytic Geometry I (Core I)</td>
<td>3</td>
<td>ENGR 3133, Programming for Non-Majors</td>
<td>3</td>
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<tr>
<td>ENGR 1410, Freshman Engineering Orientation I</td>
<td>0</td>
<td>ENGR 1420, Freshman Engineering Orientation II</td>
<td>0</td>
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### TOTAL CREDIT HOURS: 14

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<tr>
<td>MATH 2433, Calculus &amp; Analytic Geometry III</td>
<td>3</td>
<td>MATH 2524, General Physics for Engineering &amp; Science Majors</td>
<td>4</td>
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<tr>
<td>PHYS 2214, Intro. to Digital Design</td>
<td>4</td>
<td>ECE 2713, Digital Signals and Filtering</td>
<td>3</td>
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<td>ECE 2214, Intro. to Digital Design</td>
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<td>ECE 2713, Digital Signals and Filtering</td>
<td>3</td>
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### TOTAL CREDIT HOURS: 15

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### TOTAL CREDIT HOURS: 18

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### TOTAL CREDIT HOURS: 15

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**NOTE:** Engineering transfer students may take ENGR 3410 in place of ENGR 1410 and ENGR 1420.

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.

1. 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. Any course for which a grade of C or better is not earned must be repeated in the next semester enrolled in which it is offered, if a student plans to use the course in their 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 take foreign language at the University will have an additional 6-10 hours of coursework.
- Electives to be selected from list available in the ECE Office, CEC 218; all are upper-division and engineering related; 1.5 hours of design credit (minimum) must be included.
- This course fulfills the Computer Literacy Requirement for graduation as required by the Oklahoma State Regents for Higher Education.
COURSES IN CHEMISTRY AND BIOCHEMISTRY (CHEM)
1315 General Chemistry. Prerequisite: Mathematics 1503 or 1643, or math ACT equal to or greater than 23. First of a two-semester sequence in general chemistry. Topics covered: basic measurement, gas laws and changes in state, stoichiometry, atomic theory, electron configuration, periodicity, bonding, molecular structure and thermochmistry. Laboratory (F, Sp, Su) [B-LAB]

COURSES IN COMPUTER SCIENCE (C S)
1313 Programming for Nonmajors. Prerequisite: Mathematics 1523 or equivalent. Introduction to the design and implementation of computer programs. Emphasis on problem solving. (F, Sp)

COURSES IN ELECTRICAL AND COMPUTER ENGINEERING (ECE)
2214 Digital Design. Prerequisite: Mathematics 2423. Number systems, Boolean algebra, minimization procedures, combinational logic functions, introduction to sequential logic design, finite state machines and clocked (synchronous) sequential circuits. Analysis, synthesis and implementation are appropriately emphasized. (F, Sp)
2713 Digital Signals and Filtering. Prerequisite: Engineering 1410 and 1420, or Engineering 1112, and Mathematics 2423. Digital signals and filters, discrete Fourier and Z transforms, sampling. (F)
1G3113 Energy Conversion I. Prerequisite: 3613, Engineering 2613. Survey of methods of energy conversion: field-energy force relationships, equations of motion, incremental motion transducers, transformer theory; introduction to rotating machines. (Sp)
3223 Microprocessor System Design. Prerequisite: 2213 or 2214. Review of clocked sequential circuits; MSI/LSI devices and applications, including registers, busing, combinational functions; use of microprocessors and logic design using microprocessors. Emphasizes assembly of full functional units into workable systems. (Sp)
1G3233 Introduction to Solid State Electronic Devices. Prerequisite: 3613. Introduction to quantum mechanics, crystal properties and growth of semiconductors, energy bands in solids, charge carriers in semiconductors, excess carriers in semiconductors, and introduction to diodes and transistors. (F)
3613 Electromagnetic Fields I. Prerequisite: Mathematics 3113. Electrostatic and magnetostatic fields and sources, boundary conditions; introduction to Laplace’s and Poisson’s equations; quasi-stationary and time-varying fields; Maxwell’s equations and circuit concepts. (F)
1G3723 Electrical Circuits II. Prerequisite: 2713, 2723; corequisite: Mathematics 3113. Analysis of electrical circuits in both the time and the frequency domains. Continuation of AC circuit theory, use of two port network theorems, impulse response, convolution, and differential equations. Laplace and Fourier transform analysis of electrical circuits. (F, Sp)
1G3793 Signals and Systems. Prerequisite: 2713, 2723 or Engineering 2613 and Mathematics 3113 and Mathematics 3333. Use of transforms in analysis and design, state-space methods, feedback and communication systems, introduction to stochastic processes. (F, Sp)
1G3813 Introductory Electronics. Prerequisite: Engineering 2613. Small and large signal characteristics and models of electronic devices; analysis and design of elementary electronic circuits. (F, Sp)
3873 Electrical and Computer Engineering Electronics Laboratory. Prerequisite: 3773 or 3772, 3813, Engineering 2003. Electronic analog circuit design, simulation, construction, debugging and measurement of circuit performance quantities using advanced instrumentation techniques; circuit reliability theory; independent design skills development and technical writing. (F, Sp)
1G4273 Digital Design Laboratory. Prerequisite: 3223, 3872. Design of digital systems with integrated circuits and MSI/LSI and microprocessor interfacing. Laboratory (F, Sp) G4773 Laboratory (Special Projects). Prerequisite: 4273 or enrollment in 4273. Individual supervision of special engineering problems of experimental nature. Laboratory (F, Sp) [IV]

COURSES IN ENGINEERING (ENGR)
1410 Freshman Engineering Orientation I. Prerequisite: declared major in engineering. All entering freshmen with a declared engineering major are required to enroll. One hour of this seminar a week is in a large group setting where all students meet and cover details on all engineering disciplines. Additional topics would be continuums of majors, success in the College of Engineering, success at the University of Oklahoma, study abroad programs, advising issues, graduate school opportunities, career planning, and information related to technical/honor societies and participation. A second hour a week is required small group session with an upper-class mentor from the College of Engineering Dean’s Leadership Council. This second hour will focus on basic enrollment and retention strategies such as adding and dropping classes and choosing electives in addition to a weekly topic area. (F)
1420 Freshman Engineering Orientation II. Prerequisite: declared major in engineering. All entering freshmen with a declared engineering major are required to enroll in this spring continuation course. One hour of this seminar a week is in a large group setting where all students meet and cover details on all engineering disciplines. Additional topics would be continuums of majors, success in the College of Engineering, success at the University of Oklahoma, study abroad programs, advising issues, graduate school opportunities, career planning, and information related to technical/honor societies and participation. A second hour a week is required small group session with an upper-class mentor from the College of Engineering Dean’s Leadership Council. This second hour will focus on basic enrollment and retention strategies such as adding and dropping classes and choosing electives in addition to a weekly topic area. (Sp)
2003 Engineering Practice I. Prerequisite: 1410, 1420, and English 1213. Introduction to basic principles of successful engineering enterprise. (F, Sp)

COURSES IN INDUSTRIAL ENGINEERING (I E)
1G3293 Applied Engineering Statistics. Prerequisite: Mathematics 2433. Introduction to probability, one and higher dimensional random variables, function of random variables, expectation, discrete and continuous distributions, sampling and descriptive statistics, parameter estimation, use of statistical packages. Not available for graduate credit for students in engineering disciplines. (F, Sp, Su)

COURSES IN MATHEMATICS (MATH)
1823 Calculus and Analytic Geometry I. Prerequisite: 1523 at OU, or satisfactory score on the placement test, or satisfactory score on the ACT/SAT. Topics covered include equations of straight lines; conic sections; functions, limits and continuity; differentiation; maximum-minimum theory and curve sketching. A student may not receive credit for this course and 1743. (F, Sp, Su) [I-M]
2423 Calculus and Analytic Geometry II. Prerequisite: 1823. Integration and its applications; the calculus of transcendental functions; techniques of integration; and the introduction to differential equations. A student may not receive credit for this course and 2123. (F, Sp, Su) [I-M]
2433 Calculus and Analytic Geometry III. Prerequisite: 2423. Polar coordinates, parametric equations, sequences, infinite series, vector analysis. (F, Sp, Su)
2443 Calculus and Analytic Geometry IV. Prerequisite: 2433. Vector calculus; functions of several variables; partial derivatives; gradients, extreme values and differentials of multivariate functions; multiple integrals; line and surface integrals. (F, Sp, Su)
1G3113 Introduction to Ordinary Differential Equations. Prerequisite: 2423 or concurrent enrollment.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)
1G3333 Linear Algebra I. Prerequisite: 2433 or permission of instructor. Systems of linear equations, determinants, finite dimensional vector spaces, linear transformations and matrices, characteristic values and vectors. (F, Sp, Su)

COURSES IN PHYSICS (PHYS)
2514 General Physics for Engineering and Science Majors. Prerequisite: Mathematics 1823. 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) [I-NL]
2524 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics 2423. Not open to students with credit in 2123. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)
1G2223 Modern Physics for Engineers. Prerequisite: Mathematics 3113 or equivalent. Relativity, atomic structure, nuclear theory, wave mechanics, statistical physics, solid state physics. (F)