REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ARCHITECTURAL ENGINEERING

Accredited by the Engineering Accreditation Commission of ABET, **http://www.abet.org**

COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education
Summer 2011 through Spring 2012

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.

Architectural Engineering

B035
Bachelor of Science in Architectural Engineering

OU encourages students to complete at least 32 hours of applicable coursework each year to have the opportunity to graduate in four 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)	
	MATH 1823, Calculus & Analytic Geometry I (Core I)	3	**MATH 2423**, Calculus & Analytic Geometry II (Core I)	3
	ENGR 1410, Freshman Engineering Orientation	0	**PHYS 2514**, General Physics for Engineering & Science Majors (Core II)	4
	ARCH 1154, Design & Graphics Studio I	4	**ARCH 1254**, Design & Graphics Studio II	4
	***CEES 1112,** Intro. to CEES	2	**P SC 1113**, American Federal Government (Core III)	3
	TOTAL CREDIT HOURS	**17**	**TOTAL CREDIT HOURS**	**17**
SOPHOMORE	**ARCH 2243,** History of the Built Environment I (Core IV: Western Civilization & Culture)	3	**MATH 2443**, Calculus & Analytic Geometry IV	3
	MATH 2433, Calculus & Analytic Geometry III	3	**MATH 3113**, Intro. to Ordinary Differential Equations	3
	PHYS 2524, General Physics for Engineering & Science Majors	4	**§CEES 1000**, CEES Seminar	0
	§CEES 1000, CEES Seminar	0	**CEES 2153**, Mechanics of Materials	3
	CEES 1213, Computing Applications in CEES	3	**CEES 2223**, Fluid Mechanics	3
	CEES 2113, Statics and Dynamics	3	**GEOL 1114**, Physical Geology for Sci. & Engr., **or** other MATH (calculus or above) or Basic Science Elective (four credit hrs.)	4
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**16**
JUNIOR	**AME 2213**, Thermodynamics	3	**AME 3173**, Heat Transfer	3
	§CEES 1000, CEES Seminar	0	**§CEES 1000**, CEES Seminar	0
	CEES 3253, Introduction to Continuum Mechanics	3	**CEES 3334**, Measurements in CEES	4
	CEES 3364, Soil Mechanics	4	**CEES 3403**, Materials	3
	CEES 3414, Structural Analysis I	4	**CEES 3774**, Structural Design — Concrete and Steel	4
	ENGR 2431, Electrical Circuits	1	**ENGL 3153**, Technical Writing	3
	ENGR 3401, Engineering Economics	1		
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**17**
SENIOR	**HIST 1483**, U.S., 1492-1865, or **1493**, U.S., 1865-Present (Core IV)	3	**ANTH 4623**, Approaches to Cross-Cultural Human Problems or approved substitute (Core IV, Non-Western Civ.)	3
	AME 4653, Air Conditioning Systems	3	**§CEES 1000**, CEES Seminar	0
	§CEES 1000, CEES Seminar	0	**CEES 4333**, Foundation Engineering	3
	CEES 4113, Building Lighting & Electrical Systems	3	**CEES 4993**, Architectural Engineering Capstone	3
	CEES 4753, Structural Design — Wood	3	†Approved Elective: Core III: Social Science	3
	CEES 4803, Professional Practice	3	†Approved Elective: Artistic Forms (Core IV)	3
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**15**

NOTE: Engineering transfer students may take ENGR 3410 in place of ENGR 1410.

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. 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.

§Students must complete a minimum of four semesters of CEES 1000.

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

COURSES IN AEROSPACE & MECHANICAL ENGINEERING (AME)

2213 Thermodynamics. Prerequisite: Mathematics 2433 and Physics 2524, or concurrent enrollment (in both). First and second law of thermodynamics are developed and applied to the solutions of problems from a variety of engineering fields. Extensive use is made of differential calculus to interrelate thermodynamics functions. (F)

3173 Heat Transfer. Prerequisite: AME 2213 or Engineering 2213, and AME 3153. Heat transfer by conduction, convection, and radiation; mass transfer and combined modes of heat transfer. (Sp)

G4653 Air Conditioning Systems. Prerequisite: AME 3173. Theory and design of systems for controlling properties such as temperature, humidity, air purity, air distribution and noise in enclosures. (Irreg.)

COURSES IN ANTHROPOLOGY (ANTH)

4623 Approaches to Cross-Cultural Human Problems. Prerequisite: 1113 or junior standing. Introduces students to the complex problems of contemporary global-scale cultures and helps them better understand their place on this global arena. This course will look at specific international issues or problems, and relate them to processes occurring in many parts of the world. (Irreg.) [IV-NW]

COURSES IN ARCHITECTURE (ARCH)

1154 Design and Graphics Studio I. Individual and/or team projects at an introductory level focused on the comprehensive integration of social, cultural, theoretical, environmental, and technical influences. Application of professional techniques of representation and communication required. (F)

1254 Design and Graphic Studio II. Prerequisite: 1154 with a grade of C or better. Students are introduced to the basic principles and concepts for design professionals. Topics include cultural, social, theoretical and behavioral factors and their implications for planning and designing the built environment. Application of professional techniques of representation and communication are required. (Sp)

2243 History of the Built Environment I. Prerequisite: majors only or permission of instructor. A theological investigation of the cultural, historical, political and aesthetic values of diverse Western and non-western cultures that result in significant built environments through the 16th century. Buildings, urbanism, theories, and cultural context will be emphasized. (F) [IV-WC]

COURSES IN CIVIL ENGINEERING & ENVIRONMENTAL SCIENCE (CEES)

1000 CEES Seminar. Seminar provides a common meeting time for students and faculty for department activities, such as invited speakers, project presentations, educational surveys, cross-course project coordination, and policy announcements. Students must enroll every semester that they are matriculated in CEES at OU after the freshman year, but in no case can a student graduate without successfully completing four semesters of seminar. (F, Sp)

1112 Introduction to Civil Engineering and Environmental Science. Freshman only. Introduction to fundamental concepts (mass/flow balance), problem solving and design, and simple computing software for architectural, civil or environmental engineers and environmental scientists. (F)

1213 Computing Applications in Civil Engineering and Environmental Science. Prerequisite: Math 2423, Physics 2514 or concurrent enrollment. Introduction to application software and computing tools relevant to civil engineering, environmental engineering and environmental science, including programming, spreadsheets and computer-aided design. (F)

2113 Statics and Dynamics (Crosslisted with Petroleum Engineering 2113). Prerequisites: Physics 2514 and Mathematics 2433 or concurrent enrollment in Mathematics 2433. Vector representations of forces and moments; general three-dimensional theorems of statics and dynamics; centoids and moments of area and inertia. Free-body diagrams, equilibrium of a particle and of rigid bodies, principles of work and energy; principle of impulse-momentum. Motion of particles and rigid bodies in translating and rotating reference frames. Newton's law of motion and Lagrange's equation, including application to lumped-parameter systems. Analyses of trusses, frames and machines. (F, Sp)

2153 Mechanics of Materials. Prerequisites: 2113 or Aerospace and Mechanical Engineering 2113 or Petroleum Engineering 2113. Basic principles of mechanics, including the definition of stress and strain, transformations and principal values for the stress and strain tensors, kinematic relations, review of conservation equations and the development and application of constitutive laws for idealized materials. Elementary elastostatics utilizing Hooke's law; constitutive relations for a linear-elastic continuum, including elastic parameters such as Young's modulus, shear and bulk moduli and Poisson's ratio. Solution of elementary one- and two-dimensional mechanics problems, including thermal stresses and strains, beam flexure, shear and deflections, pressure vessels and buckling of columns. (Sp)

2223 Fluid Mechanics. Prerequisites: 2113 or Aerospace and Mechanical Engineering 2113 or Petroleum Engineering 2113, and Mathematics 3113 or concurrent enrollment. 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. (Sp)

3253 Introduction to Continuum Mechanics. Prerequisite: 2153 and Mathematics 3113. Mechanics of a deformable continuum, including applications of plane stress, plane strain and an introduction to three-dimensional elastostatics. Thermodynamics of deformable media, including energy formulations suitable for closed-form applications and for computational approximations. Constitutive relations for engineering materials, including nonlinear stress-strain relations and multiphysics problems with coupling of the behavior of solids and fluids within the framework of poromechanics. Considerations for structural mechanics, micromechanics and nanomechanics. (F)

3334 Measurements in CEES. Prerequisites: Mathematics 2423, Physics 2424 or Physics 2524. Introduction to measurement (laboratory and field) techniques, data analysis and interpretation and applications to architectural, civil or environmental engineering and environmental science problems. Topics include statistics, land surveying, remote sensing, GIS, environmental sampling and analysis and sensors. **Laboratory** (Sp)

3364 Soil Mechanics. Prerequisite: 2153. General treatment of the physical and mechanical properties of soils. Theories of effective stress, consolidation, lateral earth pressure, bearing capacity, slope stability and groundwater flow. **Laboratory** (F)

3403 Materials. Prerequisite: 2153 or concurrent enrollment. Study of the properties of materials utilized by architectural and civil engineers; analyses of aggregates, concrete, masonry, steel, asphalt, plastics and wood. **Laboratory** (Sp)

3414 Structural Analysis I. Prerequisite: 2153. Loads, reactions and force systems; introduction to design codes; analysis of frames and trusses; calculation of structural deformations; and analysis of indeterminate structures. Emphasis on classical solutions and time-tested approaches to structural engineering. Introduction to structural analysis computer programs to solve complex problems. (F)

3774 Structural Design – Concrete and Steel. Prerequisite: 3403 and 3414. Design of structural members constructed of reinforced concrete and/or steel. Concrete design will include beams in flexure/shear, one way slabs, development length, serviceability and an introduction to columns. Steel design will include tension elements, columns, beams, beam columns and an introduction to connections. **Laboratory** (Sp)

4113 Building Lighting and Electrical Systems. Prerequisite: Mathematics, 2423, Physics 2524, Engineering 2431 or equivalents. Fundamentals of building lighting and electrical systems. Lighting topics include the determination of appropriate lighting quantity and quality, luminaires and lighting design procedures for residential, commercial and industrial buildings. Electrical topics will include service voltages, overcurrent protection, short circuit analysis and branch circuit design for residential, commercial and industrial buildings. (F)

G4333 Foundation Engineering. Prerequisite: 3364. Substructure analysis and design to meet various soil conditions; footings and rafts, shoring and underpinning, piles, cofferdams, caissons, breakwaters, piers, wharves, vibratory effects on foundations. (Sp)

G4753 Structural Design – Wood. Prerequisite: 3414 or equivalent. Material properties and behavior of wood. Analysis and design of solid and laminated structural members, connections, systems, trusses and arches. Current developments in structural wood design and research. (F)

4803 Civil Engineering Professional Practice. Prerequisites: senior standing in Architectural or Civil Engineering. Architectural engineers must also have Engineering 2431 or concurrent enrollment. Introduces students to both technical and non-traditional aspects of professional practice. Technical emphases include discipline-specific instruction on the design process. Architectural engineers are trained in design of building plumbing and electrical systems. Civil engineers are trained on structural and foundation design. Both disciplines receive training on non-technical aspects of professional practice including organization, project management, ethics and communications. (F)

4993 Architectural Engineering Capstone. Prerequisite: CEES 3364, CEES 3774, CEES 4113, CEES 4803 and AME 4653. A capstone course emphasizing design of structural components and environmental systems of buildings. Requires students to have knowledge and skills from prerequisite courses to address a real-world, open-ended design problem. Required for architectural engineering students. The capstone project will be under direct faculty supervision. (Sp) [V]

COURSES IN ENGINEERING (ENGR)

2431 Electrical Circuits. Prerequisite: Mathematics 2423 and Physics 2524 or concurrent enrollment. Introduction to basic principles of electrical circuits. Topics include DC circuits analysis, DC transients, static electrical fields, static magnetic fields, capacitors, inductors, and filters. (F, Sp)

3401 Engineering Economics. Prerequisite: Mathematics 1823. Introduction to basic principles of engineering economics. Topics include value and interest, cash flow diagrams, cash flow patterns, equivalence of cash flow patterns, unusual cash flows and interest periods, evaluating alternatives (annual equivalent cost comparisons, present equivalent cost comparisons, incremental approach, rate of return comparisons, benefit/cost comparisons, MARR, replacement problems, always ignore the past, break-even analysis), income tax and depreciation, and inflation. (F)

COURSES IN ENGLISH (ENGL)

3153 Technical Writing. Prerequisite: 1213 and Engineering or hard science majors only. For students of the pure and applied sciences. Focuses on the forms of report writing most frequently encountered in research and industry. (F, Sp, Su)

COURSES IN GEOLOGY (GEOL)

1114 Physical Geology for Science and Engineering Majors. Prerequisite: equivalent knowledge of high school chemistry, algebra and trigonometry. Laboratory included. Plate tectonics, the makeup of continents and mountain building. Heat flow, magnetism, gravity, rock deformation, earthquakes and the earth's interior. Surface processes including weathering, erosion, transport and deposition. Landforms, rivers, groundwater, glaciers, ocean processes, and volcanoes. Minerals and rocks. Application of geology to land-use, groundwater, mineral and fossil fuel exploration. **Laboratory** (F, Sp) [II-LAB]

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: MATH 2423 or MATH 2924. 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)

COURSES IN PHYSICS (PHYS)

2514 General Physics for Engineering and Science Majors. Prerequisite: Mathematics 1823 or Mathematics 1914 with grade of C or better. 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)