REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ENGINEERING PHYSICS

(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. . . . . 129• ***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.	Engineering Physics **0919A** Bachelor of Science in Engineering Physics

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	**ENGL** 1113, Prin. of English Composition (Core I) **MATH** 1823, Calculus & Analytic Geometry I (Core I) **P SC** 1113, American Federal Government (Core III) **ENGR** 1112, Intro. to Engineering **§PHYS** 1205, Intro. Physics I for Physics Majors (Core II)	3 3 3 2 5	**ENGL** 1213, Prin. of English Composition (Core I) **CHEM** 1315, General Chemistry (Core II) **MATH** 2423, Calculus & Analytic Geometry II (Core I) **§PHYS** 1215, Intro. Physics II for Physics Majors	3 5 3 5
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**16**
SOPHOMORE	**MATH** 2433, Calculus & Analytic Geometry III **HIST** 1483, U.S., 1492-1865, **or** 1493, U.S. 1865-Present (Core IV) **ENGR** 1001, Engineering Computing **ENGR** 2613, Electrical Science **PHYS** 2064, Waves, Optics & Relativity **PHYS** 2302, Electronics Lab I	3 3 1 3 4 2	**MATH** 2443, Calculus & Analytic Geometry IV **ENGR** 2313, Structure & Properties of Materials **ENGR** 3723, Numerical Methods for Engineering Computations **PHYS** 2312, Electronics Lab II **PHYS** 3113, Quantum Physics †Approved Elective: Social Science (Core III)	3 3 3 2 3 3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**17**
JUNIOR	**MATH** 3413, Physical Math I **ENGR** 3223, Fluid Mechanics **PHYS** 3054, Physical Mechanics **PHYS** 3183, Electricity & Magnetism †Approved Elective: Artistic Forms (Core IV)	3 3 4 3 3	**MATH** 3423, Physical Math II ***ECE** 3813, Introductory Electronics **PHYS** 3302, Junior Laboratory I **or**, 3312, Junior Laboratory II **PHYS** 3803, Intro. to Quantum Mechanics I ¤Engineering Elective †Approved Elective: Western Civ. & Culture (Core IV)	3 3 2 3 3 3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**17**
SENIOR	**PHYS** 4153, Statistical Physics & Thermodynamics **PHYS** 4300, Senior Lab Project (Capstone) ¤Engineering Elective ¤Engineering Elective ‡Technical Elective †Approved Elective: Non-Western Culture (Core IV)	3 2 3 3 3 3	**PHYS** 4300, Senior Lab Project (Capstone) Approved Physics Elective ¤Engineering Elective ¤Engineering Elective +Engineering Physics Elective	2 3 3 3 3
	TOTAL CREDIT HOURS	**17**	**TOTAL CREDIT HOURS**	**14**

NOTE:

* In order to be admitted to upper-division ECE courses, a student must complete a set of requisite courses and have a 2.80 OU retention and 2.80 combined retention grade point average. Students should submit application to ECE when ready to begin upper-division coursework.

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. 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.

§With approval of adviser, PHYS 2514, 2524, and PHYS 1302 may substitute for PHYS 1205, 1215.

‡A course numbered 3000 or above from engineering, physics or mathematics. Co-op students may substitute 3 hours of ENGR 2281, on approval of adviser. A 2000-level engineering course may be used if prerequisite for engineering design sequence. Must be approved by adviser.

¤The 15 hours of engineering electives in an engineering discipline must contain 8 hours of design. Electives must be approved by adviser.

+A course numbered 3000 or above from engineering or physics. A 2000-level engineering course may be used if it is a prerequisite of a design sequence and the technical elective is not a 2000-level course. ELECTIVES MUST BE APPROVED BY ADVISER.

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 ELECTRICAL AND COMPUTER ENGINEERING (ECE)

†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)

COURSES IN ENGINEERING (ENGR)

1001 Engineering Computing. Prerequisite: Mathematics 1823 or concurrent enrollment. Introduction to computer programming and University computing facilities; program design and development; computer application exercises in engineering. (F, Sp, Su)

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)

2313 Structure and Properties of Materials. Prerequisite: 1112, Chemistry 1315 and concurrent enrollment in Physics 2524. The behavior of materials under various conditions and environments is correlated to atomic and molecular structure and bonding. (F, Sp)

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)

†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)

†G3413 Physical Mathematics I. Prerequisite: 2443 or concurrent enrollment. Complex numbers and functions. Fourier series, solution methods for ordinary differential equations and partial differential equations, Laplace transforms, series solutions, Legendre's equation. Duplicates two hours of 3113. (F)

†3423 Physical Mathematics II. Prerequisite: 2443, 3413. The Fourier transform and applications, a survey of complex variable theory, linear and nonlinear coordinate transformations, tensors, elements of the calculus of variations. Duplicates one hour of 3333 and one hour of 4103. (Sp)

COURSES IN PHYSICS (PHYS)

1205 Introductory Physics I for Physics Majors. Prerequisite: enrollment in Mathematics 1823 or permission of instructor. To be taken by physics, astronomy and engineering physics majors during the first semester of their freshman year. Kinematics, dynamics, work and energy, many-particle systems, rigid body rotation, simple harmonic motion. Laboratory is an integral part of the course. **Laboratory** (F)

1215 Introductory Physics II for Physics Majors. Prerequisite: 1205 or permission of instructor. Electricity and magnetism: static fields and forces, circuits, electromagnetic induction. Thermodynamics: the First and Second Laws, temperature, heat, work and entropy. Laboratory is an integral part of the course. **Laboratory** (Sp)

2064 Waves, Optics, and Relativity. Prerequisite: 1215 or permission of instructor. Traveling and standing waves, the wave equation, sound and light, geometric and physical optics. The theory of special relativity. Occasional laboratory experiments. (F)

2302 Electronics Laboratory I. Prerequisite: 1215 or 2524 or permission of instructor. Introduction to analog and digital electronics. Experiments involve operation and use of basic solid state devices and integrated circuits. Emphasis on design and construction of circuits relating to the use of microprocessors as an interface between computer and experiment. (F)

2312 Electronics Laboratory II. Prerequisite: 2302. Design and application of basic digital electronic circuits. Experiments begin with combinational circuitry progressing to sequential circuitry, culminating in microprocessor-based digital system design. Operation and use of microprocessors. (Sp)

†G3054 Physical Mechanics. Prerequisite: 2064 and Mathematics 3413 or permission of instructor. Newtonian particle mechanics. Central forces, collisions, accelerating reference frames, rigid-body motion. Introduction to Lagrange's equations. Forced vibrations and resonance. Coupled oscillations and normal modes. (F)

3113 Quantum Physics. Prerequisite: 2064 or permission of instructor. Kinetic theory of matter; photons, particle waves, the Schrödinger equation; models of the atom; nuclear models and processes; elementary particles; quantum statistics. (Sp)

†G3183 Electricity and Magnetism I. Prerequisite: 2064 and Mathematics 3413 or permission of instructor. Electrostatics, dielectrics, continuity conditions, magnetic forces and fields, magnetic induction, magnetization, Maxwell's equations. (F)

3302 Junior Laboratory I. Prerequisite: 2312 or permission of instructor. Junior-level experiments in physics. (F, Sp)

3312 Junior Laboratory II. Prerequisite: 3302 or permission of instructor. Junior-level experiments in physics. (F, Sp)

†G3803 Introduction to Quantum Mechanics I. Prerequisite: 3113 or permission of instructor. Fundamental ideas of quantum physics. Postulates of quantum theory, wave functions, operators, the Schrödinger equation, one-dimensional systems. Mathematical tools of quantum mechanics. Theory of measurement. Stationary and nonstationary states. (Sp)

G4153 Statistical Physics and Thermodynamics. Prerequisite: 3803. Statistical properties of physical systems. Entropy and temperature, the Boltzmann distribution, Fermi-Dirac and Bose-Einstein gases. Thermodynamic functions. Statistical interpretation of thermodynamics. (F)

4300 Senior Research Project. 1 to 3 hours. Prerequisite: senior standing in major and permission of instructor. May be repeated once. or theoretical, to be arranged with individual faculty, leading to a senior thesis. Group seminars to discuss projects and other topics of current interest in physics and astronomy. Total of four hours required for general education capstone. (F, Sp)