REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING/MASTER OF SCIENCE

Accredited by ABET, Inc., (formerly the Accrediting Board for Engineering and Technology)

COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education
Summer 2009 through Spring 2010

GENERAL REQUIREMENTS

Total Credit Hours . . . . . **143-146•**
Minimum Retention/Graduation Grade Point Averages:
Overall - Combined and OU **3.00**
Major - Combined and OU **3.00**
Curriculum - Combined and OU **3.00**
A minimum grade of C is required for each course in the curriculum.

Electrical Engineering/ Electrical & Computer Engineering — **F350 Q211**
Bachelor of Science in Electrical Engineering/ Master of Science

OU encourages students to complete at least 29 hours of applicable coursework each year to have the opportunity to graduate in five years.

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), **or**	3
	CHEM 1315, General Chemistry (Core II)	5	**EXPO 1213**, Expository Writing (Core I)	
	HIST 1483, U.S., 1492-1865, **or**	3		
	1493, U.S., 1865-Present (Core IV)		**MATH 2423**, Calculus & Analytic Geometry II (Core I)	3
	MATH 1823, Calculus & Analytic Geometry I (Core I)	3	**P SC 1113**, American Federal Government (Core III)	3
	ENGR 1411, Freshman Engineering Experience	1	**PHYS 2514**, General Physics for Engineering & Science Majors (Core II)	4
			***C S 1313,** Programming for Non-Majors	3
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**16**
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
			ENGR 2002, Professional Development	2
	ECE 2214, Intro. to Digital Design	4	**ECE 2723**, Electrical Circuits I	3
	ECE 2713, Digital Signals and Filtering	3	**I E 3293**, Applied Engineering Statistics	3
	TOTAL CREDIT HOURS	**14**	**TOTAL CREDIT HOURS**	**14**

‡ In order to be admitted to upper-division ECE classes, students must submit an application to the ECE Program office. At the time of the application, students shall have completed a set of requisite courses and have a 2.00 OU retention and 2.00 combined retention grade point average.

JUNIOR	**PHYS 3223**, Modern Physics for Engineers	3	**MATH 3333**, Linear Algebra I	3
	‡ECE 3613, Electromagnetic Fields I	3	**‡ECE 3113**, Energy Conversion I	3
	‡ECE 3723, Electrical Circuits II	3	**‡ECE 3223**, Microprocessor System Design	3
	‡ECE 3773, ECE Circuits Laboratory	3	**‡ECE 3793**, Signals and Systems	3
	‡ECE 3813, Introductory Electronics	3	**‡ECE 3873**, ECE Electronics Laboratory	3
	†Approved Elective, Core III: Social Science	3	†Approved Elective, Core IV: Artistic Forms	3
	TOTAL CREDIT HOURS	**18**	**TOTAL CREDIT HOURS**	**18**

✯ Students are eligible to enter accelerated program after application is granted for unconditional enrollment in upper-division ECE courses and meeting minimum requirements, including 3.25 retention and 3.25 combined retention grade point averages.

SENIOR	**‡ECE 3323**, Intro. to Solid State Electronic Devices	3	**‡ECE 4773**, Laboratory–Special Projects (Capstone)	3
	‡ECE 4273, Digital Design Lab	3		
	[1]ECE G4000-level or higher Elective	3	§ECE G4000-level or higher Elective	3
			[1]§ECE 5000-level or higher Elective	3
	[1]ECE G4000-level or higher 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**	**15**

Students are eligible for graduate status upon graduation with the Bachelor of Science in Electrical Engineering.

FIFTH YEAR	[1]ECE G4000/5000 Electives	6	[1,2] 5000 or higher Electives, **or**	12
				or
	ECE 5000 or higher Elective, **or**	3	**ECE 5980**, Research for Master's Thesis, **and**	3
	ECE 5980, Research for Master's Thesis		[1,2] 5000 or higher Electives	6
	TOTAL CREDIT HOURS	**9**	**TOTAL CREDIT HOURS**	**9-12**

✯ Students may enter the accelerated program based on the undergraduate degree pattern offered in the year they first enrolled in the Oklahoma State System of Higher Education or later.

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. Any course for which a grade of C or better is not earned must be repeated 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 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.

*This course fulfills the Computer Literacy Requirement for graduation as required by the Oklahoma State Regents for Higher Education.

[1] Fourth and fifth year electives (G4000 or higher, including technical electives for MS) must satisfy MSECE Approved Requirements.

[2] Thesis option requires nine hours; non-thesis requires 12 hours.

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) [II-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 3410, and Mathematics 2423. Digital signals and filters, discrete Fourier and Z transforms, sampling. (F, Sp)

2723 Electrical Circuits I. Prerequisite: 2713, Mathematics 2423, Physics 2524. Introduction to circuit elements and the laws of electrical science. Loop and nodal analysis solution methods. Thevenin and Norton equivalent circuits. Superposition and source transformation methods. Laplace transform analysis of electrical circuits. Guest Lectures introducitng advanced topics. (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: 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. (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)

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)

†G3723 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)

3773 Electrical and Computer Engineering Circuits Laboratory. Prerequisite: 2214 or 2213 and either 3723 or enrollment in 3723. Electrical laboratory procedures, circuit construction, debug and experimental confirmation of the principles of circuit theory. Introduction to use of laboratory instrumentation, including skills in the use of the oscilloscope in the evaluation of DC and AC circuits. Use and aplication of diodes, operational amplifiers and programmable logic devices. (F, Sp)

†G 3793 Signals and Systems. Prerequisite: 2713, 2723, Mathematics 3113; corequisite: Mathematics 3333. Linear systems; time domain analysis; frequency domain analysis; Fourier, Laplace and Z-transforms; introduction to communications and control. (F, Sp)

†G3813 Introductory Electronics. Prerequisite: 2723. 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, 3813, and Engineering 2002 or 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)

†G4273 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. Individually supervised special engineering problems of experimental nature. **Laboratory** (F, Sp) [V]

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 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)

COURSES IN INDUSTRIAL ENGINEERING (I E)

†G3293 Applied Engineering Statistics. Prerequisite: Mathematics 2433. Introduction to probability, one and higher dimensional random variates, 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, for incoming freshmen direct from high school, 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)

†G3113 Introduction to Ordinary Differential Equations. Prerequisite: 2423. 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)

†G3333 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 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) [II-NL]

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)