

OFFICE OF THE FACULTY COUNCIL

THE UNIVERSITY OF TEXAS AT AUSTIN

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September 29, 2015

Judith H. Langlois
Interim Executive Vice President and Provost
The University of Texas at Austin
MAI 201
Campus Mail Code: G1000

Dear Dr. Langlois:

Enclosed for your consideration and action is a proposal to add an Environmental Engineering Degree Program in the Cockrell School of Engineering chapter in the *Undergraduate Catalog, 2016-18* (D 13173-13180). On September 21, 2015, the Faculty Council unanimously approved the legislation. The proposal was classified as being of *general* application and of primary interest more than one college or school. The authority to grant final approval resides with the Texas Higher Education Coordinating Board.

Please let me know if you have questions or if I can provide other information concerning these items of legislation.

Sincerely,

A handwritten signature in black ink, appearing to read "Hillary Hart".

Hillary Hart, Secretary
General Faculty and Faculty Council

HH:dlr

Enclosure

xc: Gregory L. Fenves., president
Carol Longoria, deputy to the president
Janet Dukerich, senior vice provost for faculty affairs

ec (letter only): Sharon L. Wood, dean, Cockrell School of Engineering
Gerald Speitel, associate dean for academic affairs, Cockrell School of Engineering
Deana Sutliff, manager of reporting and analysis, IRRIS
Allen Walser, manager of reporting and analysis, IRRIS
Brenda Schumann, associate registrar
Lydia Cornell, Program Coordinator
Michelle George, administrative manager for faculty affairs, provost's office

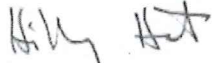
DOCUMENTS OF THE GENERAL FACULTY

**PROPOSAL TO ADD AN ENVIRONMENTAL ENGINEERING DEGREE PROGRAM IN THE
COCKRELL SCHOOL OF ENGINEERING CHAPTER IN THE *UNDERGRADUATE CATALOG*,
2016-2018**

Dean Sharon L. Wood in the Cockrell School of Engineering has filed with the secretary of the Faculty Council the following changes to the *Undergraduate Catalog, 2016-2018*. On January 24, 2014, the Department of Civil, Architectural, and Environmental Engineering approved the proposal. On February 25, 2015, the dean and the faculty in college approved the proposal. The secretary has classified this proposal as legislation of *general* interest to more than one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the new degree program on May 13, 2015, and forwarded the proposal to the Office of the General Faculty. The Faculty Council has the authority to approve this legislation on behalf of the General Faculty. The authority to grant final approval on this legislation resides with Texas Higher Education Coordinating Board.

The Faculty Council will discuss and take action on the proposal at its meeting on September 21, 2015.



Hillary Hart, Secretary
General Faculty and Faculty Council

If yes, please indicate the number of students and/or class seats involved. Fifty students in BIO 311C and CH 204; in GEO 303, since most CE students take this course as a required science elective, the impact will be approximately ten students.

If 4 a, b, c, or d was answered with yes, please answer the following questions. If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted? Fifty students per year: the Cockrell School of Engineering has admission limits for each of its undergraduate degree programs, as well as an overall limit on the total number of undergraduates enrolled. The admission limit for environmental engineering will be fifty students per year, which will be achieved by reducing the civil engineering admission limit by fifty per year, thereby yielding no net change in the total number of undergraduates enrolled in the Cockrell School of Engineering.

These students will take classes in CNS; the chemistry and biology requirements are greater in this curriculum than in the current civil engineering curriculum. The students will also take a geology class, but most CE students take this course as a required science elective, so there will be minimal impact unless the total enrollment in the two degree programs rises.

Impacted schools must be contacted and their response(s) included: College of Natural Sciences

Person communicated with: Sacha Kopp, associate dean

Date of communication: February 14, 2014

Response: Okayed the BIO 311C, CH 204, and CH 328 increases.

Person communicated with: David Vandebout, associate dean

Date of communication: April 15, 2015

Response: Approved the Ch 353 and additional math and physics courses

Impacted schools must be contacted and their response(s) included: Jackson School & Dept of Geology

Person communicated with: Richard Ketcham, Assoc. Dean, and Ron Steel, Chair of Geology

Date of communication: April 30, 2014

Response: Okayed increases in GEO 303 (or 401 for a few students)

- e. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? **NO**. If yes, explain:

If yes, undergraduate studies must be informed of the proposed changes and their response included:

Person communicated with:

Date of communication:

Response:

- f. Will this proposal change the number of hours required for degree completion? If yes, explain:
This is a new degree program, with required credit hours at the minimum of all of the engineering programs at UT Austin

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: January 24, 2014

College approval date: February 25, 2014

Dean approval date: February 25, 2014

PROPOSED NEW CATALOG TEXT:**Bachelor of Science in Environmental Engineering**

Environmental Engineers protect the natural environment and the health of people as influenced by the environment. The field began as a part of civil engineering by providing the water supply for municipalities but has grown to encompass a broad view of the interaction of humans with the environment. The environmental engineer applies principles from all of the natural sciences (physics, chemistry, geology, and biology) to understand the natural environment and to build systems that protect that environment. Areas of environmental engineering include air quality, water quality, water resources, and contaminant process engineering.

The environmental engineering student obtains a broad background in mathematics and all the sciences, along with their application to the several areas of environmental engineering. This flexible curriculum allows the student to elect eighteen semester hours of approved technical coursework to emphasize the areas of environmental engineering of most interest to the student. In addition, courses in the humanities and social sciences are included.

To excel as an environmental engineer, a student should have an aptitude for mathematics and science, an abiding interest in protecting the natural environment and public health, and the motivation to study and prepare for environmental engineering practice. Environmental engineering graduates of the University may seek a wide variety of employment opportunities with private consulting firms, industry, and government agencies at the local, state, and national levels. Those who plan to pursue graduate work in engineering, or in other professions such as business, medicine, law, or journalism, have an excellent base on which to build.

Student Outcomes

Graduates of the environmental engineering program should attain the following outcomes:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design and conduct experiments, as well as to analyze and interpret data
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- An ability to function on multidisciplinary teams
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility
- An ability to communicate effectively
- The broad education necessary to understand what impact engineering solutions have in global, economic, environmental, and societal contexts
- Recognition of the need for and an ability to engage in lifelong learning
- Knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Program Educational Objectives

Graduates of the environmental engineering program should address environmental engineering problems within a greater societal context. They should:

- Act professionally and ethically
- Apply knowledge, strong reasoning, and quantitative skills to design and implement creative and sustainable solutions
- Engage in lifelong learning to meet the challenges facing the profession
- Exhibit strong communication, interpersonal, and resource-management skills as leaders in the environmental engineering profession

Portable Computing Devices

- Students entering Environmental Engineering are required to have a laptop at their disposal. Laptops do not need to be brought to campus on a daily basis, but individual courses may require that a laptop be brought to class or laboratory sessions. For a list of minimum system requirements see: www.caee.utexas.edu/students/itss.

Curriculum

Each student must complete the University's core curriculum. In some cases, a course required for the Bachelor of Science in Environmental Engineering may also be counted toward the core curriculum; these courses are identified below. To ensure that courses used to fulfill the social and behavioral sciences and visual and performing arts requirements of the core curriculum also meet ABET criteria, students should follow the guidance given in ABET Criteria.

In the process of fulfilling engineering degree requirements, students must also complete coursework to satisfy the following flag requirements: one independent inquiry flag, one quantitative reasoning flag, one ethics and leadership flag, one global cultures flag, one cultural diversity in the US flag, and two writing flags. The independent inquiry flag, the quantitative reasoning flag, the ethics and leadership flag, and one writing flag are carried by courses specifically required for the degree; these courses are identified below. Students are advised to fulfill the flag requirements with a course that meets other requirements of the degree. Courses that may be used to fulfill flag requirements are identified in the *Course Schedule*.

Math, science and engineering electives are chosen from a list of approved courses maintained in the undergraduate office.

Requirements	Hours
<u>Environmental Engineering</u>	
<u>EVE 3XX</u> <u>Introduction to Environmental Engineering</u>	<u>3</u>
<u>EVE 3YY</u> <u>Sustainable Systems Engineering</u>	<u>3</u>
<u>EVE 3ZZ</u> <u>Environmental Engineering and Science</u>	<u>3</u>
<u>Approved environmental engineering elective</u>	<u>15</u>
<u>Approved environmental engineering design elective</u>	<u>3</u>
<u>Architectural Engineering</u>	
<u>ARE 323K</u> <u>Project Management and Economics Biology</u>	<u>3</u>
<u>Biology</u>	
<u>BIO 311C</u> <u>Introduction to Biology I</u>	<u>3</u>
<u>Chemistry</u>	
<u>CH 301</u> <u>Principles of Chemistry I (part I science and technology)</u>	<u>3</u>
<u>CH 302</u> <u>Principles of Chemistry II (part I science and technology)</u>	<u>3</u>
<u>CH 204</u> <u>Introduction to Chemical Practice</u>	<u>2</u>
<u>CH 328M</u> <u>Organic Chemistry</u>	<u>3</u>
<u>Civil Engineering</u>	
<u>C E 311K</u> <u>Introduction to Computer Methods</u>	<u>3</u>
<u>C E 311S</u> <u>Probability and Statistics for Civil Engineers</u>	<u>3</u>
<u>C E 319F</u> <u>Elementary Mechanics of Fluids</u>	<u>3</u>
<u>C E 333T</u> <u>Engineering Communication (writing flag and ethics and leadership flag)</u>	<u>3</u>
<u>C E 356</u> <u>Elements of Hydraulic Engineering</u>	<u>3</u>
<u>Engineering Mechanics</u>	

<u>E M 306</u>	<u>Statics</u>	<u>3</u>
<u>Geology</u>		
<u>GEO 303</u>	<u>Introduction to Geology</u>	<u>3</u>
<u>Mathematics</u>		
<u>M 408C</u>	<u>Differential and Integral Calculus (mathematics; quantitative reasoning flag)</u>	<u>4</u>
<u>M 408D</u>	<u>Sequences, Series, and Multivariable Calculus</u>	<u>4</u>
<u>M 427J or M 427K</u>	<u>Differential Equations with Linear Algebra or Advanced Calculus for Applications I (quantitative reasoning flag)</u>	<u>4</u>
<u>Physics</u>		
<u>PHY 303K</u>	<u>Engineering Physics I (part II science and technology; quantitative reasoning flag)</u>	<u>3</u>
<u>PHY 303L</u>	<u>Engineering Physics II</u>	<u>3</u>
<u>PHY 103M</u>	<u>Laboratory for Physics 303K</u>	<u>1</u>
<u>PHY 103N</u>	<u>Laboratory for Physics 303L</u>	<u>1</u>
<u>Rhetoric and Writing</u>		
<u>RHE 306</u>	<u>Rhetoric and Writing (English composition)</u>	<u>3</u>
<u>Other Required Courses</u>		
<u>M E 320</u>	<u>Applied Thermodynamics</u>	<u>3</u>
<u>or M E 326</u>	<u>Thermodynamics</u>	
<u>or CH 353</u>	<u>Physical Chemistry I</u>	
<u>Approved mathematics or science elective</u>		<u>3</u>
<u>Approved engineering elective</u>		<u>6</u>
<u>Remaining Core Curriculum Courses</u>		
<u>UGS 302</u>	<u>First-Year Signature Course (writing flag)</u>	
<u>or UGS 303</u>	<u>First-Year Signature Course (some sections carry a writing flag)</u>	
<u>E 316L</u>	<u>British Literature (humanities) (some sections carry a global cultures flag)</u>	<u>3</u>
<u>or E 316M</u>	<u>American Literature (some sections carry a global cultures flag)</u>	
<u>or E 316N</u>	<u>World Literature (some sections carry a global cultures flag)</u>	
<u>or E 316P</u>	<u>Masterworks of Literature</u>	
<u>American and Texas government (some sections carry a global cultures and/or cultural diversity flag)</u>		<u>6</u>
<u>American history (some sections carry a cultural diversity flag)</u>		<u>6</u>
<u>Social and behavioral science (some sections carry a global cultures and/or cultural diversity flag)</u>		<u>3</u>
<u>Visual and performing arts (some sections carry a global cultures and/or cultural diversity flag)</u>		<u>3</u>
<u>Total Hours</u>		<u>124</u>

Technical Electives

Technical electives in environmental engineering are listed in four areas of specialization below. Six semester credit hours must be selected from one of the technical areas along with an approved environmental engineering design elective. The remaining environmental engineering electives can be taken from any area or combination of areas. Courses not listed can be approved by the undergraduate advisor.

Area 1, Air, Climate and Energy

Architectural Engineering 346N, Building Environmental Systems

Architectural Engineering 346P, HVAC Design

Architectural Engineering 370, Design of Energy Efficient and Healthy Buildings

Architectural Engineering 371, Energy Simulation in Building Design

Architectural Engineering 372, Modeling of Air and Pollutant Flows in Buildings

Architectural Engineering 377, Climate Change Mitigation
Chemical Engineering 379, Atmospheric Physicochemical Processes
Civil Engineering 369L, Air Pollution Engineering
Civil Engineering 369R, Indoor Air Quality

Area 2, Sustainable Water Systems

Civil Engineering 342, Water and Wastewater Treatment Engineering
Civil Engineering 346, Solid Waste Engineering and Management
Civil Engineering 370L, Water Pollution Chemistry

Area 3, Water Resources and the Environment

Civil Engineering 374K, Hydrology
Civil Engineering 374L, Groundwater Hydraulics
Civil Engineering 357, Geotechnical Engineering
Civil Engineering 358, Introductory Ocean Engineering

Area 4, Contaminant Fate and Transport

Civil Engineering 342, Water and Wastewater Treatment Engineering
Chemical Engineering 322, Thermodynamics
Chemical Engineering 353, Transport Phenomena

First year: Fall

4	<u>M 408C</u>	<u>Differential & Integral Calculus</u>
3	<u>CH 301</u>	<u>Principles of Chemistry I</u>
3	<u>BIO 311C</u>	<u>Introduction to Biology I</u>
3	<u>RHE 306</u>	<u>Rhetoric and Composition</u>
3	<u>UGS 302 (or UGS 303)</u>	<u>First-year Signature Course</u>
16		

First year: Spring

4	<u>M 408D</u>	<u>Sequences, Series, & Multivariable Calculus</u>
3	<u>CH 302</u>	<u>Principles of Chemistry II</u>
2	<u>CH 204</u>	<u>Intro to Chemical Practice</u>
3	<u>EVE 3xx</u>	<u>Intro to Environmental Engineering</u>
3	<u>PHY 303K</u>	<u>Engineering Physics I</u>
1	<u>PHY 103M</u>	<u>Laboratory for PHY 303K</u>
16		

Second Year: Fall

4	<u>M 427J or M 427K</u>	<u>Differential Equations with Linear Algebra</u>
3	<u>PHY 303L</u>	<u>Engineering Physics II</u>
1	<u>PHY 103N</u>	<u>Laboratory for PHY 303L</u>
3	<u>EM 306</u>	<u>Statics</u>
3	<u>EVE 3yy</u>	<u>Sustainable Systems Engineering</u>
3	<u>GOV</u>	<u>American Government</u>
17		

Second Year: Spring

3	<u>CH 328M</u>	<u>Organic Chemistry</u>
3	<u>CE 319F</u>	<u>Fluid Mechanics</u>
3	<u>CE 311K</u>	<u>Intro to Computer Methods</u>
3	<u>CE 333T</u>	<u>Engineering Communication</u>
3	<u>EVE 3zz</u>	<u>Environmental Engineering & Science</u>
15		

Third Year: Fall

3	<u>ME 320 or ME 326 or CH 353</u>	<u>Thermodynamics/Physical Chemistry.</u>
3	<u>CE 311S</u>	<u>Probability & Statistics for Civil Engineers</u>
3	<u>CE 356</u>	<u>Elements of Hydraulic Engineering</u>
3		<u>Environmental Engineering Elective</u>
3	<u>GOV</u>	<u>American Government</u>
15		

Third Year: Spring

3	<u>GEO 303</u>	<u>Introduction to Geology</u>
3		<u>Environmental Engineering Elective</u>
3		<u>Environmental Engineering Elective</u>
3	<u>HIS</u>	<u>American History</u>
3		<u>Humanities Core Course</u>
15		

Fourth Year: Fall

3	<u>ARE 323K</u>	<u>Project Management & Economics</u>
3		<u>Environmental Engineering Elective</u>
3		<u>Environmental Engineering Elective</u>
3		<u>Social and Behavioral Science Core Course</u>
3		<u>Mathematics or Science Elective</u>
15		

Fourth Year: Spring

3		<u>Environmental Engineering Design Elective</u>
3		<u>Engineering Elective</u>
3		<u>Engineering Elective</u>
3	<u>HIS</u>	<u>American History</u>
3		<u>Visual & Performing Arts Core Course</u>
15		