DOCUMENTS OF THE GENERAL FACULTY

**PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN GEOSYSTEMS ENGINEERING AND HYDROLOGY 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

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

**PROPOSED CHANGES TO THE BACHELOR OF SCIENCE IN GEOSYSTEMS ENGINEERING AND HYDROLOGY 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:**

**Item 1**
**Change to Curriculum**: Modifying M 427K to M 427J or 427K.
**Rationale**: To reflect the changes made by the Mathematics department that denote either 427K or 427J will count toward the Advanced Calculus requirement for all Bachelor of Science in engineering degrees. This is reflected in both the list of required courses and Suggested Arrangement of Courses sections.

**Item 2**
**Change to Curriculum**: Remove statements 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 reflect the approval.

**Item 3**
**Change to Curriculum**: Adding Portable Computing Devices requirement
**Rationale**: Students enrolled in the Geosystems Engineering degree program will be expected to own a portable computing device

**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?
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: April 20, 2015 for item 1 and July 24, 2015 for item 2 and 3
College approval date: August 20, 2015 for all items
Dean approval date: September 25, 2015 for all items

**PROPOSED NEW CATALOG TEXT:**

**BACHELOR OF SCIENCE IN GEOSYSTEMS ENGINEERING AND HYDROLOGY ENGINEERING**

Geosystems engineers and hydrogeologists are concerned with the development and use of engineering approaches in the management of natural resources from the earth's surface and subsurface, environmental restoration of subsurface sites, and other processes related to the earth sciences. This degree program, offered jointly by the Cockrell School of Engineering and the Jackson School of Geosciences, is designed to teach students the geological and engineering principles needed to solve subsurface resource development and environmental problems. The curriculum includes a fundamental sequence of engineering and geological sciences courses in such areas as multiphase fluid flow, physical hydrology, heat and mass transfer, field methods, and engineering design. This interdisciplinary systems approach, combining engineering and geological sciences, is increasingly required to address complex real-world problems such as characterization and remediation of aquifers. The degree program is designed to prepare graduates for employment with environmental, water resource management, and energy companies in addition to many government agencies. Better-qualified graduates of the program may pursue graduate study in subsurface environmental engineering, petroleum engineering, geology, and other related fields.

The objective of the degree program is to prepare graduates for successful careers in the fields of subsurface environmental engineering (including carbon dioxide sequestration), oil and gas production and services, or similar pursuits. Graduates are expected to understand the fundamental principles of science and engineering behind the technology of geosystems engineering and hydrogeology to keep their education from becoming outdated and to give them the capability of self-instruction after graduation. They should also be prepared to serve society by applying the ideals of ethical behavior, professionalism, and environmentally responsible stewardship of natural resources.

Containing the following elements, the technical curriculum provides both breadth and depth in a range of topics.

- A combination of college-level mathematics and basic sciences (some with experimental work) that includes mathematics through differential equations, physics, chemistry, and geology
- Basic engineering and geologic topics that develop a working knowledge of fluid mechanics, strength of materials, transport phenomena, material properties, phase behavior, and thermodynamics
- Engineering and geosciences topics that develop competence in characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods, including field methods; design and analysis of systems for producing, injecting, and handling fluids; application of hydrogeologic and reservoir engineering principles and practices for water and energy resource development and management; contamination evaluation and remediation methods for hydrologic resources; and use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty
- A major capstone design experience that prepares students for engineering and hydrogeologic practice, based on the knowledge and skills acquired in earlier coursework and incorporating engineering and geological standards and realistic constraints

**Portable Computing Devices**

Students entering Geosystems Engineering and Hydrogeology are required to have access to a portable computing device capable of running programs suitable for use in the classroom and on the university wireless network. The use of this device will be necessary in many required courses, and individual instructors may require the device be brought to class or lab sessions. For a list of minimum system requirements see: http://www.pge.utexas.edu/portabledevicereqs.

**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 ~~much~~ must complete the University's Core Curriculum. In some cases, a course that fulfills one of the following requirements may also be counted toward core curriculum or flag requirements; 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 course with a 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 both 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~~ |
| ~~CH 302~~ | ~~Principles of Chemistry II~~ | ~~3~~ |
| **Petroleum and Geosystems Engineering** | | |
| PGE 310 | Formulation and Solution of Geosystems Engineering Problems | 3 |
| PGE 322K | Transport Phenomena in Geosystems | 3 |

| | | |
|---|---|---|
| PGE 323K | Reservoir Engineering I: Primary Recovery | 3 |
| PGE 323L | Reservoir Engineering II: Secondary and Tertiary Recovery | 3 |
| PGE 326 | Thermodynamics and Phase Behavior | 3 |
| PGE 333T | Engineering Communication (writing flag and ethics and leadership flag) | 3 |
| PGE 365 | Resource Economics and Valuation | 3 |
| PGE 368 | Fundamentals of Well Logging | 3 |
| PGE 373L | Geosystems Engineering Design and Analysis (independent inquiry flag) | 3 |
| PGE 424 | Petrophysics | 4 |
| PGE 427 | Properties of Petroleum Fluids (Properties of Petroleum Fluids) | 4 |
| **Chemistry** | | |
| CH 301 | Principles of Chemistry I (part II science and technology) | 3 |
| CH 302 | Principles of Chemistry II | 3 |
| **Civil Engineering** | | |
| C E 357 | Geotechnical Engineering | 3 |
| **Engineering Mechanics** | | |
| E M 306 | Statics | 3 |
| E M 319 | Mechanics of Solids | 3 |
| **Geological Sciences** | | |
| GEO 303 | Introduction to Geology | 3 |
| GEO 376L | Field Methods in Groundwater Hydrology | 3 |
| GEO 376S | Physical Hydrology | 3 |
| GEO 416K | Earth Materials | 4 |
| GEO 416M | Sedimentary Rocks | 4 |
| GEO 420K | Introduction to Field and Stratigraphic Methods | 4 |
| GEO 428 | Structural Geology | 4 |
| GEO 476K | Groundwater Hydrology (writing flag) | 4 |
| **Mathematics** | | |
| M 408C | Differential and Integral Calculus (mathematics; quantitative reasoning flag) | 4 |
| M 408D | Sequences, Series, and Multivariable Calculus | 4 |
| M 427~~K~~J or M427K | ~~Advanced Calculus for Applications I~~Differential Equations with Linear Algebra (quantitative reasoning flag) | 4 |
| ~~Petroleum and Geosystems Engineering~~ | | |
| ~~PGE 310~~ | ~~Formulation and Solution of Geosystems Engineering Problems~~ | ~~3~~ |
| ~~PGE 427~~ | ~~Properties of Petroleum Fluids (Properties of Petroleum Fluids)~~ | ~~4~~ |
| ~~PGE 322K~~ | ~~Transport Phenomena in Geosystems~~ | ~~3~~ |
| ~~PGE 326~~ | ~~Thermodynamics and Phase Behavior~~ | ~~3~~ |
| ~~PGE 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 |

| | | |
|---|---|---|
| ~~UGS 302~~ | ~~First-Year Signature Course (some sections carry a writing flag)~~ | ~~3~~ |
| ~~or UGS 303~~ | ~~First-Year Signature Course~~ | |
| ~~Major Sequence Courses~~ | | |
| ~~Geological Sciences~~ | | |
| ~~GEO 420K~~ | ~~Introduction to Field and Stratigraphic Methods~~ | ~~4~~ |
| ~~GEO 428~~ | ~~Structural Geology~~ | ~~4~~ |
| ~~GEO 476K~~ | ~~Groundwater Hydrology (writing flag)~~ | ~~4~~ |
| ~~GEO 376L~~ | ~~Field Methods in Groundwater Hydrology~~ | ~~3~~ |
| ~~GEO 376S~~ | ~~Physical Hydrology~~ | ~~3~~ |
| ~~Petroleum and Geosystems Engineering~~ | | |
| ~~PGE 323K~~ | ~~Reservoir Engineering I: Primary Recovery~~ | ~~3~~ |
| ~~PGE 323L~~ | ~~Reservoir Engineering II: Secondary and Tertiary Recovery~~ | ~~3~~ |
| ~~PGE 424~~ | ~~Petrophysics~~ | ~~4~~ |
| ~~PGE 365~~ | ~~Resource Economics and Valuation~~ | ~~3~~ |
| ~~PGE 368~~ | ~~Fundamentals of Well Logging~~ | ~~3~~ |
| ~~PGE 373L~~ | ~~Geosystems Engineering Design and Analysis (independent inquiry flag)~~ | ~~3~~ |
| ~~**Civil Engineering**~~ | | |
| ~~C E 357~~ | ~~Geotechnical Engineering~~ | ~~3~~ |
| Approved engineering elective | | 3 |
| Approved geosciences technical elective | | 3 |
| **Remaining Core Curriculum Courses** | | |
| 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 government (some sections carry a global cultures and/or cultural diversity flag) | | 6 |
| American history (some sections carry a cultural diversity flag) | | 6 |
| Visual and performing arts (some sections carry a global cultures and/or cultural diversity flag) | | 3 |
| Social and behavioral sciences (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 | | 132 |

**Suggested Arrangement of Courses**

**First Year**

| First Term | Hours | Second Term | Hours |
|---|---|---|---|
| CH 301 | 3 | CH 302 | 3 |
| GEO 303 | 3 | M 408D | 4 |
| M 408C | 4 | PHY 303K | 3 |
| RHE 306 | 3 | PHY 103M | 1 |
| UGS 302 or 303 | 3 | PGE 333T | 3 |
| | | American history | 3 |
| | 16 | | 17 |

**Second Year**

| First Term | Hours | Second Term | Hours |
|---|---|---|---|
| E M 306 | 3 | E M 319 | 3 |
| GEO 416K | 4 | PGE 310 | 3 |
| GEO 416M | 4 | PGE 427 | 4 |
| M 427J or K | 4 | PGE 326 | 3 |
| | | PHY 303L | 3 |
| | | PHY 103N | 1 |
| | 15 | | 17 |

**Third Year**

| First Term | Hours | Second Term | Hours | Summer Term | Hours |
|---|---|---|---|---|---|
| GEO 476K | 4 | C E 357 | 3 | GEO 376L | 3 |
| PGE 322K | 3 | GEO 420K | 4 | | |
| PGE 323K | 3 | PGE 323L | 3 | | |
| PGE 424 | 4 | PGE 368 | 3 | | |
| Social and behavioral sciences | 3 | American government | 3 | | |
| | 17 | | 16 | | 3 |

**Fourth Year**

| First Term | Hours | Second Term | Hours |
|---|---|---|---|
| E 316L, 316M, 316N, or 316P | 3 | PGE 373L | 3 |
| GEO 428 | 4 | Geoscience technical elective | 3 |
| GEO 376S | 3 | American government | 3 |
| PGE 365 | 3 | American history | 3 |
| Engineering technical elective | 3 | Visual and performing arts | 3 |
| | 16 | | 15 |

Total credit hours: 132