

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

For Students Entering the Oklahoma State System for Higher Education:
Summer 2000 through Spring 2001

GENERAL REQUIREMENTS

Total Credit Hours **126***
‡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.

Electrical Engineering

0909A
 Bachelor of Science in
 Electrical Engineering

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	ENGL 1113 , Prin. of English Composition (Core I)	3	ENGL 1213 , Prin. of English Composition (Core I)	3
	CHEM 1315 , General Chemistry (Core II)	5	MATH 2423 , Calculus & Analytic Geometry II (Core I)	3
	HIST 1483 , U.S., 1492-1865, or 1493 , U.S., 1865-Present (Core IV)	3	P SC 1113 , American Federal Government (Core III)	3
	MATH 1823 , Calculus & Analytic Geometry I (Core I)	3	PHYS 2514 , General Physics for Engineering & Science Majors (Core II)	4
	ENGR 1112 , Intro. to Engineering	2	C S 1323 , Fund. of Computer Programming	3
	TOTAL CREDIT HOURS		16	TOTAL CREDIT HOURS
SOPHOMORE	MATH 2433 , Calculus & Analytic Geometry III	3	MATH 2443 , Calculus & Analytic Geometry IV	3
	PHYS 2524 , General Physics for Engineering & Science Majors	4	MATH 3113 , Introduction to Ordinary Differential Equations	3
	C S 1333 , Programming Structures & Abstractions	3	ECE 2772 , E E Laboratory I	2
	ECE 2213 , Intro. to Digital Design	3	ENGR 2113 , Rigid Body Mechanics	3
	ECE 2713 , Digital Signals and Filtering	3	ENGR 2613 , Electrical Science	3
	TOTAL CREDIT HOURS		16	TOTAL CREDIT HOURS
JUNIOR	PHYS 3223 , Modern Physics for Engineers	3	#ECE 3113 , Energy Conversion I	3
	#ECE 3223 , Microprocessor System Design	3	#ECE 3323 , Intro. to Solid State Electronic Devices	3
	#ECE 3613 , Electromagnetic Fields I	3	#ECE 3723 , Electrical Circuits	3
	#ECE 3772 , E E Laboratory II	2	#ECE 3793 , Signals and Systems	3
	#ECE 3813 , Introductory Electronics	3	#ECE 3872 , E E Laboratory III	3
	†Approved Elective, Core III: Social Science	3	†Approved Elective, Core IV: Artistic Forms	2
TOTAL CREDIT HOURS		17	TOTAL CREDIT HOURS	
SENIOR	ENGR 2213 , Thermodynamics	3	ENGR 3723 , Numerical Methods for Engineering Computations	3
	ENGR 3293 , Applied Engineering Statistics	3	#ECE 4773 , Laboratory-Special Projects (Capstone)	3
	#ECE 4273 , Digital Design Lab	3	§ECE Elective	3
	§ECE Elective	3	§Professional Elective	3
	†Approved Elective, Core IV: Western Civ. & Culture	3	†Approved Elective, Core IV: Non-Western Culture	3
	TOTAL CREDIT HOURS		15	TOTAL CREDIT HOURS

NOTE:
 ‡ In order to be admitted to upper-division ECE classes, students must submit an application. At the time of the application, students shall have completed a set of requisite courses and have a 2.80 OU retention and 2.80 combined retention grade point average.

Courses designated as Core I, II, III or IV 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. Six 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 the next semester enrolled, if a student plans to use the course in their curriculum. Please refer to the General Catalog for additional enrollment limitations.

Students should read the College of Engineering Scholastic Regulations which are posted on the Advising Bulletin Board across from CEC 104.

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.

§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.

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 thermochemistry. **Laboratory** (F, Sp, Su)

COURSES IN COMPUTER SCIENCE (C S)

1323 Fundamentals of Computer Programming. Prerequisite: Mathematics 1523 or high school equivalent. Introduction to basic programming techniques: expressions, functions, conditionals, iteration, data abstraction. Practice in the use of high-level programming languages. Emphasizes principles of software engineering and illustrates with examples from central areas of computing science. An introduction to ethics in computer science including philosophical ethics theories. (F, Sp, Su)

1333 Programming Structures and Abstractions. Prerequisite: 1323. Organizing data to facilitate programming and computation. Use of pointers and dynamic memory allocation to represent stacks, queues, linked lists, trees. File processing. Continued practice in the use of high-level programming languages and the application of software engineering principles with examples from central areas of computing science. Discussion of intellectual property rights and privacy. (F, Sp)

COURSES IN ELECTRICAL AND COMPUTER ENGINEERING (ECE)

2213 Introduction to 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 1112, Mathematics 2423. Digital signals and filters, discrete Fourier and Z transforms, sampling. (F, Sp)

2772 Electrical Engineering Laboratory I. Prerequisite: Engineering 2613 or concurrent enrollment in Engineering 2613. Principles of instrumentation and data analysis and the development of methods of experimental analysis for testing theories and hypotheses. **Laboratory** (F, Sp)

†G3113 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. 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. (F, Sp)

†G3323 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, Sp)

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, Sp)

†G3623 Electromagnetic Fields II. Prerequisite: 3613. Guided waves, radiation and energy relations in electromagnetic fields; distributed parameter systems, resonance; elementary electrodynamics. (F)

†G3723 Electrical Circuits. Prerequisite: 2713, Engineering 2613; corequisite: Mathematics 3113. Analysis of electrical circuits in both the time and the frequency domains. Network theorems, impulse response, convolution, differential equations and second-order transient response. Laplace, z, and Fourier transform analysis of electrical circuits. (Sp)

3772 Electrical Engineering Laboratory II. Prerequisite: 2772. Principles of instrumentation and data analysis and the development of methods of experimental analysis for testing theories and hypotheses. **Laboratory** (F, Sp)

3793 Signals and Systems. Prerequisite: 2713, Engineering 2613, Mathematics 3113. Use of transforms in analysis and design, state-space methods, feedback and communication systems, introduction to stochastic processes. (F, Sp)

†G3813 Introductory Electronics. Prerequisite: Engineering 2613. Small and large signal characteristics and models of electronic devices; analysis and design of elementary electronic circuits. (F, Sp)

3872 Electrical Engineering Laboratory III. Prerequisite: 3772, 3813. Principles of instrumentation and data analysis and the development of methods of experimental analysis for testing theories and hypotheses. **Laboratory** (F, Sp)

G4113 Electrical Power Systems. Prerequisite: 3113, 3713. Transmission and distribution of electrical energy. System load flow and control. Faults and system transients. (F)

G4173 Electric Power Laboratory. Prerequisite: 3113. **Laboratory** (Sp)

4213 Digital Signal Processing (Slashlisted with 5213). Prerequisite: 3793. Discrete-time linear systems, finite duration impulse response digital filters, infinite impulse response digital filters, finite word length effects, spectral analysis, fast Fourier-transforms, two-dimensional signal processing and applications. No student may earn credit for both 4213 and 5213. (F)

†G4273 Digital Design Laboratory. Prerequisite: 3223, 3872. Design of digital systems with integrated circuits and MSI/LSI and microprocessor interfacing. **Laboratory** (F, Sp)

†G4383 Integrated Circuit Fabrication Technology. Prerequisite: 3323. A treatment of the theory and processes involved in the fabrication of integrated circuits. (F)

G4413 Introduction to Control System Engineering. Prerequisite: 3793. Analysis and synthesis of control systems; control systems performance and applications. (F)

G4523 Introduction to Communication Theory. Prerequisite: 3793. An introductory treatment of statistical communication theory; description of a random process by auto-correlation and power spectral density functions, sources and properties of electrical noise, the effects of modulation, detection and filtering on signal information content, bandwidth and signal-to-noise ratio. (Sp)

G4613 Computer Architecture (Crosslisted with Computer Science 4613). Prerequisite: 3223 or Computer Science 3613. Covers basic concepts of computer system design and communication between components, along with current and historical examples of computer architecture. (F)

G4773 Laboratory (Special Projects). Prerequisite: 3872 or 4273. Individually supervised special engineering problems of experimental nature. **Laboratory** (F, Sp)

G4813 Electronics. Prerequisite: 3813. Analysis and design of electronic circuits such as multi-stage amplifiers, feedback amplifiers, oscillators and power amplifiers. (Sp)

COURSES IN ENGINEERING (ENGR)

1112 Introduction to Engineering. Prerequisite: Mathematics 1523. Engineering fundamentals/problem solving (principles of mechanics, energy balances, simple circuits), graphics, specifications, ethics, contracts, introduction to the engineering library. (F, Sp, Su)

2113 Rigid Body Mechanics. Prerequisite: 1112, Physics 2514 and Mathematics 2433 or concurrent enrollment in 2433. Vector representation of forces and moments; general three-dimensional theorems of statics; free bodies; two- and three-dimensional statically determinate frames; centroids and moments of inertia of areas. Absolute motion of a particle; motion of rigid bodies; rotating axes and the Coriolis component of acceleration; Newton's laws applied to translating and rotating rigid bodies; principles of work and energy and impulse and momentum in translation and rotation; moments of inertia of masses. (F, Sp, Su)

2213 Thermodynamics. Prerequisite: 1112, Mathematics 2433 and Physics 2524 or concurrent enrollment. First and second laws of thermodynamics are developed and applied to the solution of problems from a variety of engineering fields. Extensive use is made of partial differential calculus to interrelate the thermodynamic functions. (F, Sp, Su)

2613 Electrical Science. Prerequisite: 1112, Mathematics 2423; Physics 2524 or concurrent enrollment. Formulation and solution of circuit equations, network theorems, sinusoidal steady-state analysis, simple transients. (F, Sp, Su)

3223 Fluid Mechanics. Prerequisite: 2213, Mathematics 2433; concurrent enrollment in 2113 and Mathematics 3113. Coverage of the fundamentals of fluid statics and dynamics. Formulation of the equation of fluid flow, i.e., Navier Stokes Equations, Eulers Equations, Bernoulli Equations, etc. and their application. Examples of ideal fluid flow and viscous fluid flow, such as flow in open and closed conduits. (F, Sp, Su)

†G3293 Applied Engineering Statistics. Prerequisite: 1112, 1001 or Computer Science 1313 or 1323; Mathematics 2433. Introduction to probability, one and higher dimensional random variates, functions 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)

†G3723 Numerical Methods for Engineering Computation. Prerequisite: 1112, 1001 or Computer Science 1313 or 1323, and Mathematics 3113. Basic methods for obtaining numerical solutions with a digital computer. Included are methods for the solution of algebraic and transcendental equations, simultaneous linear equations, ordinary and partial differential equations, and curve fitting techniques. The methods are compared with respect to computational efficiency and accuracy. (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)

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)

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)

†G3113 Introduction to Ordinary Differential Equations. Prerequisite: 2443 or concurrent enrollment. Duplicates two hours of 3413. First order ordinary differential equations, linear differential equations with constant coefficients, Laplace transformations, power-series solutions of differential equations, Bessel functions. (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 1205. Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, waves. (F, Sp, Su)

2524 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics 2423. Not open to students with credit in 1215. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)

†G3223 Modern Physics for Engineers. Prerequisite: Mathematics 3113 or equivalent. Relativity, atomic structure, nuclear theory, wave mechanics, statistical physics, solid state physics. (F, Sp, Su)