## REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ENVIRONMENTAL ENGINEERING

(Accredited by the Accreditation Board for Engineering and Technology)

### COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

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**GENERAL REQUIREMENTS**

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>Minimum Retention/Graduation Grade Point Averages:</th>
<th>A minimum grade of C is required for each course in the curriculum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>126*</td>
<td>Overall - Combined and OU: 2.00</td>
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<tr>
<td></td>
<td>Major - Combined and OU: 2.00</td>
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<tr>
<td></td>
<td>Curriculum - Combined and OU: 2.00</td>
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</tbody>
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**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)** | 3
| **HIST 1483, U.S., 1492-1865, or 1493, U.S., 1865-Present (Core IV)** | 3 | **CHEM 1415, General Chemistry** | 5
| **MATH 1823, Calculus & Analytic Geometry I (Core I)** | 3 | **MATH 2423, Calculus & Analytic Geometry II (Core I)** | 3
| *CEES 1112, Intro. to Civil Engr. & Envir. Science** | 2 | **PHYS 2514, General Physics for Engr. & Science (Core II)** | 4
| **ENGR 1410, Freshman Engineering Orientation I** | 0 | **ENGR 1420, Freshman Engineering Orientation II** | 0

**TOTAL CREDIT HOURS:** 15

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**SOPHOMORE**

| **MATH 2433, Calculus & Analytic Geometry III** | 3 | **MATH 2443, Calculus & Analytic Geometry IV** | 3
| **PHYS 2524, General Physics for Engr. & Science** | 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, Intro. to Mass Balance & Fate Process** | 3 | **CEES 2323, Environmental Transport and Fate Process** | 3

**TOTAL CREDIT HOURS:** 15

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**JUNIOR**

| **CEES 3213, Water Resources Engineering** | 3 | **CEES 3243, Water & Wastewater Treatment Design** | 3
| **CHEM 3053, Organic Chemistry** | 3 | **CEES 3334, Measurements in CEES** | 4
| **CHEM 3423, Physical Chemistry I** | 3 | **CHEES 1000, CEES Seminar** | 0
| **ENGL 3153, Technical Writing** | 3 | **CEES 1000, CEES Seminar** | 3
| *CEES 1000, CEES Seminar** | 0 | **CEES 3243, Water & Wastewater Treatment Design** | 3
| **CEES 3364, Soil Mechanics** | 4 | **CEES 3334, Measurements in CEES** | 4

**TOTAL CREDIT HOURS:** 16

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**SENIOR**

| *CEES 1000, CEES Seminar** | 0 | **ANTH 4623, Approaches to Cross-Cultural Human Problems** | 3
| **CEES 4114, Aquatic Chemistry** | 4 | **PSC 1113, American Federal Government (Core III)** | 3
| **CEES 4234, Applied Environmental Microbiology** | 4 | **CEES 1000, CEES Seminar** | 0
| **CEES 4263, Hazardous and Solid Waste Management** | 3 | **CEES 4923, Environmental Engineering Design (Capstone)** | 3
| **CEES 4813, Professional Practice** | 3 | **CEES 1000, CEES Seminar** | 0
| **HSCI 2333, Inventing the Modern World, or approved substitute (Core IV, West. Civ. & Culture)** | 3 | **CEES 4923, Environmental Engineering Design (Capstone)** | 3

**TOTAL CREDIT HOURS:** 17

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**NOTE:** Engineering transfer students may take ENGR 3410 in place of ENGR 1410 and ENGR 1420.

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.

1. 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.

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

• 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.

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

$Chosen from list of professional electives with approval of the faculty adviser. List and elective form are available in CEES Undergraduate Student Handbook.

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**For Students Entering the Oklahoma State System for Higher Education**

**Summer 2007 through Spring 2008**

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**Environmental Engineering 0922B**

Bachelor of Science in Environmental Engineering
COURSES IN CHEMISTRY AND BIOCHEMISTRY (CHM)

1315 General Chemistry. Prerequisite: Mathematics 1503 or 1543, or math ACT equal to or greater than 24, or math SAT equal to or greater than 500. Vector representations of force and moments; general three-dimensional theorems of statics and dynamics; centroids 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 motion. Newton's law of motion and LaGrange's equation, including application to lumped-parameter systems. Analyses of trusses, frames and machines. (F, Sp, S)

2133 Statics and Dynamics. Prerequisites: Physics 2514 and Mathematics 2433 or concurrent enrollment. Vector representations of force and moments; general three-dimensional theorems of statics and dynamics; centroids 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 motion. Newton's law of motion and LaGrange's equation, including application to lumped-parameter systems. Analyses of trusses, frames and machines. (F, Sp, S)

COURSES IN CIVIL ENGINEERING AND ENVIRONMENTAL SCIENCE (CEES)

1000 CEES 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 computer 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, Sp, S)

2133 Statics and Dynamics. Prerequisites: Physics 2514 and Mathematics 2433 or concurrent enrollment. Vector representations of force and moments; general three-dimensional theorems of statics and dynamics; centroids 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 motion. Newton's law of motion and LaGrange's equation, including application to lumped-parameter systems. Analyses of trusses, frames and machines. (F, Sp, S)

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, kinematics, relations, reviews of conservation equations and boundary conditions, and solution 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 modulus, 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, Euler equations, Bernoulli relations, etc., and their application. Examples of ideal fluid flow and viscous fluid flow, such as flow in open and closed conduits. (Sp)

2313 Introduction to Mass Balance and Fate Processes. Prerequisite: Chemistry 1415, Mathematics 2433, and corequisite Environmental Engineering 2423. Studies of mass and energy transfer, introductory environmental chemistry, water quality parameters, mathematics of growth, statistics and data analysis, introduction to environmental laws and regulations. (F)

2323 Environmental Transport and Fate Process. Prerequisite: 2313. Physicochemical and biological processes controlling contaminant distribution and fate; hydrodynamic processes controlling contaminant transport; sources, prevention and remediation of environmental pollutants. (Sp)

2323 Environmental Transport and Fate Process. Prerequisite: Chemistry 1415, Mathematics 2433, and corequisite Environmental Engineering 2423. Studies of mass and energy transfer, introductory environmental chemistry, water quality parameters, mathematics of growth, statistics and data analysis, introduction to environmental 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 surface water and drinking water, wastewater and effluent treatment processes. Studies of mass and energy transfer, introductory environmental chemistry, water quality parameters, mathematics of growth, statistics and data analysis, introduction to environmental laws and regulations. (F)

3324 Environmental Engineering 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)

3330 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)

4114 Aquatic Chemistry (Slashlisted with 5114). Prerequisite: Senior standing and one year of general biology or one year of general chemistry and biology. 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)

COURSES IN ENVIRONMENTAL SCIENCE (ENV)

2155 Introduction to the Nature and Role of Environmental Science. Prerequisite: 1100. Exploration of the diversity and importance of organisms involved in solid and liquid waste reduction. The course examines basic microbiology, biodegradation mechanisms, bioavailability, biore treatability studies, groundwater remediation (both oxic and anoxic), and bioengineering process technologies. No student may earn credit for both 2155 and 2153. (F)

G4263 Hazardous and Solid Waste Management. Prerequisite: 3213. Sources and types of solid wastes; identification and classification of hazardous wastes; waste handling, transportation, treatment and disposal techniques, federal and state legislation; and environmental and health effects. (Sp)

4813 Environmental Science and Environmental Engineering Professional Practice. Prerequisite: senior standing in environmental science or environmental engineering, 4630 or Civil Engineering 3213, and Civil Engineering 3334. Nature of profession, duties and administrative responsibilities. Organization and management of operating divisions with emphasis on role of environmental professional. Functional approach to planning and implementing public works needs with emphasis on role of environmental professional. (F)

4923 Environmental Engineering Design. Prerequisite: Civil Engineering 4803 and senior standing. Solution of major design problems by a team approach of disciplines. Problems to be varied within the area of environmental engineering (water resources; water and wastewater treatment; environmental remediation; hazardous and solid waste design) according to the student's major interest. The design project will be under direct staff supervision. (Sp)