REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN COMPUTER 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.

Computer Engineering

0909C
Bachelor of Science in Computer 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	5	**MATH** **2423**, Calculus & Analytic Geometry II	3
	MATH **1823**, Calculus & Analytic Geometry I (Core I)	3	**PHYS** **2514**, General Physics for Engineering & Science Majors (Core II)	4
	HIST **1483**, U.S., 1492-1865, **or** **1493**, U.S., 1865-Present (Core IV)	3	**P SC** **1113**, American Federal Government (Core III)	3
	ENGR **1112**, Intro. to Engineering	2	**C S** **1323**, Fund. of Computer Programming	3
	TOTAL CREDIT HOURS	**16**	**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	**C S** **2413**, Data Structures	3
	C S **1333**, Programming Structures & Abstractions	3	**ECE** **2213**, Intro. to Digital Design	3
	C S **1813**, Discrete Mathematics	3	**ECE** **2772**, EE Laboratory I	2
	ECE **2713**, Digital Signals and Filtering	3	**ENGR** **2113**, Rigid Body Mechanics	3
			ENGR **2613**, Electrical Science	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**17**
JUNIOR	**MATH** **3113**, Introduction to Ordinary Differential Equations	3	**C S** **3113**, Intro. to Operating Systems	3
	‡**ECE** **3223**, Microprocessor System Design	3	‡**ECE** **3793**, Signals and Systems	3
	‡**ECE** **3772**, EE Laboratory II	2	‡**ECE** **3872**, EE Laboratory III	2
	‡**ECE** **3813**, Introductory Electronics	3	**ENGR** **3293**, Applied Engineering Statistics	3
	ENGR **2213**, Thermodynamics	3	**ENGR** **3723**, Numerical Methods for Engineering Computations	3
	†Approved Elective, Core III: Social Science	3	†Approved Elective, Core IV: Artistic Forms	3
	TOTAL CREDIT HOURS	**17**	**TOTAL CREDIT HOURS**	**17**
SENIOR	**C S** **4263**, Software Engineering I	3	‡**ECE** **4773**, Laboratory–Special Projects (Capstone)	3
	‡**ECE** **4273**, Digital Design Laboratory	3	§ECE/C S 3000–4000-level Elective	3
	‡**ECE** **4613**, Computer Architecture	3	§Professional Elective	3
	§ECE/CS 3000–4000-level Elective	3	†Approved Elective, Core IV: Non-Western Culture	3
	†Approved Elective, Core IV: Western Civ. & Culture	3		
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**12**

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)

1813 Discrete Mathematics. Prerequisite: 1323. Introduction to the mathematical foundation of computer science. Topics include combinatorics, logic, relations, functions, computational complexity, automata, and graph theory. (F, Sp)

2413 Data Structures. Prerequisite: 1333, 1813. Object-oriented representation of widely used data structures and associated algorithms. The design of medium-size software systems. Written communication required in some projects. Discussion of ethical issues including computer crime, abuse, and hacker ethics. (F, Sp, Su)

3113 Introduction to Operating Systems. Prerequisite: 2413 and, either 2613 or Electrical and Computer Engineering 3223. An introduction to the major concept areas and techniques of designing and implementing operating systems. Class projects require the design of medium-scale software systems. (F, Sp)

4263 Software Engineering I. Prerequisite: 3313 or 3113 or concurrent enrollment in 3113. Methods and tools for software specification, design, and documentation. Emphasis on architectural modularity, encapsulation of software objects, and software development processes such as design review, code inspection, and defect tracking. Students working in teams apply these ideas to design and document software products. Study of professional ethics, responsibility, and liability. (F)

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)

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)

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 mentods, 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)

†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)