

# REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ARCHITECTURAL ENGINEERING

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## GALLOGLY COLLEGE OF ENGINEERING

### THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education  
**Summer 2018 through Spring 2019**

**GENERAL REQUIREMENTS**  
Total Credit Hours . . . . . **130•**  
**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
<b>FRESHMAN</b>	ENGL 1113, Prin. of English Composition (Core I)	3	ENGL 1213, Prin. of English Composition (Core I), or	3
	GEOL 1114, Physical Geology for Sci. & Engr., or other MATH (calculus or above) or Basic Science Elective (four credit hrs.)	4	EXPO 1213, Expository Writing (Core I)	
	♦MATH 1914, Differential and Integral Calculus I (Core I)	4	♦MATH 2924, Differential and Integral Calculus II	4
	ENGR 1410, Freshman Engineering Orientation	0	PHYS 2514, General Physics for Engineering & Science Majors (Core II)	4
	CEES 1112, Intro. to CEES	2	ARCH 1263, Methods II – Pattern of Architecture	3
	ARCH 2363, Methods III – Materials and Form	3	P SC 1113, American Federal Government (Core III)	3
	<b>TOTAL CREDIT HOURS</b>	<b>16</b>	<b>TOTAL CREDIT HOURS</b>	<b>17</b>
<b>SOPHOMORE</b>	ARCH 2243, History of the Built Environment I (Core IV: Western Civilization & Culture)	3	*CHEM 1315, General Chemistry (Core II)	5
	♦MATH 2934, Differential and Integral Calculus III	4	ENGR 2002, Professional Development	2
	PHYS 2524, General Physics for Engineering & Science Majors	4	MATH 3113, Intro. to Ordinary Differential Equations	3
	§CEES 1000, CEES Seminar	0	§CEES 1000, CEES Seminar	0
	CEES 2213, CADD Fundamentals	3	CEES 2153, Mechanics of Materials	3
	CEES 2113, Statics	3	CEES 2223, Fluid Mechanics	3
	<b>TOTAL CREDIT HOURS</b>	<b>17</b>	<b>TOTAL CREDIT HOURS</b>	<b>16</b>
<b>JUNIOR</b>	AME 2213, Thermodynamics	3	AME 3173, Heat Transfer	3
	§CEES 1000, CEES Seminar	0	§CEES 1000, CEES Seminar	0
	CEES 3263, Introduction to Dynamics for Architectural and Civil Engineers	3	CEES 3403, Materials	3
	CEES 3363, Soil Mechanics	3	CEES 3663, Structural Design – Steel I	3
	CEES 3361, Soil Mechanics Lab	1	CEES 4113, Building Lighting and Electrical Systems	3
	CEES 3413, Structural Analysis I	3	ENGL 3153, Technical Writing	3
	ENGR 2431, Electrical Circuits	1	CEES 3453, Introduction to Construction Management	3
ENGR 3401, Engineering Economics	1			
<b>TOTAL CREDIT HOURS</b>	<b>15</b>	<b>TOTAL CREDIT HOURS</b>	<b>18</b>	
<b>SENIOR</b>	AME 4653, Air Conditioning Systems	3	ANTH 4623, Approaches to Cross-Cultural Human Problems or approved substitute (Core IV, Non-Western Civ.)	3
	§CEES 1000, CEES Seminar	0	§CEES 1000, CEES Seminar	0
	CEES 3673, Structural Design – Concrete I	3	CEES 4333, Foundation Engineering	3
	CEES Professional Elective **	3	CEES 4993, Architectural Engineering Capstone	3
	CEES 4753, Structural Design – Wood	3	†Approved Elective: Core III: Social Science	3
	CEES 4991, Introduction to AE Capstone	1	†Approved Elective: Artistic Forms (Core IV)	3
	HIST 1483, U.S., 1492-1865, or 1493, U.S., 1865-Present (Core IV)	3		
<b>TOTAL CREDIT HOURS</b>	<b>16</b>	<b>TOTAL CREDIT HOURS</b>	<b>15</b>	

**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.

♦MATH 1823, 2423, 2433, and 2443 sequence can be substituted for MATH 1914, 2924, and 2934.

\*CHEM 1315 can be substituted with CHEM 1335 (Fall only)

\*\*Professional Elective can be chosen from any 3000-level or higher course in CEES

**COURSES IN AEROSPACE & MECHANICAL ENGINEERING (AME)**

**2213 Thermodynamics.** Prerequisite: Physics 2514; MATH 1823 or 1914; MATH 2423 or 2924; and CHEM 1315 all with a minimum grade of C or better with an overall average of 3.0 in these four courses. (AP credit accepted and weighted based upon score.) Mathematics 2433 or 2934; and Physics 2524, or concurrent enrollment in MATH 2433 or 2934 and PHYS 2524. 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.** Prerequisites: AME 2213, 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)**

**1263 Methods II - Pattern of Architecture.** Prerequisites: ARCH 1121, ARCH 1163, ARCH 1153 with a grade of C or better. Co-requisite: ARCH 1255; or permission of director. An introduction to organizational strategies across a range of architectural scales. Ordering principles are investigated from micro through macro, from the materiality and tectonics of details, to urban patterns. Architectural assemblies and building technology will introduce structural systems and material characteristics. Massing and typology studies will introduce relationships of building to site and environment. (Sp)

**2243 History of the Built Environment I.** Prerequisite: majors only or permission of director. Co-requisite: ARCH 2363, ARCH 2356; for Interior Design majors: completion of A HI 2213 and A HI 2223. A theoretical investigation of the cultural, political, and aesthetic values of diverse Western and non-Western cultures and how these affect the built environment from pre-history through the Renaissance. This course continues the development of critical writing skills and further develops analytic skills that act to inform design decisions related to studio projects. (F) [IV-WC]

**2363 Methods III - Materials and Form.** Prerequisites: ARCH 1263, ARCH 1255 with a grade of C or better. Co-requisite: ARCH 2356, ARCH 2243; or permission of director. An introduction to the nature of building materials with regard to form, strength, durability, workability, structure, connections, surfaces, and edges. Analysis of architectural expression through the use of building materials including the effects of light, air movement, humidity, and their relationships to both one another and formal and spatial expressions. (F)

**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)

**2113 Statics.** Prerequisites: Physics 2514 and Mathematics 2433 or 2934 or concurrent enrollment in Mathematics 2433 or 2934. Vector representation of forces and moments; general three-dimensional theorems of statics; centroids and moments of area and inertia. Free-body diagrams, equilibrium of a particle and of rigid bodies, distributed loads, friction and internal shear and moment loads. Analysis of trusses, frames, and machines. (F)

**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)

**2213 CADD Fundamentals.** Prerequisite: CEES Majors only and Sophomore standing. Introduction to computer aided design and drafting with a focus on the AutoCAD and MicroStation platforms. This course is primarily about learning to use the software and learning how to convey an engineering design graphically. (F)

**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) **3263 Introduction to Dynamics for Architectural and Civil Engineers.** Prerequisite: CEES 2153 and MATH 3113. Kinematics and kinetics of rigid bodies; free and forced vibrations of undamped and damped single degree-of-freedom systems; concept of mass, stiffness, and damping for typical structures; introduction to vibrations of two and more degrees-of-freedom systems; and determination of loads on structures from dynamic events such as earthquakes. (F)

**3361 Soil Mechanics Lab.** Prerequisite: CEES 2153 or PE 2153; CEES 3363 or concurrent enrollment (you must be enrolled in both lecture and lab section together the first time you attempt either). This is one of two complimentary courses taken in the area of Geotechnical Engineering and serves as an introduction to soil mechanics. During this course, the student will conduct simple laboratory tests to identify and classify soils, characterize the compacted properties of soil, and quantify soil permeability, compressibility and strength. (F)

**3363 Soil Mechanics.** Prerequisite: CEES 2153 or PE 2153; CEES 3361 or concurrent enrollment (you must be enrolled in both lecture and a lab section together the first time you attempt either). General treatment of the physical and mechanical properties of soils. Topics include soil composition, classification, phase relationships, compaction, effective stress, consolidation, shear strength and permeability and seepage. (F)

**3403 Materials.** Prerequisite: CEES 2153 or PE 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)

**3413 Structural Analysis I.** Prerequisite: CEES 2153 or PE 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)

**3453 Introduction to Construction Management.** Prerequisite: CEES 2213 and junior level standing in CEES. Introduction to methods for managing construction projects including scheduling, cost estimating, contracts, pay request, change orders, and requests for information. Students will also learn how to read construction documents and understand project specifications. (Sp)

**3663 Structural Design – Steel I.** Prerequisite: CEES 3413; and CEES 3403 or concurrent enrollment in CEES 3403. Design of steel structural members including tension elements, columns, beams, and beam-columns; bolted and welded connection design; composite beam design; introduction to plastic design. **Laboratory** (Sp)

**3673 Structural Design – Concrete I.** Prerequisite: 3403, 3414. Analysis and design of reinforced concrete beams, columns, slabs, footings, etc., along with discussion of current building practice. **Laboratory** (F)

**4113 Building Lighting and Electrical Systems.** Prerequisite: MATH 2423 or MATH 2924; PHYS 2524; and ENGR 2431 or concurrent enrollment, CEES majors only. 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 or Sp) **G4333 Foundation Engineering.** Prerequisite: CEES 3363. 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)

**4991 Introduction to AE Capstone.** Prerequisite: senior standing in Architectural Engineering. Introduction to the capstone design project, which is a two-semester-long, open-ended engineering design problem that requires applying the skills and techniques acquired in earlier engineering course work. This course will focus on introducing the project requirements; forming multi-disciplinary teams of students; developing team identities; assigning team roles; evaluating project constraints; and developing a project design schedule. (F)

**4993 Architectural Engineering Capstone.** Prerequisite: CEES 3663, CEES 3673, CEES 4991 and AME 4653; CEES 4113 and CEES 4333 or concurrent enrollment. 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. (Sp) [V]

**COURSES IN ENGINEERING (ENGR)**

**2002 Professional Development.** Prerequisite: ENGR 1410 or ENGR 1411, or ENGR 3511 or ENGR 3410 or concurrent enrollment; ENGL 1213 or EXPO 1213, and sophomore standing. Develop an understanding of engineering ethics, teamwork, leadership, and professional responsibility through the concepts of contemporary, social, and global issues. (F, Sp)

**2431 Electrical Circuits.** Prerequisite: Mathematics 2423 or 2924; 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: MATH 1823 or 1914 and CEES 2153 or PE 2153 or AME 2153. Introduction to basic principles of engineering economics. Topics include value and interest, cash flow diagrams and 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, depreciation, and inflation. (F, Sp)

**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)**

**1914 Differential and Integral Calculus I.** Prerequisite: satisfactory score on the math assessment. Duplicates three hours of MATH 1823 and one hour of MATH 2423. Limits and continuity, differentiation, applications of differentiation to optimization and curve sketching, integration, the fundamental theorem of calculus, the substitution rule, applications of integration to computation of areas and volumes. (F, Sp, Su) [I-M]

**2924 Differential and Integral Calculus II.** Prerequisite: 1914 with a grade of C or better. Duplicates two hours of 2423 and two hours of 2433. The natural logarithmic and exponential functions, indeterminate forms, techniques of integration, improper integrals, parametric curves and polar coordinates, infinite sequences and series, vectors in two and three dimensions. (F, Sp, Su)

**2934 Differential and Integral Calculus III.** Prerequisite: 2924 with grade of C or better. Duplicates one hour of 2433 and three hours of 2443. Vectors and vector functions, functions of several variables, partial differentiation and gradients, multiple integration, line and surface integrals, Green-Stokes-Gauss theorems. (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 or 2924 with a grade of C or better. Not open to students with credit in 1215. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)