

DOCUMENTS OF THE GENERAL FACULTY

**PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN ARCHITECTURAL 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*. The secretary has classified this proposal as legislation of *exclusive* interest to only one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the changes on January 6, 2016, 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 UT System.

If no objection is filed with the Office of the General Faculty by the date specified below, the legislation will be held to have been approved by the Faculty Council. If an objection is filed within the prescribed period, the legislation will be presented to the Faculty Council at its next meeting. The objection, with reasons, must be signed by a member of the Faculty Council.

To be counted, a protest must be received in the Office of the General Faculty by January 20, 2016.



Hillary Hart, Secretary
General Faculty and Faculty Council

- 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.

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?

Impacted schools must be contacted and their response(s) included:

Person communicated with:

Date of communication:

Response: Pending

- e. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? 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:

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: March 11, 2015

College approval date: March 27, 2015

Dean approval date: April 29, 2015

PROPOSED NEW CATALOG TEXT:

BACHELOR OF SCIENCE IN ARCHITECTURAL ENGINEERING

Buildings are the domain of architectural engineers and endpoints of this important engineering discipline. Americans spend over 70 total years of an average lifetime inside of buildings. As such, an important role of architectural engineers is to design buildings that are structurally resilient and able to withstand the loads that act on their exterior and interior surfaces. Because of the amount of time people spend in them, it is also important that buildings be designed, constructed, operated, and maintained to be healthy environments, free of airborne or surface contamination that can adversely affect occupants. Furthermore, buildings should also be comfortable environments that facilitate worker productivity and learning. In the United States, buildings account for nearly 40% of all energy use, over 70% of electricity use, and are major contributors to greenhouse gas emissions. As such, architectural engineers strive to design, construct, and operate both energy efficient and healthy buildings, with an increasing focus on the use of appropriate green building materials and products.

The building sector represents a major fraction of the United States economy, and buildings are by far the number one asset amongst all assets in the United States. Their appropriate design is critical for the people they serve, national and global economies, and for reasons of environmental sustainability. An unprecedented growth in the building industry, already one of the largest industries in the nation, has created a pressing demand for engineers with specialized training to plan and direct the activities of the industry. This need has been further intensified by the introduction of new materials, new structural systems, and new methods and management techniques. The curriculum in architectural engineering is designed to meet these needs ~~this demand~~. It offers training in the fundamentals of engineering, with specialization in structural analysis and design ~~structures~~, building energy and environments, ~~or building construction~~, and materials. This curriculum affords the student the opportunity to attain competence in the structural design of resilient buildings, from high-rise office buildings to single-family homes, and from hospitals to schools. ~~to long span structures and from commercial buildings to complex industrial facilities.~~ Courses in building energy

~~and environments environmental control systems permit provide graduates with knowledge relevant to the design and operation of both energy efficient and healthy buildings to integrate modern electrical, mechanical, and utility distribution systems with the structural and architectural elements of buildings. Students will also gain important knowledge related to sustainable construction practices, construction management, and modern building materials. Courses in construction methods and project management offer the student an opportunity to obtain a versatile background suitable for all areas of the building industry.~~

The extensive technical requirements, coupled with courses in arts and sciences, provide the architectural engineering student with an opportunity to obtain a background that is ideally suited for careers and positions of responsibility with consulting engineerings-firms, general contractors, manufacturers, government agencies, and architecture firms. The curriculum also serves as an excellent springboard to graduate study in the areas of structural engineering, building energy and environments, construction engineering and project management, or infrastructure construction-materials engineering.

Student Program Outcomes

Graduates of the architectural engineering program are expected to have

- 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 architectural engineering program should solve architectural engineering problems within a greater societal context. They should:

- Exhibit character and decision-making skills embodying professionalism and ethical behavior ~~Act professionally and ethically~~
- Apply knowledge, strong reasoning, and quantitative skills to design and implement creative and sustainable solutions
- Engage in lifelong learning ~~in order to meet~~ evolving engineering ~~the challenges facing the profession-society~~
- Exhibit strong communication, critical thinking, interpersonal, and ~~resource~~-management skills as leaders and contributors in the architectural engineering profession

Dual Degree program in Architectural Engineering and Architecture

A program that leads to both the Bachelor of Science in Architectural Engineering degree and the Bachelor of Architecture degree is available to qualified students. The program combines the course requirements of both degrees and requires six years for completion. Students who wish to pursue both degrees must apply for admission to the School of Architecture according to the procedures and deadlines established by the school. The program is described in Bachelor of Architecture/ Bachelor of Science in Architectural Engineering Dual

Degree Program; additional information is available from the undergraduate adviser for architectural engineering.

Portable Computing Devices

Students entering Architectural 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 lab sessions. For a list of minimum system requirements see: www.cae.utexas.edu/students/itss.

Curriculum

Course requirements include courses within the Cockrell School of Engineering ~~are divided into three categories: basic sequence courses, major sequence courses, and other required courses.~~ In addition, each student must complete the University's core curriculum. In some cases, a course required for the Bachelor of Science in Architectural 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: Liberal Education of Engineers.~~

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 United States flag, and two writing flags. The independent inquiry flag, the quantitative reasoning flag, the ethics and leadership flag, the global cultures 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 second writing flag requirement with a course that meets another requirement of the core curriculum, ~~such as the first year signature course.~~ Courses that may be used to fulfill flag requirements are identified in the *Course Schedule*.

~~Enrollment in major sequence courses is restricted to students who have received credit for all of the basic sequence courses and have been admitted to the major sequence. Requirements for admission to a major sequence are given in Admission and Registration. Enrollment in other required courses is not restricted by completion of the basic sequence.~~

Requirements		Hours
Basic Sequence Courses		
Architectural Engineering Courses		
ARE 102	Introduction to Architectural Engineering	1
ARE 217	Computer-Aided Design and Graphics	2
<u>ARE 320K</u>	<u>Introduction to Design I</u>	<u>3</u>
<u>ARE 320L</u>	<u>Introduction to Design II</u>	<u>3</u>
<u>ARE 323K</u>	<u>Project Management and Economics</u>	<u>3</u>
<u>ARE 335</u>	<u>Materials and Methods of Building Construction</u>	<u>3</u>
<u>ARE 346N</u>	<u>Building Environmental Systems</u>	<u>3</u>
<u>ARE 346P</u>	<u>HVAC Design</u>	<u>3</u>
or <u>ARE 370</u>	<u>Design of Energy Efficient and Healthy Buildings</u>	
<u>ARE 371</u>	<u>Energy Simulation in Building Design</u>	
<u>ARE 366</u>	<u>Contracts, Liability, and Ethics (ethics and leadership flag)</u>	<u>3</u>
<u>ARE 465</u>	<u>Integrated Design Project (independent inquiry flag)</u>	<u>4</u>
Chemistry		
CH 304	Principles of Chemistry I (part II science and technology)	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
<u>C E 324P</u>	<u>Properties and Behavior of Engineering Materials</u>	<u>3</u>
<u>C E 329</u>	<u>Structural Analysis</u>	<u>3</u>
<u>C E 331</u>	<u>Reinforced Concrete Design</u>	<u>3</u>
or C E 335	<u>Elements of Steel Design</u>	
<u>C E 333T</u>	<u>Engineering Communication (writing flag)</u>	<u>3</u>
<u>C E 357</u>	<u>Geotechnical Engineering</u>	<u>3</u>
Chemistry		
<u>CH 301</u>	<u>Principles of Chemistry I (part II science and technology)</u>	<u>3</u>
Engineering Mechanics		
E M 306	Statics	3
E M 319	Mechanics of Solids	3
Mathematics		
M 408C	Differential and Integral Calculus (mathematics; quantitative reasoning flag)	4
M 408D	Sequences, Series, and Multivariable Calculus	4
<u>M 427J</u> or <u>M 427K</u>	<u>Differential Equations with Linear Algebra (quantitative reasoning flag)</u>	<u>4</u>
Physics		
PHY 103M	Laboratory for Physics 303K	1
PHY 103N	Laboratory for Physics 303L	1
PHY 303K	Engineering Physics I (part I science and technology; quantitative reasoning flag)	3
PHY 303L	Engineering Physics II (part I science and technology; quantitative reasoning flag)	3
Rhetoric and Writing		
RHE 306	Rhetoric and Writing (English composition)	3
UGS 302	First Year Signature Course (some sections carry a writing flag)	3
or UGS 303	First Year Signature Course (some sections carry a writing flag)	
Major Sequence Courses		
Architectural Engineering		
ARE 320K	Introduction to Design I	3
ARE 320L	Introduction to Design II	3
ARE 323K	Project Management and Economics	3
ARE 335	Materials and Methods of Building Construction	3
ARE 346N	Building Environmental Systems	3
ARE 346P	HVAC Design	3
or ARE 370	Design of Energy Efficient and Healthy Buildings	
ARE 465	Integrated Design Project (independent inquiry flag)	4
ARE 366	Contracts, Liability, and Ethics (ethics and leadership flag)	3
Civil Engineering		
C E 324P	Properties and Behavior of Engineering Materials	3
C E 329	Structural Analysis	3
C E 331	Reinforced Concrete Design	3

or C E 335	Elements of Steel Design	
C E 333T	Engineering Communication (writing flag)	3
C E 357	Geotechnical Engineering	3
Approved technical electives		9
Other Required Courses		
M 427J or M 427K	Advanced Calculus for Applications I (quantitative reasoning flag)	4
GEO 303	Introduction to Geology	3
M E 320	Applied Thermodynamics	3
Approved architectural history elective (visual and performing arts; global cultures flag)		3
Approved mathematics or science elective		3
Approved technical electives		9
Remaining Core Curriculum Courses		
RHE 306	Rhetoric and Writing (English composition)	3
E 316L	British Literature (humanities) (some sections carry a global cultures flag)	3
or E 316M	American Literature (humanities) (some sections carry a cultural diversity flag)	
or E 316N	World Literature (humanities) (some sections carry a global cultures flag)	
or E 316P	Masterworks of Literature (humanities)	
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 behavioral-science (some sections carry a global cultures and/or cultural diversity flag)		3
UGS 302	First-Year Signature Course (all sections carry a writing flag)	3
or UGS 303	First-Year Signature Course (some sections carry a writing flag)	
Total Hours		126

Technical Electives

Technical electives in architectural engineering are listed in three areas of specialization below. Nine semester hours must be chosen from the following approved technical elective courses or selected with the approval of the department undergraduate adviser. Lower-division courses may not be used as technical electives.

Area 1, Structures ~~Structures~~ Structural Engineering

Architectural Engineering 345K, *Masonry Engineering*
 Architectural Engineering 362L, *Structural Design in Wood*
 Civil Engineering 331, *Reinforced Concrete Design* or 335, *Elements of Steel Design*
 Civil Engineering 360K, *Foundation Engineering* (carries an independent inquiry flag)
 Civil Engineering 362M, *Advanced Reinforced Concrete Design* (carries an independent inquiry flag)
 Civil Engineering 362N, *Advanced Steel Design* (carries an independent inquiry flag)
 Civil Engineering 363, *Advanced Structural Analysis*
 Civil Engineering 375, *Earth Slopes and Retaining Structures*
 Engineering Mechanics 339, *Advanced Strength of Materials*

Area 2, Building Energy and Environments

Architectural Engineering 346P, *HVAC Design* or 370, ~~*Design of Energy Efficient and Healthy Building*~~ 371, *Energy Simulation in Building Design*
 Architectural Engineering 370, *Design of Energy Efficient and Healthy Building*

~~Architectural Engineering 371, Energy Simulation in Building Design~~
~~Architectural Engineering 372, Modeling of Air and Pollutant Flows in Buildings~~
 Civil Engineering 341, Introduction to Environmental Engineering
 Mechanical Engineering 339, Heat Transfer
 Mechanical Engineering 374F, Fire Science
 Mechanical Engineering 374S, Solar Energy Systems Design
 Mechanical Engineering 379N, Engineering Acoustics

Area 3, Construction and Infrastructure Materials Engineering

Architectural Engineering 358, Cost Estimating in Building Construction
~~Architectural Engineering 376, Building Information Modeling for Capital Projects~~
 Civil Engineering 351, Concrete Materials
 Mechanical Engineering 349, Corrosion Engineering
 Mechanical Engineering 378K, Mechanical Behavior of Materials
 Mechanical Engineering 378P, Properties and Applications of Polymers

Suggested Arrangement of Courses

First Year			
First Term	Hours	Second Term	Hours
ARE 102	1	Approved architectural history elective	3
CH 301	3	GEO 303	3
M 408C	4	M 408D	4
RHE 306	3	PHY 303K	3
UGS 302 or 303	3	PHY 103M	1
		Social and behavioral sciences	3
	14		17
Second Year			
First Term	Hours	Second Term	Hours
C E 311K	3	ARE 217	2
E M 306	3	C E 311S	3
M 427J or M 427K	4	E M 319	3
PHY 303L	3	C E 319F	3
PHY 103N	1	M E 320 C E 333T	3
American history	3	American history	3
	17		17
Third Year			
First Term	Hours	Second Term	Hours
ARE 320K	3	ARE 320L	3
C E 324P	3	ARE 335	3
C E 329	3	ARE 346N	3
ARE 323K C E 357	3	C E 331 or 335	3
E 316L, 316M, 316N, or 316P M E 320	3	C E 333T E 316L, 316M, 616N, or 316P	3
	15		15
Fourth Year			
First Term	Hours	Second Term	Hours
C E 357 ARE 323K	3	ARE 465	4

ARE 346P or 370 <u>371</u>	3	ARE 366	3
Approved math/science elective	3	American government	3
Approved technical elective	3	Approved technical electives	6
American and Texas government	3		
	15		16
Total credit hours: 126			