REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN CIVIL ENGINEERING/MASTER OF SCIENCE

Accredited by ABET, Inc., (formerly the Accrediting Board for Engineering and Technology)

COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education
Summer 2009 through Spring 2010

GENERAL REQUIREMENTS

Total Credit Hours . . . . . **150-156•**

Minimum Retention/Graduation Grade Point Averages:

Overall - Combined and OU **3.00**

Major - Combined and OU **3.00**

Curriculum - Combined and OU **3.00**

A minimum grade of C is required for each course in the curriculum.

Civil Engineering
F190
Bachelor of Science in Civil Engineering
Master of Science

OU encourages students to complete at least 30-32 hours of applicable coursework each year to have the opportunity to graduate in five 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)	
	HIST 1483, U.S., 1492-1865, **or**	3		
	1493, U.S., 1865-Present (Core IV)		**CHEM 1415**, General Chemistry	5
	MATH 1823, Calculus & Analytic Geometry I (Core I)	3	**MATH 2423**, Calculus & Analytic Geometry II	3
	***CEES 1112**, Intro. to Civil Engr. & Envir. Science	2	**PHYS 2514**, General Physics for Engineering & Science Majors (Core II)	4
	ENGR 1410, Freshman Engineering Orientation I	0		
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
SOPHOMORE	**MATH 2433**, Calculus & Analytic Geometry III	3	**MATH 2443**, Calculus & Analytic Geometry IV	3
	PHYS 2524, General Physics for Engineering & Science Majors	4	**MATH 3113**, Introduction to Ordinary Differential Equations	3
	§CEES 1000, CEES Seminar	0	**§CEES 1000**, CEES Seminar	0
	CEES 1213, Computing Applications in CEES	3	**CEES 2153**, Mechanics of Materials	3
	CEES 2113, Statics & Dynamics	3	**CEES 2223**, Fluid Mechanics	3
	CEES 2313, Water Quality Fundamentals	3	**CEES 3403**, Materials	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
JUNIOR	**ENGL 3153**, Technical Writing	3	**§CEES 1000**, CEES Seminar	0
	§CEES 1000, CEES Seminar	0	**CEES 3243**, Water & Wastewater Treatment Design	3
	CEES 3213, Water Resources Engineering	3	**CEES 3334**, Measurements in CEES	4
	CEES 3253, Intro. to Continuum Mechanics	3	**CEES 3774**, Structural Design—Concrete and Steel	4
	CEES 3364, Soil Mechanics	4	**ENGR 2002**, Professional Development	2
	CEES 3414, Structural Analysis I	4	✢Professional Elective	3
	TOTAL CREDIT HOURS	**17**	**TOTAL CREDIT HOURS**	**16**
	☆ Admission to the accelerated program is by application and requires a minimum GPA of 3.20.			
SENIOR	**§CEES 1000**, CEES Seminar	0	**ANTH 4623**, Approaches to Cross-Cultural Human Problems or approved substitute (Core IV, Non-Western Civ.)	3
	✢Professional Elective	3		
	CEES 3884, Transportation Engineering	4	**P SC 1113**, American Federal Government (Core III)	3
	CEES 4803, Professional Practice	3	**§CEES 1000**, CEES Seminar	0
			CEES 4903, Architectural & Civil Engineering Design (Capstone)	3
	✢Professional Elective	3		
			†Approved Elective: Core III: Social Science	3
	HSCI 2333, Inventing the Modern World (Core IV, West. Civ. & Culture) or approved substitute	3	†Approved Elective, Core IV: Artistic Forms	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
	Students are eligible for graduate status upon graduation with the Bachelor of Science in Civil Engineering.			
FIFTH YEAR	✻**CEES 5980,** Thesis Research**, or** Graduate-level Elective	2-3	✻**CEES 5980,** Thesis Research**, or** Graduate-level Elective	2-3
	CEES Graduate-level Elective	4	**CEES 5020,** Special Topics	2
	CEES Graduate-level Elective	3	**CEES 5021**, Technical Communications	1
	CEES Graduate-level Elective	3	**CEES** Graduate-level Elective	4
			CEES Graduate-level Elective	3
	TOTAL CREDIT HOURS	**12-13**	**TOTAL CREDIT HOURS**	**12-13**

✻Dependent upon whether a student chooses the thesis or non-thesis option. Non-thesis option additionally requires: **CEES Graduate-level Elective** (3 hrs.) and **CEES 5020 Special Topics** (2 hrs.), and **Comprehensive Exam** to be taken in the last semester of study.

☆ **Students may enter the accelerated program based on the undergraduate degree pattern offered in the year they first enrolled in the Oklahoma State System of Higher Education or later.**

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.

✢Chosen from list of professional electives with approval of the faculty adviser–total of 9 hours; three hours must be design oriented. Professional elective list available in CEES Undergraduate Student Handbook.

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

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

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 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) [II-LAB]

1415 General Chemistry (Continued). Prerequisite: 1315 with a minimum grade of C or a satisfactory score on the chemistry placement examination. Topics covered include: nature of solutions, equilibrium, thermodynamics, acid and base properties, kinetics and electrochemistry. **Laboratory** (F, Sp, Su)

COURSES IN CIVIL ENGINEERING AND 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. 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: Mathematics 2423, Physics 2514 or concurrent enrollment. Introduction to a computer-aided engineering and environmental science. Introduction to application software and tools relevant to civil engineering and environmental science such as AutoCAD, Java and spreadsheets. (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. 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, 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)

2313 Water Quality Fundamentals. Prerequisite: Chemistry 1415, Mathematics 2423. Introduction to environmental mass balance and fate processes. Studies of mass and energy transfer, introductory environmental chemistry, water quality parameters, mathematics of growth, statistics and data analysis, introduction to enviromental laws and regulations. (F)

3213 Water Resources Engineering. Prerequisite: 2223 or permission of instructor. Municipal water demands, surface water hydrology, ground water hydrology, water distribution systems, pump design, wastewater collection systems, storm water management, water law. (F)

3243 Water and Wastewater Treatment Design. Prerequisite: 2223 and 2313. Design of municipal water and wastewater treatment plants. Emphasis is placed on the characterization of water and wastewater and physical, chemical and biological treatment methods. Sludge processing advanced treatment methods and treatment plant hydraulics are also considered.(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)

3884 Transportation Engineering. Prerequisite: 2153 and 3334. Introduction to transportation planning, design, construction, operations and maintenance emphasizing the highway/street mode. Includes demand modeling, route location and design, pavements including hot mix asphalt volumetrics and stability, drainage, and traffic control devices. **Laboratory** (F)

4803 Civil Engineering Professional Practice. Prerequisites: senior standing in Architectural, Civil or Environmental Engineering, 3213, 3253, 3364 and 3414. Architectural engineers must also have ENGR 2431 or concurent enrollment. Introduces students to both technical and non-traditional aspects of professional practice. Technical emphases include discipline-specific instructon 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. Environmental engineers and scientists are trained on quality assurance/quality control plans, health and safety plans and sampling and anaylsis plans. All disciplines receive training on non-technical aspects of professional practice including organization, project management, ethics and communications. (F)

4903 Architectural and Civil Engineering Design. Prerequisite: 4803 and senior standing. Solution of major design problems by a team approach of disciplines. Problems to be varied within the areas of architectural (structures; building mechanical and electrical systems; and construction management) and civil engineering (structural; geotechnical; and transportation) according to the student's major interest. The design project will be under direct staff supervision. (Sp)

G5020 Special Topics in Civil Engineering. 1 to 6 hours. Prerequisite: senior or graduate standing and permission of instructor. May be repeated with change of topic; maximum credit 12 hours. Examines subject matter in civil engineering not covered by existing course offerings as a regular course. (F, Sp, Su)

G5021 Technical Communications. Prerequisite: CEES graduate standing or permission of instructor. Focused on enabling students to improve oral and written communications skills. Examines appropriate formats for various technical publications, as well as methods and practices for developing effective oral presentations. Each student will be required to develop an oral presentation about his/her written product. (F)

G5980 Research for Master's Thesis. Variable enrollment, two to nine hours; maximum credit applicable toward degree, four hours. (F, Sp, Su)

COURSES IN ENGINEERING (ENGR)

1410 Freshman Engineering Orientation I. Prerequisite: declared major in engineering. All entering freshmen with a declared engineering major are required to enroll. One hour of this seminar a week is in a large group setting where all students meet and cover details on all engineering disciplines. Additional topics would be continuums of majors, success in the College of Engineering, success at the University of Oklahoma, study abroad programs, advising issues, graduate school opportunities, career planning, and information related to technical/honor societies and participation. A second hour a week is a required small group session with an upper-class mentor from the College of Engineering Dean's Leadership Council. This second hour will focus on basic enrollment and retention strategies such as adding and dropping classes and choosing electives in addition to a weekly topic area. (F)

2002 Professional Development. Prerequisite: sophomore standing. Develop an understanding of engineering ethics, teamwork, leadership, and professional responsibility through the concepts of contemporary, social, and global issues. (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 HISTORY OF SCIENCE (HSCI)

2333 Inventing the Modern World. A survey of the history of technology since 1500. The course emphasizes historical contexts and cultural meanings, not technical details, as it explores the key steps in the construction of our modern technological world. Materials include literature and film as well as non-fiction. (F) [IV-WC]

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: 2423. 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. 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)