REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN AEROSPACE 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 . . . . 123• **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.	Aerospace Engineering **0902A** Bachelor of Science in Aerospace Engineering

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	**ENGL** **1113**, Prin. of English Composition (Core I) **CHEM** **1315**, General Chemistry (Core II) **MATH** **1823**, Calculus & Analytic Geometry I (Core I) **HIST** **1483**, U.S. 1492-1865, **or** **1493**, U.S. 1865-Present (Core IV) **ENGR** **1112**, Intro. to Engineering	3 5 3 3 2	**ENGL** **1213**, Prin. of English Composition (Core I) **MATH** **2423**, Calculus & Analytic Geometry II (Core I) **PHYS** **2514**, General Physics for Engineering & Science Majors (Core II) **P SC** **1113**, American Federal Government (Core III) **ENGR** **1001**, Engineering Computing ◆**AME** **2103**, Interactive Engineering Design Graphics	3 3 4 3 1 3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**17**
SOPHOMORE	**MATH** **2433**, Calculus & Analytic Geometry III **PHYS** **2524**, General Physics for Engineering & Science Majors **ENGR** **2113**, Rigid Body Mechanics **ENGR** **2213**, Thermodynamics **ENGR** **2313**, Structure & Properties of Materials **AME** **2222**, Intro. to Aerospace Engineering	3 4 3 3 3 2	**MATH** **2443**, Calculus & Analytic Geometry IV **MATH** **3113**, Introduction to Ordinary Differential Equations **ENGR** **2613**, Electrical Science **AME** **2533**, Dynamics † Approved Elective: Social Science (Core III)	3 3 3 3 3
	TOTAL CREDIT HOURS	**18**	**TOTAL CREDIT HOURS**	**15**
JUNIOR	**MATH** **4163**, Intro. to Partial Differential Equations **ENGR** **3723**, Numerical Methods for Engineering Computations **AME** **3112**, Solid Mechanics Lab **AME** **3143**, Solid Mechanics I **AME** **3253**, Aerodynamics **AME** **3272**, Wind Tunnel Lab	3 3 2 3 3 2	**AME** **3333**, Flight Mechanics **AME** **3523**, Aerospace Structural Analysis **AME** **3803**, Compressible Fluid Flow §AME Approved Technical Elective †Approved Elective: Western Civ. & Culture (Core IV)	3 3 3 3 3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
SENIOR	**PHYS** **3223**, Modern Physics for Engineers **AME** **4243**, Aerospace Propulsion Systems **AME** **4273**, Aerospace Vehicle Design I **AME** **4513**, Stability & Control of Aerospace Vehicles	3 3 3 3	**AME** **4373**, Aerospace Vehicle Design (Capstone) **AME** **4593**, Space Science & Systems §Approved Experimental Elective †Approved Elective: Artistic Forms (Core IV) †Approved Elective: Non-Western Culture (Core IV)	3 3 2 3 3
	TOTAL CREDIT HOURS	**12**	**TOTAL CREDIT HOURS**	**14**

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.
§ A list of approved technical and experimental electives is available in the AME Office, Felgar Hall 212.
◆ AME courses are sequential and usually offered only in the semester shown. Note prerequisites on the back of this page.

COURSES IN AEROSPACE AND MECHANICAL ENGINEERING (AME)

2103 Interactive Engineering Design Graphics. Prerequisite: Engineering 1112, Mathematics 1823. Visualization and modeling techniques for product design and development. Design methodology, graphic standards, projection theory, freehand sketching, spatial geometry, CAD systems, geometric modeling, and tolerancing. Solving open-ended design and visualization problems. **Laboratory** (Sp)

2222 Introduction to Aerospace Engineering. Prerequisite: Physics 2514. Nature of flight and flight vehicles, preliminary design of flight vehicles and current problems in aerospace engineering. (F)

2533 Dynamics. Prerequisite: Engineering 2113, Mathematics 2433. Dynamics of particles and rigid bodies for rectilinear and curvilinear motion; energy and momentum methods; introduction to mechanical vibrations. (Sp)

3112 Solid Mechanics Lab. Prerequisite: Engineering 2113, Mathematics 3113; corequisite: 3143. Measurement of displacement; velocity, acceleration, force, torque, strain, stress, data acquisition and processing; data analysis. **Laboratory** (F)

3143 Solid Mechanics I. Prerequisite: Engineering 2113; corequisite: 3112. Concepts of stress and strain; mechanical behavior of engineering materials; analysis of uniform stress states; analysis of members in torsion; stresses and deflections in beams; modes and theories of failure; design criteria. (F)

3253 Aerodynamics. Prerequisite: 2222, 2533, Mathematics 3113. Fundamentals of fluid motion, elements of thin airfoil theory, elements of finite wing theory; effects of compressibility, supersonic airfoil theory, viscous effects and drag estimation and current topics in aerodynamics. (F)

3272 Windtunnel Laboratory. Corerequisite: 3253. Operation and calibration of subsonic and supersonic wind tunnels, power and measurement. Experimental testing of model airplanes and aerodynamic shapes; determination of drag of flight vehicle components. **Laboratory** (F)

3333 Flight Mechanics. Prerequisite: 2222, 3253. Performance of aircraft and introduction to stability and control (open loop). (Sp)

3523 Aerospace Structural Analysis. Prerequisite: 3143, Mathematics 3113. Advanced concepts of stress and strain; introduction to the analysis of aerospace engineering structures: complex bending and torsion, shear flows in thin-walled and stringer-skin sections; buckling; introduction to the finite element method; introduction to composite materials. (Sp)

3803 Compressible Fluid Flow. Prerequisite: 3253. One-dimensional gas dynamics, subsonic and supersonic flow in ducts with area change, friction, heat addition and any combination thereof. Normal shock waves, oblique shock waves, method of characteristics. (Sp)

G4243 Aerospace Propulsion Systems. Prerequisite: 3803. Propulsion systems, thermodynamic cycles, combustion and thermochemical analysis, reciprocating engines, gas turbine and jet engines, current developments in propulsion systems. (F)

4273 Aerospace Vehicle Design I. Prerequisite: 3333. Preliminary design and configuration selection, federal and military specifications, performance and handling qualities, structures and design. The first semester of a two-semester design sequence. (F)

4373 Aerospace Vehicle Design II. Prerequisite: 4273. Preliminary design and configuration, selection, federal and military specifications, performance and handling qualities, structures and design, systems design, business aspects. **Laboratory** (Sp)

G4513 Flight Controls. Prerequisite: 3333. Classical control theory with applications to aircraft flight control system design. (F)

G4593 Space Science and Systems. Prerequisite: Mathematics 4163, Engineering 2113. Celestial mechanics, powered flight and the earth's atmosphere, space environment, vehicle performance, current topics in space science and systems. (F, Sp)

AME Experimental Electives

G4362 Experimental Stress Analysis (Crosslisted with Civil Engineering 4362). Prerequisite: Engineering 2153; AME 3112 or equivalent or graduate standing. Determination of stress by means of bonded wire, metal film and semiconductor strain gages, brittle coating and photoelasticity. Design, selection and use of gauges for measuring static, dynamic and combined strains. **Laboratory** (F)

G4442 Internal Combustion Engines Laboratory. Prerequisite: 3122 or equivalent or graduate standing. Test equipment and instrumentation, propulsion systems, reciprocating engines, supercharger fuel systems, tests and evaluation. **Laboratory** (Sp)

G4812 Dynamics and Controls Laboratory. Prerequisite: 3112 or equivalent or graduate standing. May be repeated with change of project; maximum credit four hours. Objectives are to teach the implementation of instrumentation and controls for mechanical systems and explore design factors of the control of mechanical systems. **Laboratory** (Sp)

G4822 Fluid and Thermal Laboratory. Prerequisite: 3173, 3803; 3122 or equivalent or graduate standing. May be repeated with change of content; maximum credit six hours. Experimental studies in heat transfer or fluid mechanics. **Laboratory** (Sp)

G4832 Nondestructive Evaluation of Materials. Prerequisite: 3112 or equivalent or graduate standing; Engineering 2153, 2313. Principles and practices of nondestructive determination of properties and integrity of solids. Topics include: ultrasonics, liquid penetrants, magnetic particles, eddy current, electron exoemission, thermography and acoustic emission. **Laboratory** (Sp)

4980 Undergraduate Research Studies. 1 to 4 hours. Prerequisite: permission of instructor. Work with various faculty members on individual research projects. The nature of the research and the hours credit varies but no more than two hours per semester or three hours per year may be taken. (F, Sp, Su)

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 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)

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)

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)

†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)

G4163 Introduction to Partial Differential Equations. Prerequisite: 3113. Physical models, classification of equations, Fourier series and boundary value problems, integral transforms, the method of characteristics. (F, Sp)

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)