

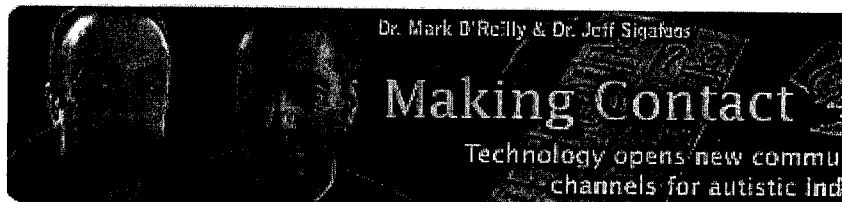


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News

Soccer player among NCAA top students
Kinesiology major Kelly Wilson selected one of Today's Top VIII seniors in nation.

Curricular reform task force created
Undergraduate core curriculum was last revised in 1981.

Information security center established
Center will address the nation's growing cybersecurity problems.

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Spotlights & Events



LBJ Library
shows exhibit on the '60s

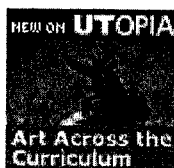


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Resources for People with Disabilities

10. College of Natural Sciences

Bachelor of Science in Geosystems Engineering and Hydrogeology

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 College of Engineering and the College of Natural Sciences, 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 and chemical 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 subsurface environmental engineering, oil and gas production and services, and similar fields. Graduates are expected to understand the fundamental principles of science and engineering behind the technology of geosystems engineering and hydrogeology so that their education will not become outdated and so that they will be capable 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, probability and statistics, 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.
- A general education component that complements the technical content of the curriculum.

Curriculum

Course requirements are divided into three categories: basic sequence courses, major sequence courses, and other required courses. 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 by the College of Engineering Admissions Committee. (Requirements for admission to a major sequence are given in chapter 6.) Enrollment in other required courses is not restricted by completion of the basic sequence.

Courses used to fulfill technical and nontechnical elective requirements must be approved by the petroleum and geosystems engineering faculty and the geological sciences faculty before the student enrolls in them. Courses that fulfill the social science and fine arts/humanities requirements are listed in chapter 6.

Students must fulfill the foreign language requirement in chapter 6. They must also remove any admission deficiencies in mathematics as described in *General Information*.

Courses	Semester Hours
Basic Sequence Courses	
Chemistry 301, 302, Engineering Mechanics 306, 319, Geological Sciences 312K, 416K, 416M, 420K, Mathematics 408C, 408D, 427K, Petroleum and Geosystems Engineering 310, 312, 333T, Physics 303K, 303L, 103M, 103N, Rhetoric and Composition 306	59
Major Sequence Courses	
field hg stewart. GF GW hydrox Civil Engineering 357, English 316K, Geological Sciences 428, 468K, 476K 376L, 376S, Petroleum and Geosystems Engineering 322K, 323, 424, 326, 331, 365, 368, 373K, 373L	52
Other Required Courses	
American government, including Texas government	6
American history	6
Approved fine arts or humanities elective	3

Minimum Required

129

Suggested Arrangement of Courses**First Year -- Fall Semester**

Courses	Semester Hours
CH 301, <i>Principles of Chemistry I</i> ✓	3
GEO 312K, <i>Geology of Engineering</i>	3
M 408C, <i>Differential and Integral Calculus</i> ✓	4
RHE 306, <i>Rhetoric and Composition</i>	3
Approved social science elective	3
Total	16

First Year -- Spring Semester

Courses	Semester Hours
CH 302, <i>Principles of Chemistry II</i>	3
GEO 416M, <i>Sedimentary Rocks</i>	4
M 408D, <i>Sequences, Series, and Multivariable Calculus</i> ✓	4
PHY 303K, <i>Engineering Physics I</i> ✓	3
PHY 103M, <i>Laboratory for Physics 303K</i>	1
American government	3
Total	18

Second Year -- Fall Semester

Courses	Semester Hours
E M 306, <i>Statics</i>	3
GEO 416K, <i>Earth Materials</i>	4

M 427K, <i>Advanced Calculus for Applications I</i>	4
PGE 310, <i>Formulation and Solution of Geosystems Engineering Problems</i>	3
American history	3
Total	17

Second Year -- Spring Semester

Courses	Semester Hours
E M 319, <i>Mechanics of Solids</i>	3
GEO 420K, <i>Introduction to Field and Stratigraphic Methods</i>	4
PGE 312, <i>Physical and Chemical Behavior of Fluids I</i>	3
PGE 333T, <i>Engineering Communication</i>	3
PHY 303L, <i>Engineering Physics II</i>	3
PHY 103N, <i>Laboratory for Physics 303L</i>	1
Total	17

Third Year -- Fall Semester

Courses	Semester Hours
GEO 476K, <u><i>Groundwater Hydrology</i></u>	4
PGE 322K, <i>Transport Phenomena in Geosystems</i>	3
PGE 424, <i>Petrophysics</i>	4
PGE 326, <i>Thermodynamics and Phase Behavior</i>	3
American history	3
Total	17

Third Year -- Spring Semester

Courses	Semester Hours
C E 357, <i>Geotechnical Engineering</i>	3
E 316K, <i>Masterworks of Literature</i>	3

PGE 323, <i>Fluid Flow through Permeable Media</i>	3
PGE 365, <i>Resource Economics and Valuation</i>	3
American government	3
Total	15

Third Year -- Summer Session

Courses	Semester Hours
GEO 376L, <i>Field Methods in Groundwater Hydrology</i>	3
Total	3

Fourth Year -- Fall Semester

Courses	Semester Hours
GEO 428, <i>Structural Geology</i> ✓	4
GEO 376S, <i>Physical Hydrology</i>	3
PGE 331, <i>Fundamentals of Reservoir Engineering</i>	3
PGE 368, <i>Fundamentals of Well Logging</i>	3
PGE 373K, <i>Geosystems Engineering Design and Analysis I</i>	3
Total	16

Fourth Year -- Spring Semester

Courses	Semester Hours
GEO 468K, <i>Geophysics for Geological Sciences Majors</i>	4
GEO 476M, <i>Chemical Hydrogeology</i>	4
PGE 370, <i>Fundamentals of Subsurface Environmental Engineering</i>	3
PGE 373L, <i>Geosystems Engineering Design and Analysis II</i>	3
Approved fine arts/humanities elective	3
Total	17

Bachelor of Science in Geological Sciences

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The Bachelor of Science in Geological Sciences serves as a professional degree for students planning careers as geologists or teachers, as well as for those planning to pursue graduate work in the geosciences and related areas. Employment opportunities for students with this degree are dominated by the petroleum and related energy industries, but include the gamut of jobs that relate knowledge of the earth to resources, the environment, and human use of raw materials. When finite resources are in increasing demand, professional geologists trained to seek and develop raw materials serve a vital role in industrial society. Professional employment is also available in state and federal agencies, with consulting firms, and with service companies subsidiary to the energy and mineral industries. Careers include such areas as resource evaluation, environmental control, reclamation concerns, building foundation evaluation, groundwater contamination studies, soil testing, regional planning, watershed management, and mineral exploitation.

Students seeking the Bachelor of Science in Geological Sciences degree must choose one of four options--general geology, geophysics, hydrogeology/environmental geology, or teaching.

Prescribed Work Common to All Options

1. Rhetoric and Composition 306 and English 316K. In addition, in taking courses to fulfill other degree requirements, the student must complete two courses certified as having a substantial writing component; one of these courses must be upper-division. If the writing requirement is not fulfilled by courses specified for the degree, the student must fulfill it either with electives or with coursework taken in addition to the number of hours required for the degree. Courses with a substantial writing component are identified in the Course Schedule.
2. Courses 506 and 507 (or the equivalent) in a single foreign language, and a three-semester-hour course in the same language for which 507 or the equivalent is a prerequisite; or as much of this coursework as required by the student's score on the appropriate language placement test. Students in the teaching option are exempt from this requirement.

For students who enter the University with fewer than two high school units in a single foreign language, the first two semesters in a language may not be counted toward the total number of hours required for the degree.

3. Six semester hours of American government, including Texas government.
4. Six semester hours of American history.
5. Three semester hours of coursework in economics, upper-division coursework in anthropology, or upper-division coursework in geography.
6. Three semester hours in architecture, art (including art history, design, studio art, visual art studies), classics (including classical civilization, Greek, Latin), fine arts, music (including music, instruments, ensemble), philosophy (excluding courses in logic), or theatre and dance.

Option II: Geophysics

8. Mathematics 408C and 408D, or 408K, 408L, and 408M; 427K; and 427L. Algebra courses at the level of Mathematics 301 or the equivalent may not be counted toward the total number of hours required for the degree. Students who enter the University with fewer than three units of high school mathematics at the level of Algebra I or higher must take Mathematics 301 without degree credit to remove their deficiency.
9. Physics 301, 101L, 315, 115L, 316, and 116L.
10. Computer Sciences 303E.
11. Chemistry 301 and 302.
12. Geological Sciences 401 or 303 or 312K, 416K, 416M, 420K, 325K, 428, 354, 660 or an approved six-semester-hour geophysics field camp, 465K, and six additional approved hours of upper-division geological sciences. (Geological Sciences 365N is recommended.)
13. Nine semester hours chosen from the following courses: Aerospace Engineering 366K, Astronomy 352K, 353, Chemistry 353, Civil Engineering 319F, 341, 357, 374K, Computer Sciences 303E, 313E, 323E, 324E, 326E, 327E, Electrical Engineering 411, 351K, 351L, 351M, Geography 335C, Mathematics 328K, 333L, 340L, 343K, 361, 361K, 362K, 364K, 364L, 365C, 365D, 367K, 367L, 368K, 372, 373K, 373L, 374, 374K, 378K, Mechanical Engineering 326, Petroleum and Geosystems Engineering 322K, 323, 424, 368, Physics 333, 336K, 336L, 338K, 352K, 453, 362K, 362L, 369, 373, 474, 375P, and 375S.

This requirement is intended to function as an unspecified minor. Courses used to fulfill the requirement do not have to be taken in the same department, but they should form a self-reinforcing sequence related to geological sciences. Courses not listed above will be considered upon petition to the undergraduate adviser. If the student chooses computer sciences courses to fulfill this requirement, these courses may also be counted toward a certificate in the elements of computing. The Elements of Computing Program is described in this chapter.
14. Enough additional coursework to make a total of 126 semester hours.

Option III: Hydrogeology/Environmental Geology

8. Mathematics 408C and 408D, or 408K, 408L, and 408M, and 427K. Algebra courses at the level of Mathematics 301 or the equivalent may not be counted toward the total number of hours required for the degree. Students who enter the University with fewer than three units of high school mathematics at the level of Algebra I or higher must take Mathematics 301 without degree credit to remove their deficiency.
9. Physics 301, 101L, 316, and 116L; or Physics 303K, 103M, 303L, and 103N.
10. Chemistry 301, 302, and 204.
11. Biology 211.
12. Geological Sciences 401 or 303 or 312K, 416K, 416M, 420K, 428, 346C, 660 or 679J, 476K, 476M, and six additional approved hours of upper-division geological sciences. Geological Sciences 376L is strongly recommended.