DOCUMENTS OF THE GENERAL FACULTY

PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN MECHANICAL 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 *general* interest to more than 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 Texas Higher Education Coordinating Board.

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 26, 2016.

Hillary Hart, Secretary
General Faculty and Faculty Council

Posted on the Faculty Council website (http://www.utexas.edu/faculty/council/) on January 13, 2016.

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PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN MECHANICAL 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:

A. **Change to Curriculum:** Removing statement referencing basic sequence and major sequence courses. **Rationale**: A proposal to eliminate major sequence has been approved by the school. As a result, the wording is being changed to remove the reference to basic and major sequence.

B. **Change to Curriculum**: Replacing M 427K with M 427J. **Rationale**: A proposal to change the material covered in the math courses has been approved by the school. As a result, the Math department is replacing M 427K with M 427J.

C. **Change to Curriculum**: Removing a math elective and requiring M 427L. **Rationale**: Per our departmental curriculum committee and faculty vote:

a. Many on the committee felt that the M 340L Matrices and Linear Algebra course as it is currently arranged does not constitute an entire semester of essential material for engineers

b. Although the M 340L Matrices course was a logical course for our students under the previous curriculum, it is much harder to justify now given that they have an introduction to Linear Algebra in M 427K; much of that material will be repeated in M 340L

c. Based on the requirements at our peer institutions, there is an expectation that ME undergraduates will take a full semester of multivariable calculus, e.g. a course analogous to M 427L

d. Students still will have a Natural Science/Math

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?

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.

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? 150 students/semester
Impacted schools must be contacted and their response(s) included:
Person communicated with: Raymond Heitmann (Mathematics)
Date of communication: March 18, 2015
Response: This will not significantly impact Mathematics

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:
We propose to increase the number of credit hours in Mechanical Engineering required to graduate by 1. We propose to change a 3 credit hour Mathematics elective with a specific required Mathematics course (M 427L). Our peer institutions all require a course similar to M 427L and therefore this material is considered essential four undergraduate Mechanical Engineering.

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: April 1, 2015
College approval date: April 10, 2015 for all items
Dean approval date: April 29, 2015 for all items

PROPOSED NEW CATALOG TEXT:

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Mechanical engineering is one of the largest and broadest fields of technical study. Mechanical engineers are concerned with the engineering systems used to control and transform energy to meet the needs of humanity. In mechanical engineering, students develop an understanding of basic topics and fundamental principles upon which engineered systems are conceived and developed in a modern society. It is an excellent foundation for a rewarding career in engineering, as well as for further study in business, law, medicine, and other professions that require a solid foundation in science and technology, and the ability to solve problems.

The mechanical engineering department is dedicated to graduating mechanical engineers who practice mechanical engineering in the general stems of thermal/fluid systems, mechanical systems and design, and materials and manufacturing in industry and government settings; pursue advanced education, research and development, and other creative efforts in science and technology; conduct themselves in a responsible, professional, and ethical manner; and participate as leaders in activities that support service to and economic development of the region, state, and nation.

The mechanical engineering faculty has defined ten educational outcomes that students in the program are expected to achieve by the time of graduation. These outcomes are

- Knowledge of and ability to apply engineering and science fundamentals to real problems

- Ability to formulate and solve open-ended problems
- Ability to design mechanical components, systems, and processes
- Ability to set up, conduct, and interpret experiments, and to present the results in a professional manner
- Ability to use modern computer tools in mechanical engineering
- Ability to communicate in written, oral, and graphical forms
- Ability to work in teams and apply interpersonal skills in engineering contexts
- Ability and desire to lay a foundation for continued learning beyond the baccalaureate degree
- Awareness of professional issues in engineering practice, including ethical responsibility, safety, the creative enterprise, and loyalty and commitment to the profession
- Awareness of contemporary issues in engineering practice, including economic, social, political, and environmental issues and global impact

The mechanical engineering curriculum meets these outcomes by providing breadth and depth across a range of topics.

- A combination of college-level mathematics and basic science courses (some with experimental work) that includes mathematics ~~through differential equations~~, probability and statistics, physics, and chemistry
- Engineering courses that develop a working knowledge of graphics and computer-aided design, engineering mechanics, thermodynamics, kinematics, dynamics and control of mechanical systems, computational methods, fluid mechanics, heat transfer, materials science and engineering, mechatronics, technical communication, and engineering economics
- Mechanical engineering project and laboratory experiences that develop competence in measurements and instrumentation, interpretation of data, reverse engineering analysis of mechanical systems, use of computational tools for engineering analysis, integration of multidisciplinary topics in design of complex systems, teamwork and project planning, and written and oral communication
- A sequence of engineering design courses, culminating in a major capstone design experience in collaboration with an industrial sponsor, that draws on the knowledge and skills students have acquired in earlier coursework and incorporates modern engineering standards and realistic constraints
- Core curriculum courses, including social and behavioral sciences, humanities, and visual and performing arts electives, that complement the technical content of the curriculum
- A ~~variety~~ broad range of senior elective options that provide a career gateway to further study and lifelong learning in the practice of engineering and other professions

PROCEED (Project-Centered Education)

The undergraduate curriculum in mechanical engineering is built on the principle of project-centered education, or PROCEED. A number of courses throughout the curriculum are structured to motivate the study of engineering science by challenging students with in-depth analysis of real mechanical components and systems. In PROCEED, students address real-world projects based on current industrial methods and practices.
Undergraduate laboratories and computer facilities are integrated into the curriculum to connect theory with practice.

Portable Computing Devices

Students entering Mechanical Engineering are expected to have a laptop computer at their disposal. The use of laptop computers will be necessary in many required courses, and individual instructors may require that a laptop be brought to class or lab sessions. For a list of minimum system requirements see: http://www.me.utexas.edu/laptopreq.

Curriculum

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

In the process of fulfilling engineering degree requirements, students must also complete coursework to satisfy the University's flag requirements: one independent inquiry flag, one course with a quantitative reasoning flag, one ethics and leadership flag, one global cultures flag, one cultural diversity in the United States flag, and three writing flags. The independent inquiry flag, the quantitative reasoning flag, the ethics and leadership flag, and three writing flags are carried by courses specifically required for the degree; these courses are identified below. 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 to a Major Sequence. Enrollment in other required courses is not restricted by completion of the basic sequence.~~

	Requirements	Hours
~~Basic Sequence Courses~~		
~~**Chemistry**~~		
~~CH 301~~	~~Principles of Chemistry I (part II science and technology)~~	~~3~~
Mechanical Engineering Courses		
M E 130L	Experimental Fluid Mechanics	1
M E 134L	Materials Engineering Laboratory	1
M E 139L	Experimental Heat Transfer	1
M E 140L	Mechatronics Laboratory	1
M E 144L	Dynamic Systems and Controls Laboratory	1
M E 266K	Mechanical Engineering Design Project (independent inquiry flag and writing flag)	2
M E 266P	Design Project Laboratory	2
M E 302	Introduction to Engineering Design and Graphics	3
M E 314D	Dynamics	3
M E 316T	Thermodynamics	3
M E 318M	Programming and Engineering Computational Methods	3
M E 330	Fluid Mechanics	3
M E 333T	Engineering Communication (writing flag and ethics and leadership flag)	3
M E 334	Materials Engineering	3
M E 338	Machine Elements	3
M E 339	Heat Transfer	3
M E 340	Mechatronics	3
M E 344	Dynamic Systems and Controls	3
M E 335	Engineering Statistics	3

M E 353	Engineering Finance	3
M E 366J	Mechanical Engineering Design Methodology (writing flag)	3
Chemistry		
CH 301	Principles of Chemistry I (part II science and technology)	3
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
M 427~~KJ~~ or M 427K	~~Advanced Calculus for Applications I~~ Differential Equations with Linear Algebra (quantitative reasoning flag)	4
M427L	Advanced Calculus for Applications II	4
~~Mechanical Engineering~~		
~~M E 302~~	~~Introduction to Engineering Design and Graphics~~	~~3~~
~~M E 318M~~	~~Programming and Engineering Computational Methods~~	~~3~~
~~M E 324~~	~~Dynamics~~	~~3~~
~~M E 326~~	~~Thermodynamics~~	~~3~~
~~M E 330~~	~~Fluid Mechanics~~	~~3~~
~~M E 130L~~	~~Experimental Fluid Mechanics~~	~~1~~
~~M E 333T~~	~~Engineering Communication (writing flag and ethics and leadership flag)~~	~~3~~
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
~~Major Sequence Courses~~		
~~Mechanical Engineering~~		
~~M E 334~~	~~Materials Engineering~~	~~3~~
~~M E 134L~~	~~Materials Engineering Laboratory~~	~~1~~
~~M E 338~~	~~Machine Elements~~	~~3~~
~~M E 339~~	~~Heat Transfer~~	~~3~~
~~M E 139L~~	~~Experimental Heat Transfer~~	~~1~~
~~M E 340~~	~~Mechatronics~~	~~3~~
~~M E 140L~~	~~Mechatronics Laboratory~~	~~1~~
~~M E 344~~	~~Dynamic Systems and Controls~~	~~3~~
~~M E 144L~~	~~Dynamic Systems and Controls Laboratory~~	~~1~~
~~M E 366J~~	~~Mechanical Engineering Design Methodology (writing flag)~~	~~3~~
~~M E 266K~~	~~Mechanical Engineering Design Project (independent inquiry flag and writing flag)~~	~~2~~
~~M E 266P~~	~~Design Project Laboratory~~	~~2~~

~~Other Required Courses~~		
~~M E 335~~	~~Engineering Statistics~~	~~3~~
~~M E 353~~	~~Engineering Finance~~	~~3~~
Approved career gateway electives		12
~~Approved mathematics elective~~		~~3~~
Approved natural science/mathematics elective		3
Remaining Core Curriculum Requirements		
E 316L	British Literature (humanities) (some sections carry a global cultures flag)	3
or E 316M	American Literature (some sections carry a cultural diversity 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 sciences (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
UGS 302	First-Year Signature Course (~~some~~ all sections carry a writing flag)	3
or UGS 303	First-Year Signature Course (some sections carry a writing flag)	
Total Hours		~~125~~ 126

Bridges to the Future ~~Certificate~~ Credential Program

The Department of Mechanical Engineering offers highly qualified senior-level undergraduate students an opportunity for in-depth study and research in an emerging area of mechanical engineering through the Bridges to the Future ~~Certificate~~ Credential Program. Upon completion of a prescribed series of technical electives and an independent research study under the direction of a faculty member and a doctoral student mentor, students receive a ~~certificate~~ signed award and a letter from the department chair that describes the program and the work completed. ~~The certificate~~ This credential and its supporting documentation, plus supporting letters from supervising faculty and mentors, can be valuable assets for students applying to graduate school or pursuing competitive job opportunities. This ~~certificate~~ program will not appear on the student's transcript.

Students must apply for admission to a ~~certificate~~ credential program during the junior year~~; they must have completed all basic sequence courses and must have been admitted to the major sequence in mechanical engineering~~. In some cases, the coursework may include a graduate course, which may be credited toward a University graduate degree.

Details on course offerings and admission procedures are available from the Department of Mechanical Engineering undergraduate office and on the mechanical engineering Web site.

Career Gateway Elective Options

The mechanical engineering curriculum includes twelve hours of career gateway electives, which are to be selected by the student to support his or her career goals. These courses should be chosen carefully and must be pertinent to each other and to the student's career goals.

~~To assist students in thinking about career options, the advising section of the mechanical engineering Web site contains information that describes potential career paths in traditional and nontraditional areas.~~ Students are required to review these materials and to meet with an ~~faculty elective~~ adviser to discuss their

options prior to selecting their career gateway elective courses.

~~Before registering for any career gateway elective courses, students must prepare a career statement and a list of relevant, related courses, and a mechanical engineering faculty elective adviser must provide preliminary approval. Ultimately, the faculty undergraduate adviser in mechanical engineering must provide final approval before the student's first degree audit for graduation.~~

~~By the beginning of the semester in which he or she will take the first career gateway elective, the student must have completed all basic sequence courses with a grade of at least *C* in each and must have been admitted unconditionally to the major sequence in mechanical engineering.~~

Career gateway electives can include approved upper-division courses from mechanical engineering and other engineering departments, as well as upper-division courses from a number of other colleges and departments. A detailed description of courses that satisfy the career gateway elective requirements is available on the advising section of the mechanical engineering Web site. Highly qualified students are encouraged to fulfill career gateway elective requirements as part of the Bridges to the Future ~~Certificate~~ Credential Program described above.

SUGGESTED ARRANGEMENTS OF COURSES

First Year

First Term	Hours	**Second Term**	Hours
CH 301	3	M 408D	4
M 408C	4	PHY 303K	3
M E 302	3	PHY 103M	1
RHE 306	3	Social and behavioral sciences	3
UGS 302 or 303	3	Visual and performing arts	3
		American history	3
	16		17

Second Year

First Term	Hours	**Second Term**	Hours
E M 306	3	E M 319	3
M 427~~K~~J or K	4	M 427L	4
~~M E 326~~ M E 316T	3	M E 318M	3
PHY 303L	3	~~M E 324~~ M E 314D	3
PHY 103N	1	M E 333T	3
American and Texas government	3	~~M E 330~~	~~3~~
		~~M E 130L~~	~~1~~
	~~14~~ 17		16

Third Year

First Term	Hours	**Second Term**	Hours
M E 330	3	M E 338	3
M E 130L	1	M E 339	3
M E 334	3	M E 139L	1
M E 134L	1	M E 340	3
M E 335	3	M E 140L	1
~~M E 339~~	~~3~~	~~M E 353~~	~~3~~
~~M E 139L~~	~~1~~	Approved career gateway elective	3

Approved career gateway elective	3	~~American and Texas government~~	~~3~~
	14		~~16~~ 14

Fourth Year

First Term	Hours	**Second Term**	Hours
M E 344	3	M E 266K	2
M E 144L	1	M E 266P	2
M E 353	3	Approved career gateway elective	3
M E 366J	3	Approved mathematics/natural science elective	3
Approved career gateway elective	3	E 316L, 316M, 316N, or 316P	3
~~Approved mathematics elective~~	~~3~~	American history	3
American and Texas government	3		
	16		16

Total credit hours: ~~125~~ 126