



college of engineering  
school of civil engineering and  
environmental science

# School of Civil Engineering and Environmental Science

## Undergraduate Guide for Environmental Science Students

Summer 2007

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## **MISSION STATEMENT**

The mission of the School of Civil Engineering and Environmental Science is to provide a high-quality educational experience for undergraduate and graduate students in the areas of architectural, environmental, geotechnical, structural, and transportation engineering and environmental science. The educational experience is accomplished through innovative classroom instruction aided by computer and multimedia-based instruction, laboratory experiences and student mentoring. The products of this experience are engineers and scientists capable of critical thinking, devoted to a lifetime of learning, and highly sought after by employers.

**Program Educational Objective 1:** CEES alumni will have embarked on successful careers in areas associated with the development, implementation, and management of architectural, civil, or environmental engineering systems.

*Program Outcome 1.1:* graduating seniors will be technically competent in core areas within architectural, civil, or environmental engineering and related sciences and mathematics

*Program Outcome 1.2:* graduating seniors will be able to work within a team and communicate effectively

*Program Outcome 1.3:* graduating seniors will be able to synthesize diverse information to develop creative and ethically sound design solutions

**Program Educational Objective 2:** CEES alumni will advance in their careers and continue their professional development through continuing education and lifelong learning.

*Program Outcome 2.1:* graduating seniors will be able to function in an evolving engineering practice

*Program Outcome 2.2:* graduating seniors will understand the importance of continuing education, professional registration, and ethical responsibilities

*Program Outcome 2.3:* graduating seniors will be able to work within a team, develop project management skills and communicate effectively

## **1.0 ENVIRONMENTAL SCIENCE**

What is an environmental scientist? What kinds jobs can I get with this degree? Where will I work? What will I actually be doing? These are the questions often asked by students entering the Bachelor of Science in Environmental Science (B.S.E.S) degree program

The B.S.E.S. at the University of Oklahoma is a broad-based degree program, with a firm foundation in mathematics, physics, chemistry, and biology. This strong base enables graduates to continue their studies in graduate school or to go on to exciting careers in environmental protection, management and remediation. Possible areas of

focus include solid and hazardous waste management, air and water quality management, hazardous materials management, resource management, and occupational health and safety. For over 30 years, the School of Civil Engineering and Environmental Science (School of CEES) has been preparing recipients of the B.S.E.S. degree for employment opportunities in local, state, and federal government, private industry, consulting firms, and education. Graduates of the program are currently employed by the United States Environmental Protection Agency, the Oklahoma Department of Environmental Quality, the Oklahoma State Department of Health, engineering and consulting firms, and the University of Oklahoma. Highly qualified undergraduate students may continue their environmental science education at the University of Oklahoma in the accelerated BS/MS degree program in Environmental Science. With careful choice of elective courses, the B.S.E.S. can meet the requirements for an approved pre-medical program. Students who plan to apply to medical school should contact their E.S. advisor and the Pre-Medical Professions Advising Office early in the degree program.

The day-to-day activities of the environmental scientist will vary with employer, specific job duties, educational background, and geographical location. Graduates may find themselves collecting and analyzing air, water, or soil samples, conducting compliance investigations, assisting companies in writing discharge permits, or addressing public meetings on local environmental problems.

Some of the environmental issues currently addressed by environmental scientists are:

- intrinsic remediation of contaminated soils and sediments
- release of antibiotics and pharmaceuticals into watersheds
- treatment wetlands for water quality improvement
- development of clean drinking water supplies
- National Pollution Discharge Elimination System (NPDES) and National Emissions Standards for Hazardous Air Pollutants (NESHAPS) permits
- solid and hazardous waste disposal requirements and hazardous waste site remediation
- risk assessment to determine cleanup levels
- recycling of industrial byproducts

The strong technical foundation of the B.S.E.S. degree will enable graduates to effectively identify and find solutions for the environmental problems of the 21st century.

## **2.0 ACADEMIC PROGRAM PLANNING**

When you enroll in the School of CEES, we will appoint a faculty member to serve as your advisor. If you have a question regarding a specialty area within the School of CEES, you are encouraged to discuss the matter with a faculty member in that discipline. You should assume the primary responsibility for planning a coherent academic program that achieves your educational objectives and satisfies the requirements for graduation.

Students graduating from the School of CEES must meet a number of criteria. The

requirements for the Bachelor of Science in Environmental Science (121 hours) are located at the back of this booklet. In order to graduate, you must successfully complete 121 semester hours (plus language requirement if applicable), with a minimum retention grade point average of 2.00 in: all University of Oklahoma courses; all courses taken anywhere; all major (at OU & combined) courses; and all courses required for the bachelor of science degree. In addition, you must have a minimum C grade in every required and elective course taken for your degree.

You must be admitted to the College of Engineering in order to enroll in all Civil Engineering and Environmental Science courses numbered 3XXX or greater, as well as in English 3153 (Technical Writing). For College of Engineering admission requirements, refer to "Policy on Admission of Undergraduate Students" in the current OU General Catalog.

It is your responsibility as a student to follow the course requirements for graduation, but your advisor will help you based on his/her knowledge at the time of each advising conference. Advisors can assist you in optimizing your learning experiences at OU. **Failure to follow the advisor's recommendations can prolong the time required to earn a degree and result in probation and suspension.** Your advisor has the authority to withhold his/her approval if your selection of courses is inappropriate or unwise. Remember that both course and grade prerequisites are necessary for every course.

## **2.1 Accelerated BS/MS Environmental Science Degree**

The School of CEES offers an accelerated BS/MS Environmental Science degree program. To be accepted into the program, students must apply to the program two semesters prior to graduation, and have a GPA of 3.2 or better in the B.S.E.S. curriculum at the time of application. This option is not available to students transferring in beyond junior standing in Environmental Science, or available retroactively to students already admitted to the graduate program. Students will have to meet requirements for admission to Graduate College. If a student is admitted to the program, two technical electives taken in the senior year, selected from CEES offerings of 5000-level courses with advisor's approval, will be applied to the Master's degree. These courses, in which a grade of B or better must be earned, must be taken after admission to the Accelerated program. See your advisor for additional requirements.

## **2.2 Minor in Environmental Science**

The School of CEES offers a Minor in Environmental Science. We believe that students in the scientific disciplines can benefit from gaining basic knowledge of environmental science. Earning a minor in ES will allow these students to round out their academic strengths and will create scientists and professionals who will be able to practice in their primary disciplines while participating in environmental science problem solving.

The Minor in Environmental Science is available to students in good academic standing in the following majors:

Bachelor of Science in Engineering (all majors except Environmental Engineering)

Bachelor of Architecture  
Bachelor of Science in Construction Science  
Bachelor of Science in Astronomy, Astrophysics, Biochemistry, Botany, Chemistry, Health and Sport Sciences, Mathematics, Microbiology, Physics, Psychology, Zoology  
Bachelor of Science in Education (Mathematics, Science)  
Bachelor of Science in Geography, Geology, Geophysics, Geosciences, Meteorology  
Other majors on a case-by-case basis

Students must have completed the following courses satisfactorily prior to application:

Math 1823 and 2423  
Chemistry 1315 and 1415  
Zoology 1114, or Botany 1114  
Physics 2514, or Physics 2414

The following courses must be completed satisfactorily, for a total of 15 – 16 hours of CEES coursework:

CEES 2313 Introduction to Mass Balance and Fate Processes  
CEES 2323 Environmental Transport and Fate Processes  
CEES 4603 Environmental Protection or equivalent as approved by faculty

One from the following list (may require additional pre-requisites)

CEES 4114 Aquatic Chemistry  
CEES 4324 Environmental Biology and Ecology  
CEES 4493 Environmental Evaluation and Management  
CEES 4863 Environmental Assessment  
One CEES Elective, 3XX3 or 4XX3

### **2.3 Williams Student Services Center**

The Williams Student Services Center, Felgar Hall, Room 112, assists students with the following matters:

- retention
- transfer equivalencies (for lower division courses)
- repeat/forgiveness policy
- general education questions
- appropriate curriculum
- petitions to add/drop
- suspension petitions
- complete withdrawal
- A/DA corrections/updates
- graduation verification
- general OU policy information
- general assistance if you don't know where to go

## **2.4 Transfer Students**

Students transferring into the ES program may notice that the A/DA (advising/degree audit, a computerized form from Williams) has placed courses into a category at the end called "excess coursework." It is very likely that some of this coursework can be applied towards your degree. You will need to meet individually with your advisor to discuss approval of transfer coursework. Please note that any changes must be approved by the advisor on the blue sheet. You will need to fill out an A/DA Correction Form (green sheet) so that the Williams Student Services Center can make these corrections. Please be patient, since it takes time for these changes to appear on the A/DA.

## **2.5 Graduating Seniors**

Graduating seniors should visit the Williams Student Services Center for TWO (2) graduation checks: one in the semester BEFORE you plan to graduate; and one EARLY in the semester you plan to graduate. In addition, you must schedule and attend an exit interview with the Director of the School of CEES, towards the end of your last semester.

## **3.0 STUDENT ADVISING AND ADVANCE REGISTRATION**

If you have been admitted to the College of Engineering, meet current retention standards, and have no unpaid fines, overdue books or parking tickets you can participate in advance registration. Advance registration for fall and summer is held during the preceding spring semester, and advance registration for the spring semester is held during the preceding fall semester. With a few exceptions, advance registration is conducted according to classification and in varying alphabetical order of students' last names.

Prior to the advance registration period, CEES holds group advising sessions for all CEES undergraduate students. Group advising periods are scheduled each semester. Students should check their e-mail, the bulletin boards in the Carson Engineering Center or inquire in CEC 334 for the group advising schedule. Students who do not attend one of the group advising periods forfeit their opportunity to register during the advanced registration period and will only be advised at the start of the subsequent semester.

Please follow these steps to register:

1. Attend a **group advising session**. After attending a group advising session, special problems or circumstances may necessitate your scheduling an appointment with your faculty advisor. **All CEES students are assigned an individual faculty advisor who can answer questions between group advising sessions.** Please feel free to contact your faculty advisor for an appointment.
2. Prior to attending group advising log on to Degree Navigator at [degree.ou.edu](http://degree.ou.edu) and select proposed courses for the upcoming semester using the "search" feature.

3. Prepare a trial schedule on enroll.ou.edu to ensure that there are no scheduling conflicts or special permissions required for chosen classes.
4. If you need special permission for a CEES class, you must complete a special permission slip and obtain the signature of the instructor. Submit the slip to a CEES staff member who will then enter the permission. You must obtain special permission for English 3153 from the English Dept.
5. Return the signed advising verification form to the Williams Student Services Center. A staff member in WSSC will remove the advising stop on your account and you will be free to register via the Sooner Information Network when your enrollment window opens.

Before enrolling in any course, you should determine that you satisfy the course prerequisites. The CEES curriculum flow charts are located at the back of this guide and the *General Catalog* is available on-line at enroll@ou.edu. Any request to waive a prerequisite must be approved by the instructor of the class. You will be administratively removed from any course taken without prior approval. Remember that a minimum "C" grade is needed in all courses and is a part of the prerequisite.

All students must take CEES 4913 (Environmental Science Capstone). This course is offered only in the spring semester and must be taken by students scheduled to graduate that spring semester or the subsequent summer or fall semesters. Students planning to graduate in the summer or fall semesters must have completed 90 credit hours of the Environmental Science curricula prior to enrolling in their capstone course.

#### **4.0 ENVIRONMENTAL SCIENCE AND TRACK ELECTIVES**

The Bachelor of Science in Environmental Science degree requires two environmental science electives and three track electives. Environmental science electives include any course in CEES numbered 3000 or higher. Suggested environmental science electives are listed in Table 1.

**Table 1. Suggested Environmental Science Electives.**

CEES 4263	Hazardous Waste Management and Toxicology
CEES 4473	Soil Science
CEES 4980	Senior Research
CEES 5032/5041	Radioisotope Techniques
CEES 5253	Environmental Administration / Law
CEES 5913	Risk Assessment
CEES 5943	Air Quality Management
CEES 6210	ES Special Topics (requires special permission and 3.0 gpa)
CEES 5600	Environmental Quality Management Field Training
CEES 5633	Urban Environmental Systems
CEES 5803	Solid Wastes Systems Planning
CEES 5833	Ground Water Quality Protection
CEES 5873	Wetland Science and Management
CEES 5923	Air Pollution Control/Engineering
CEES 5020	Ecological Engineering Science
CEES 5020	Environmental Organic Chemistry
CEES 5020	Environmental Instrumental Analysis

Because of university regulations and CEES policy, certain restrictions apply in selecting environmental science electives. Courses at the 6000-level may only be taken by undergraduates under special conditions (appropriate grade point average and special permission). Undergraduate students at the senior level may take 5000-level courses with permission. Be sure to get a pink slip, have the professor teaching the class sign it, and return it to CEC 334.

Prior to enrolling in any track elective course, environmental science students must select a degree track from among the following four options: biology, chemistry, math/physical sciences, and policy. Choice of an environmental science degree track should be made after careful consideration of a student's interests and career plans and in detailed consultation with the student's advisor. Upon choosing a degree track, a student may choose to change their advisor to a faculty member who can best advise them on course selection for their chosen path.

Prior to enrolling in their first track elective course, students must, in consultation with their advisor, plan the three track elective courses that they will take. Track electives must be chosen from the courses listed under the selected degree track in Table 2, or, with approval of their advisor, from relevant classes offered in other departments at the University of Oklahoma. Students may change their planned track electives with the permission of their advisor. In planning their degree program, students should be aware that many track electives listed in Table 2 have prerequisite courses, and that many are offered only in certain semesters. Thus, advance planning, typically no later than the end of the sophomore year, is needed to ensure that students will be able to complete their degree in a timely manner. It is not necessary to complete the environmental science and track elective courses during the semesters listed on the flow charts and program requirement course list shown at the back of this handbook—students may

want to change this sequence of elective courses depending on the semesters in which their chosen classes are offered.

**Table 2. Track Electives for Bachelor of Science in Environmental Science Curriculum.**

<b>Biology Track Electives</b>	<b>Chemistry Track Electives</b>	<b>Math/Physical Sciences Track Electives</b>	<b>Policy Track Electives</b>
BOT/ZOO 3333/3342	CHEM 3153/3152	MATH 2433	PSC 4213
BOT 3453/3451	CHEM 3214	MATH 2443	ECON 3113
BOT 4115	CHEM 3423/3421	MATH 3113	ECON 4373
	CHEM 3523/3521		
BOT/MBIO 3113	CHEM 3653	MATH 3413	ECON 4853
BOT/MBIO 3932	CHEM 3753	MATH 4033	ECON 4873
BOT/MBIO 4803	CHEM 4023/4033	MATH 4073	RCPL 4003
BOT/MBIO/ZOO 4843	CHEM 4333	MATH 4783	PHIL 3293
MBIO 4853	CHEM 4503	MATH 4793	COMM 3483
ZOO 3013	CHEM 4753	GEOL 3114	COMM 3513
ZOO 3104		GEOL 3123	COMM 4513
ZOO 4462/4472		GEOL 3633	GEOG 3563
ZOO 4913		GEOL 4633	
ZOO 4970/5970			

## 5.0 REQUIRED SOCIAL SCIENCE AND HUMANITIES COURSES

The University of Oklahoma General Education Requirements mandate that students take two courses (6 credits) in social science (Core Area III) and four courses (12 credits) in humanities (Core Area IV). The humanities requirement consists of one course (3 credits) in understanding artistic forms, two courses (6 credits) in western civilization and culture, and one course (3 credits) in non-western culture. Furthermore, according to the State Regents' ruling, one of the social science courses must be Political Science 1113 (Government of the United States), and the western civilization and culture courses must include either History 1483 (United States, 1492-1865) or History 1493 (United States, 1865 - present). The four courses (12 credits) that are taken to meet the remaining requirements must have been approved by the University of Oklahoma, and are listed in the class schedule book each semester. In addition, it is a College of Engineering requirement that at least 3 of these 12 hours be upper division courses (3000- or 4000-level). It is important that students are aware of the

requirements and meet them as early as possible in their curriculum. Please consult with Williams Student Services Center for more information.

### **5.1 Foreign Language Requirements**

To satisfy the OU General Education Requirements, non-international students must successfully complete two years of the same foreign language in high school or a two-semester sequence of a single language (such as Chinese, French, German, Greek, Hebrew, Italian, Japanese, Latin, Russian, Spanish, Arabic, or Native American Languages) in college.

An international student who graduates from a secondary school in which the language of instruction was not English has satisfied the language requirement through passing the TOEFL exam for admission to OU. An international student who graduates from a secondary school in which the language of instruction was English must meet the foreign language requirement of non-international students. Transcripts documenting foreign language study or an advanced standing exam must be presented for completion of the general education foreign language requirement.

In addition, students who complete an Associate of Arts or Associate of Sciences degree in the Oklahoma state system are considered to have completed all lower division general education requirements, including foreign language (even though they may never have taken any foreign language.)

### **6.0 SCHOLARSHIPS AND FINANCIAL AID**

Several scholarship opportunities are available to environmental science undergraduates, including entering freshman. Scholarships typically are awarded both for potential academic ability and financial need. Scholarships are awarded by the school, alumni, consulting firms, and private industry. In addition to the scholarships offered by the School of CEES, students may qualify for other forms of financial assistance, including tuition waivers, direct student loans, university scholarships, work-study, and coop programs with Oklahoma firms and government agencies. The College of Engineering has several scholarships with yearly stipends of \$500 to \$2500 available for academically gifted or underrepresented students. CEES Scholarship Application forms are available from the CEES office.

The Dean's Office has a number of scholarships that are listed in *A Guide to Scholarships & Financial Aid* available from Prospective Student Services at the University of Oklahoma. There are also scholarships based on ACT or SAT test scores that are available to either incoming freshman or transfer students. For further information regarding general scholarships, call Prospective Student Services.

The Office of Financial Aid, 731 Elm Avenue, Norman, OK 73019-0230, can provide information on the national Direct Student Loan Program, the Guaranteed Loan Program, the University Work-Study Program, and additional programs and opportunities. Whether or not they are eligible for the Work-Study Program, students can obtain assistance in finding part-time jobs on the campus by applying to the Personnel Service Office, 905 Asp Avenue, Norman, OK 73019-0420.

**Scholarship recipients should be aware of the School of CEES Policy on Scholarship Recipient Obligations (dated December 1994). This policy requires written acknowledgements to the sponsor, and participation in the annual scholarship luncheon and professional activities. Scholarship students must obtain and familiarize themselves with the policy.**

## **7.0 STUDENT ACTIVITIES**

Student groups provide an excellent opportunity to supplement classroom education through contact with faculty, practicing environmental scientists, and your fellow students.

### **7.1 Environmental Science Student Association**

The University of Oklahoma Environmental Science Student Association was established in 1992 and is an independent organization of undergraduate and graduate environmental science students, although students from all academic majors are welcome at ESSA functions. Its purpose is to provide fellowship among environmental science students and professors, introduce students to environmental professionals and provide information on career opportunities. ESSA sponsors presentations by OU faculty and graduate students, government agency and nonprofit organization personnel, and consulting scientists and engineers. Employees of several state agencies including the Oklahoma Office of the Secretary of the Environment, Conservation Commission, Department of Environmental Quality and Water Resources Board have spoken about current environmental issues and career opportunities. ESSA organizes field trips to nearby locations (including the USEPA Robert S. Kerr Environmental Laboratory and Wichita Mountains National Wildlife Refuge) and group attendance at professional meetings (i.e., Oklahoma Academy of Sciences, Oklahoma Clean Lakes Association, Air and Waste Management Association, etc.). ESSA is active in several volunteer activities including the Oklahoma City Blue Thumb Water Quality Improvement and Education Program. ESSA sponsors an internship program that matches students with both public and private sector employers for both paid and unpaid internships. For more information, contact the ESSA Faculty Advisor, Dr. Mark Nanny at [nanny@ou.edu](mailto:nanny@ou.edu).

### **7.2 Engineers' Club**

The Engineers' Club fosters the high ideals of the engineering profession, stimulates interest in School and College Activities, and develops professional awareness and leadership qualities. Activities of the Engineers' Club include organization of the OU Engineers' Week activities and Engineering Open House.

### **7.3 Society of Black Engineers (SBE)**

SBE shares many of the same goals and objectives as the Engineers' Club, while directing attention to the problems and needs of black students.

### **7.4 Society of Women Engineers**

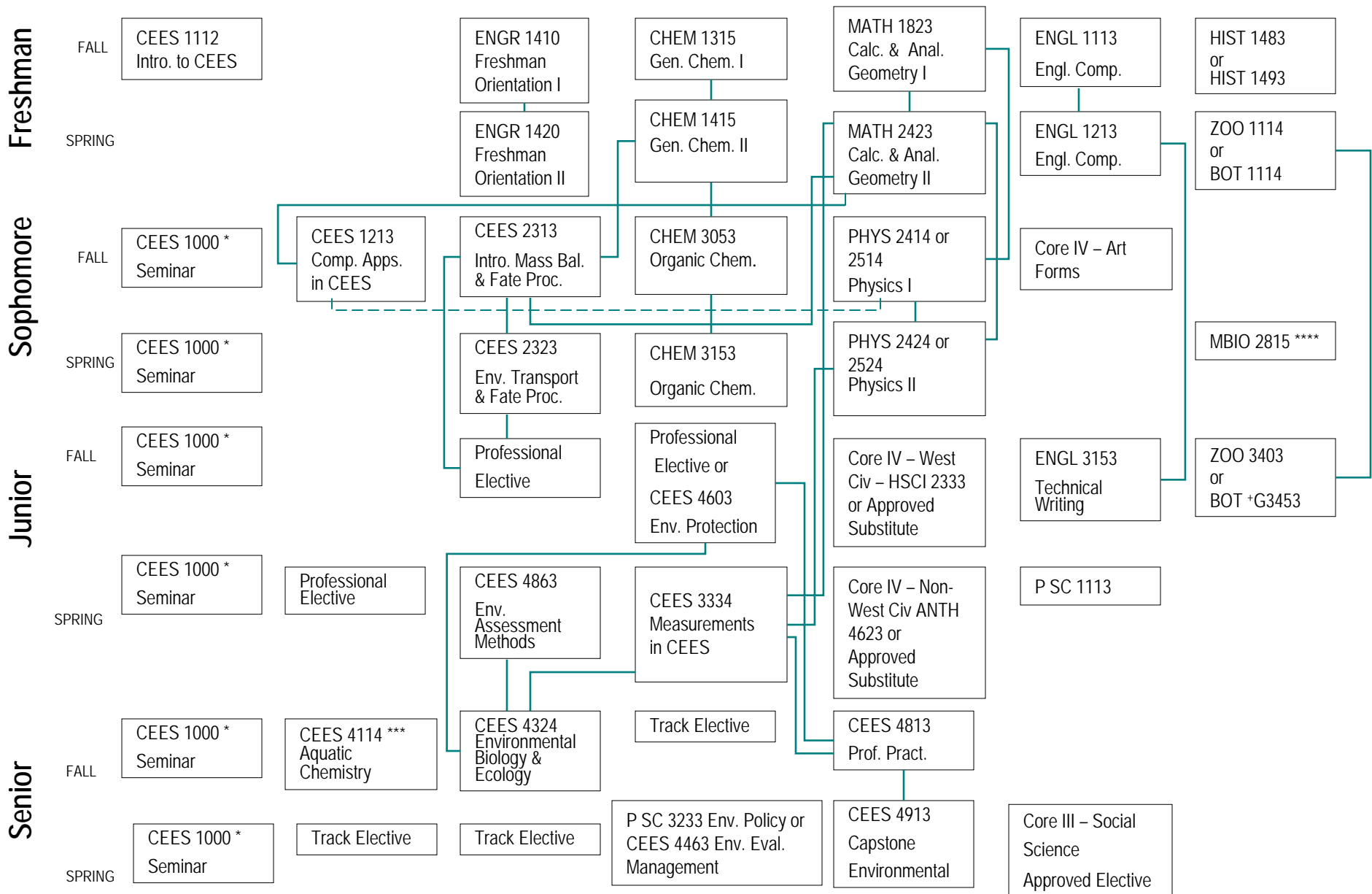
The Society of Women Engineers is a technical society with the objective of encouraging women who have chosen to study engineering. Through speakers, discussions, and field trips, members are able to examine professional issues and

challenges particular to women. Membership is open to both men and women.

### **8.0 ENVIRONMENTAL SCIENCE CURRICULUM**

The following flow chart is provided to help you in planning your coursework, and is not intended to be exhaustive. This information presupposes that you are enrolled in the current curriculum; if necessary, please see the CEES office to receive updates to this curriculum.

# Environmental Science Curriculum



ES electives are CEES courses and typically require relevant core courses as pre-requisites; Track (biology, chemistry, math/physical sciences, policy) electives must be from the approved lists or approved by advisor. \*CEES 1000 – must take 4 of 6 offered. \*\*ENGL 3153 must be taken with either MBIO 2815 or ZOO 3403 or BOT 3453.

\*\*\*CEES 4114 pre-requisite senior standing and one year of General Chemistry. \*\*\*\*MBIO 2815 pre-requisite one year of college chemistry.

— Pre-requisite must be taken first. - - - Co-requisite must be taken as a pre-requisite or in the same semester.

Modified 03-30-07