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

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

Type of Change ☐ Academic Change
☒ Degree Program Change (THECB form required)

Proposed classification ☐ Exclusive ☒ General ☐ Major

1. IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST CONSULT LINDA DICKENS, DIRECTOR OF ACCREDITATION AND ASSESSMENT, TO DETERMINE IF SACS-COC APPROVAL IS REQUIRED.

- Is this a new degree program? Yes ☒ No ☐
- Does the program offer courses that will be taught off campus? Yes ☐ No ☒
- Will courses in this program be delivered electronically? Yes ☐ No ☒

2. EXPLAIN CHANGE TO DEGREE PROGRAM AND GIVE A DETAILED RATIONALE FOR EACH INDIVIDUAL CHANGE:

This is a new degree program. The curriculum has been put together to satisfy all requirements of the Texas Higher Education Coordinating Board (THECB), the University of Texas at Austin core curriculum, and the Accreditation Board for Engineering and Technology (ABET) for an environmental engineering degree. The curriculum is presented and explained in detail in the THECB[2] form and under the proposed new catalog text[4] heading below.

3. THIS PROPOSAL INVOLVES (Please check all that apply)

☒ Courses in other colleges	☐ Courses in proposer's college that are frequently taken by students in other colleges	☒ Flags
☐ Course in the core curriculum	☐ Change in course sequencing for an existing program	☒ Courses that have to be added to the inventory
☐ Change in admission requirements (external or internal)	☐ Requirements not explicit in the catalog language (e.g., lists of acceptable courses maintained by department office)	

4. SCOPE OF PROPOSED CHANGE

a. Does this proposal impact other colleges/schools? Yes ☒ No ☐
If yes, then how? 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 this requirement is the same as in the civil engineering curriculum. Most students choose GEO 303 as their required science elective. So there will be minimal impact unless the total enrollment in the two degree programs rises.

b. Do you anticipate a net change in the number of students in your college? Yes ☐ No ☒
If yes, how many more (or fewer) students do you expect?

c. Do you anticipate a net increase (or decrease) in the number of students from outside of your college taking classes in your college? Yes ☐ No ☒
If yes, please indicate the number of students and/or class seats involved.

d. Do you anticipate a net increase (or decrease) in the number of students from your college taking courses in other colleges? Yes ☒ No ☐

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

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

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

First year: Spring

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

Second Year: Fall

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

Second Year: Spring

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

Third Year: Fall

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

Third Year: Spring

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

Fourth Year: Fall

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

Fourth Year: Spring

3		Environmental Engineering Design Elective
3		Engineering Elective
3		Engineering Elective
3	HIS	American History
3		Visual & Performing Arts Core Course
15		