REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE

COLLEGE OF ENGINEERING

THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education
Summer 2010 through Spring 2011

GENERAL REQUIREMENTS

Total Credit Hours . . . . . **122•**
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.

Environmental Science

B405

Bachelor of Science in Environmental Science

OU encourages students to complete at least 31 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	**BIOL 1134,** Intro. Biology: Evolution, Ecology & Diversity, **or**	4
	CHEM 1315, General Chemistry (Core II)	5	**BOT 1114**, General Botany, **or**	
	MATH 1823, Calculus & Analytic Geometry I (Core I)	3	**ZOO 1114,** Introductory Zoology	
	HIST 1483, U.S., 1492-1865, **or**	3		
	1493, U.S., 1865-Present (Core IV)		**ENGL 1213**, Prin. of English Composition (Core I), **or**	3
	***CEES 1112**, Intro. to Civil Engr. & Envir. Science	2	**EXPO 1213**, Expository Writing (Core I)	
	ENGR 1410, Freshman Engineering Orientation I	0		
			CHEM 1415, General Chemistry	5
			MATH 2423, Calculus & Analytic Geometry II (Core I)	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
SOPHOMORE			**CHEM 3153**, Organic Chemistry	3
	CHEM 3053, Organic Chemistry	3	**MBIO 2815**, Introduction to Microbiology	5
	PHYS 2514, Gen. Physics for Engineering & Science, **or**	4	**PHYS 2524**, General Physics for Engineering & Science, **or**	4
	2414, Gen. Physics for Life Sciences		**2424,** General Physics for Life Sciences	
	CEES 2313, Water Quality Fundamentals	3	**CEES 2323**, Environmental Transport and Fate Process	3
	§CEES 1000, CEES Seminar	0	**§CEES 1000**, CEES Seminar	0
	CEES 1213, Computing Applications in CEES	3		
	†Approved Elective: Artistic Forms (Core IV)	3		
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
JUNIOR	**ZOO 3403**, Principles of Ecology, **or**	3	**ANTH 4623,** Approaches to Cross-Cultural Human Problems	3
	BOT 3453, Principles of Plant Ecology		or approved substitute (Core IV, Non-Western Civ.)	
	ENGL 3153, Technical Writing	3	**GEOG 4293**, Hydrologic Science	3
	CEES Professional Elective	3	**P SC 1113**, American Federal Government (Core III)	3
	HSCI 2333, Inventing the Modern World or approved substitute (Core IV, West. Civ. & Culture)	3	**CEES** Track Elective	3
	§CEES 1000, CEES Seminar	0	**CEES 3334**, Measurements in CEES	4
	‡**CEES** Elective	3	**§CEES 1000**, CEES Seminar	0
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**16**
SENIOR			**CEES 4913**, Environmental Science Capstone (Capstone)	3
	CEES 4114, Aquatic Chemistry	4		
	CEES 4324, Environmental Biology & Ecology	4	**CEES** Track Elective	3
	CEES 4263, Hazardous & Solid Waste Management, **or**	3	**CEES** Track Elective	3
	CEES 4863, Environmental Assessment Methodologies			
			CEES Professional Elective	3
	§CEES 1000, CEES Seminar	0		
	CEES 4813, Professional Practice	3	†Approved Elective: Social Science (Core III)	3
			§CEES 1000, CEES Seminar	0
	TOTAL CREDIT HOURS	**14**	**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 should read the College of Engineering Scholastic Regulations which are posted on the WSSC Bulletin Board across from FH 112.

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.

‡ The Environmental Science electives will be selected from Civil Engineering and Environmental Science courses with the approval of the adviser.

*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

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 BIOLOGY (BIOL)

1134 Introductory Biology: Evolution, Ecology and Diversity. Prerequisite: Life science majors only. Major biological principles and concepts as illustrated in a survey of the diversity, behavior, and ecological functions of animals, plants, fungi, and microbes. Emphasis is on evolution, ecology, and diversity. Will include biological laboratory experience with emphasis on problem solving. Problems will be derived from topics in evolution, ecology, and diversity. Will include training in scientific procedures, including laboratory technical skills, writing skills, and introduction to statistical analysis. Recitation will include discussion and case study analysis of the major biological principles presented in the lecture within the context of health and the environment. Will involve problem sets, primary journal articles, and writing assignments. Includes both online and classroom activities. **Laboratory** (Sp)

COURSES IN BOTANY (BOT)

1114 General Botany. Previous course in chemistry (high school or college) recommended. Fulfills Arts and Sciences' biological science requirement. Basic processes and structures in plants; their relation to factors in the environment; reproduction; heredity, heritable and nonheritable variations in plants and their causes and consequences are studied. Scientific procedures are acquired through application and discussion. **Laboratory** (F, Sp, Su) [II-LAB]

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)

3053 Organic Chemistry. Prerequisite: 1415 or 1425. Two-semester sequence (3053 and 3153) covering the fundamental concepts of organic structure and reactions of the principal functional groups. Reaction mechanisms. (F, Sp, Su)

3153 Organic Chemistry. Prerequisite: 3053 with a grade of "C" or better. Two-semester sequence (3053 and 3153) covering the fundamental concepts of organic structure and reactions of the principal functional groups. Reaction mechanisms. (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)

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)

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

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)

4114 Aquatic Chemistry (Slashlisted with 5114). Prerequisite: Senior standing and one year of general chemistry. Environmental kinetics and thermodynamics in aquatic systems; acid/base, precipitation/solubility, metal complexation and oxidation/reduction reactions; environmental colloidal and solid-liquid interface chemistry. No student may earn credit for both 4114 and 5114 or Environmental Science 4114 and 5114. **Laboratory** (F)

G4263 Hazardous and Solid Waste Management. Prerequisite: 2323 or 3213 or permission of instructor. 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. (F)

4324 Environmental Biology and Ecology (Slashlisted with 5324). Prerequisite: 3334. Examines applied environmental biology; biological consequences of environmental impacts; mitigation of environmental impacts via biogeochemical, ecological and microbial processes. No student may earn credit for both 4324 and 5324. **Laboratory** (F)

4813 Environmental Science and Environmental Engineering Professional Practice. Prerequisite: senior standing in environmental science or environmental engineering. 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)

4863 Environmental Assessment Methodologies (Slashlisted with 5863; Crosslisted with Regional and City Planning 4863). Prerequisite: senior standing in CEES or permission of instructor. Develop knowledge of various environmental assessment methodologies or "tools", including assessments of socio-economic, physical/chemical and biological impacts at the pre-project, operational and post-project phases on human and non-human components of the environment. No student may earn credit for both 4863 and 5863. (Sp)

4913 Environmental Science Capstone. Prerequisite: 2323 or 3213; 3334 and 4813. Solution of major environmental problems by a team approach of disciplines. Problems to be varied within the area of environmental science according to the student's major interest. The capstone project will be under direct faculty supervision. (Sp) [V]

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)

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 GEOGRAPHY (GEOG)

4293 Hydrologic Science (Slashlisted with 5293). Prerequisite: Math 1823 and either Physics 2414, 2514 or Chemistry 1315. Study of the processes which control the storage and movement of water at global, regional, and local scales. The emphasis is on the land portion of the hydrologic cycle, and includes the study of processes such as infiltration, soil water flow in the saturated and unsaturated zone, rainfall/runoff and evaporation. Lab sections include exercises on a computer in the field and in a soils lab. No student may earn credit for both 4293 and 5293. (Sp)

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]

COURSES IN MICROBIOLOGY (MBIO)

2815 Introduction to Microbiology. Prerequisite: one course in college chemistry. Introduction to microorganisms as biological entities. Survey of the roles of microorganisms in the ecosystem. Application of microorganisms to industrial and environmental problems. Discussion of microorganisms as causes of human disease and response of hosts to microbial invasion. This course does not count for major credit in Microbiology or Botany. **Laboratory** (F, Sp, Su) [II-LAB]

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)

COURSES IN ZOOLOGY (ZOO)

1114 Introductory Zoology. Major biological principles and concepts as illustrated in the structure, function and evolution of animals. Emphasis is on self-regulatory mechanisms, especially in the vertebrates, and their adaptive significance. (F, Sp, Su) [II-NL]

†G3403 Principles of Ecology. Prerequisite: eight hours of zoology or permission of instructor. Patterns of environments and biological communities; the processes maintaining these patterns. **Laboratory** (F, Sp)