Bachelor of Science in Geosystems Engineering

Geosystems engineers are concerned with the development and use of engineering approaches in the management of natural resources from the earth's surface and subsurface. 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, heat and mass transfer, field methods, and engineering design with applications to water and energy resources. This interdisciplinary systems approach, combining engineering and geological sciences, is increasingly required to address complex real-world problems such as geothermal energy, the mining of strategic minerals, geologic storage of CO2 captured from the atmosphere, and pollution remediation and management of aquifers. The degree program is designed to prepare graduates for successful careers with energy, environmental, and water resource management companies in addition to many government agencies. Graduates of the program may pursue graduate study in environmental engineering, petroleum engineering, geology, and other related fields.

Graduates are expected to understand the fundamental principles of science and engineering behind subsurface processes involved in energy and water resources to keep their education from becoming outdated and to give them the capability of self-instruction after graduation.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

ABET Student Outcomes:

a. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
b. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
c. an ability to communicate effectively with a range of audiences
d. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
e. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
f. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
g. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Portable Computing Devices

Students entering Geosystems Engineering 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/future/undergraduate/program.

Curriculum †

The student must take all courses applied to degree requirements on the letter-grade basis. Students must earn a grade of at least C- in each course, except for those listed as Remaining Core Curriculum courses. Students must also maintain grade point averages of at least 2.00 in the major area of study and in required technical courses as described in Academic Standards, and a cumulative University grade point average of at least 2.00 as described in the General Information Catalog.

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 registers for them.

Requirements		Hours
Petroleum and Geosystems Engineering Courses		
PGE 311	Numerical Methods and Programming	3
PGE 322K	Transport Phenomena in Geosystems	3
PGE 323K	Reservoir Engineering I: Primary Recovery	3
PGE 326	Thermodynamics and Phase Behavior	3
PGE 333T	Engineering Communication	3
PGE 334	Reservoir Geomechanics	3
PGE 358	Principles of Formation Evaluation	3
PGE 365	Resource Economics and Valuation	3
PGE 373L	Geosystems Engineering Design and Analysis	3

PGE 424	Petrophysics	4
PGE 430	Drilling and Well Completions	4
Chemistry		
CH 301	Principles of Chemistry I	3
CH 302	Principles of Chemistry II	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 416E	Solid Earth Processes	4
GEO 416S	Earth and Planetary Processes Through Time	4
GEO 416W	Climate, Water, and the Environment	4
GEO 420K	Introduction to Field and Stratigraphic Methods	4
GEO 476K	Groundwater Hydrology	4
Mathematics		
M 408C	Differential and Integral Calculus	4
M 408D	Sequences, Series, and Multivariable Calculus	4
M 427J	Differential Equations with Linear Algebra	4
Physics		
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	1
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	1
PHY 303K	Engineering Physics I	3
PHY 303L	Engineering Physics II	3
Other Required Courses		
Approved engineering electives		6
Approved geosciences technical electives		6
Rhetoric and Writing		
RHE 306	Rhetoric and Writing	3
Remaining Core Curriculum Courses		
E 316L	British Literature	3
or E 316M	American Literature	
or E 316N	World Literature	
or E 316P	Masterworks of Literature	
American government		6
American history		6
Visual and performing arts		3
Social and behavioral sciences		3
UGS 302	First-Year Signature Course	3
or UGS 303	First-Year Signature Course	
Total Hours		**132**

Core Component Areas: [010] Communication; [020] Mathematics; [030] Natural Science and Technology, Part I; [040] Humanities; [050] Visual and Performing Arts; [060] U.S. History; [070] American and Texas Government; [080] Social and Behavioral Sciences; [090] First-Year Signature Course; [093] Natural Science and Technology, Part II

† Effective April 2025, UT Austin no longer requires Skills and Experience flags.