

DEPARTMENT OF GEOGRAPHY & GEOLOGY

Chair: Brian Cooper (bio_bjc@shsu.edu) (936) 294-1566

Website: Department of Geography & Geology (http://www.shsu.edu/~gel_geo)

The Department of Geography and Geology is an excellent blend of two disciplines that have a common thread. Both programs are concerned with the physical environment, with resources – including energy resources – and with ways that humans interact with and modify the natural environment. Students may major or minor in either program.

Mission

The primary mission of the Department of Geography and Geology is to provide students of the two complementary programs a comprehensive understanding of the range and depth of these scientific disciplines which encompass, respectively, the human and physical domains of geography, and the physical and historical domains of geology. This understanding is intended to enable our students to achieve their full potential as skilled professionals and well-qualified technical employees in a diverse range of companies and governmental organizations and to become effective teachers and community leaders. Our programs enable students to become informed users of a range of technologies and prudent stewards of our natural resources. This understanding of the world will promote successful careers, active life-long learning, and an ability and desire to contribute positively to society.

Geography Program

Coordinator: John Strait (jstrait@shsu.edu) (936) 294-4077

Website: Department of Geography & Geology (<http://www.shsu.edu/academics/geography-geology>)

Geography is an all-encompassing discipline that involves the interdisciplinary study of places and the relationships between people and their environment from a spatial perspective. As an academic subject, it includes an understanding of both the physical environment and the cultural world of international affairs, economics, population, religion, language, and other human phenomena. Geographers are not only interested in the locations of these phenomena, but are also interested in understanding the causal factors responsible for their spatial distributions and the larger implications of these spatial arrangements. Geography also entails the use and application of a host of geospatial technologies as a means to study and analyze this subject matter, such as geographic information systems (GIS), remote sensing, digital image processing, and global positioning systems. In the age of global markets, global culture, global transportation systems, and global telecommunications, we are increasingly faced with the reality that our welfare is highly interdependent with the rest of the world. A geographic education represents an excellent way to understand how to deal with environmental, social and economic issues associated with this reality. For an individual curious about the world, and his or her place in it, few disciplines satisfy that curiosity as much as geography.

Academic Programs

The Geography program incorporates a three-track curriculum and is designed to fit the particular academic interests of our students and better prepare them for life beyond SHSU, particularly in terms of graduate study or employment opportunities. Student majors can pursue either Bachelors of Arts (BA) or Bachelors of Science (BS) degrees and focus their studies within one of three concentrations, each providing a broad geographical background yet emphasizing different foci. The *human geography* concentration is designed for students primarily interested in the geographical study of human or cultural phenomena, such as population, race and ethnicity, religion, economics, tourism, and urban geography. The *environmental geography* concentration is designed for students interested in studying physical geography, conservation of natural resources, geomorphology, hydrology, environmental sustainability and sustainable development. The *geographic information sciences* (GIS) concentration is designed for students more interested in developing skills in the application of a variety of geo-spatial technologies, such as GIS, remote sensing, computer cartography, and digital image processing.

Highlights

Located on the third floor of the Lee Drain Building, the department maintains both a Geographic Information System (GIS) lab and a combination computer cartography and remote sensing lab. These labs contain state-of-the-art computers, software and scanners. We also have a van for fieldtrips, a coring device capable of taking up to 6m core samples, high-quality GPS receivers, a large-scale flume to demonstrate sedimentation processes, and a Ground Penetrating Radar System. In order to enhance learning, all of our rooms are outfitted with video-projection systems, and our lecture rooms have sound systems and dedicated computers with Internet access that are used by the instructors for teaching purposes. Many of our students obtain internships and work with faculty members on research projects. Beyond traditional in-class courses, the geography program does offer a number of on-line courses. The program also regularly offers a number of field courses that offer students opportunities to directly experience the geographical processes and concepts learned in the classroom. Some of these field courses involve travel and/or international experiences and have included trips to Thailand, Hawaii, Mississippi Delta, Brazil, Spain, Italy and other locations.

Career Opportunities

Because of the breadth of geography, there are a wide variety of career opportunities for geography graduates. These opportunities include careers in the following:

- urban and/or regional planning
- GIS analyst/programmer
- environmental consulting and management
- emergency management
- state transportation departments
- city, county, state, and federal government
- education/teaching
- geoscientist/geo-technician
- travel writing
- energy companies
- tourism
- military

Geography's focus on spatial relationships, in conjunction with new advances in technology, have led to the development of a host of geographical tools—principally Geographic Information Systems (GIS) and Global Positioning Systems (GPS)—that regularly function as core tools used in a wide variety of fields. In fact, geospatial technology now affects almost every aspect of life, from navigating an unfamiliar neighborhood to locating the world's most wanted terrorists. Because these tools can be applied within virtually any field (government, business, military, etc.) geospatial technology is one of the fastest growing job fields and the demand for people with experience using them exceeds the supply. Aside from offering a major concentration that emphasizes these technologies, we also offer students an Interdisciplinary Minor in Geospatial Science (GSS) that emphasizes GIS, remote sensing and computer cartography. The combination of geography major and a GSS minor is highly marketable. In addition, we also offer a GIS certificate program for students desiring to pursue a limited number of geotechnical courses. With their broad background, geography graduates have an ability to see connections where others do not, and this enables geographers to work in many different fields. Geography literally offers a world of opportunities.

Suggested Minors

- GSS (Geo-spatial Science)
- Geology
- Foreign Language
- Biology or Environmental Science
- History
- International Business
- Sociology
- Mass Communication
- Computer Science
- Political Science
- Secondary Education

Program Specific Requirements

Students must meet the academic standards established by the university.

Curriculum

Required Courses for Geography Major

Bachelor of Arts, human geography concentration

Code	Title	Hours
Course Requirements		
Select one of the following		3-4
GEOG 1401	Weather and Climate <small>will double-dip with Core or Degree Specific lab science requirement</small>	
GEOG 2320	Sustainability & Environment	
GEOG 2341	Physical Geography	
GEOG 3301	Environmental Geography	

Select two of the following:		6
GEOG 1300	People, Place and the Envrnmt	
GEOG 2355	World Reg Geo-Eur Asia Aust	
GEOG 2356	Reg Geo-Lat Am Africa So Asia	
GEOG 3350	Cultural Geography	3
Select one of the following technique courses:		3
GEOG 2364	Geo-Spatial Technology	
GEOG 2464	Intro to Geographic Info Sys	
GEOG 3363	Computer Cartography	
GEOG 4333	Field Studies	
GEOG 4361	Geographic Information Systems for Public Health	
GEOG 4365	Applied Geographic Info Systms	
GEOG 4468	Remote Sensing	
Select five of the following:		15
GEOG 3310	Sustainable Development	
GEOG 3352	Tourism Geography	
GEOG 4351	Economic Geography	
GEOG 4356	Urban Geography	
GEOG 4357	Population Geography	
GEOG 4359	Transportation Geography	
GEOG 4360	Cultural Field Study	
Advanced Geography Electives		3
General Geography Electives		3
Total Hours		36-37

Bachelor of Science, human geography concentration

The above requirements, plus additional degree specific requirements (see below)

Bachelor of Arts, environmental geography concentration

Code	Title	Hours
Course Requirements		
GEOG 1401	Weather and Climate	4
GEOG 2341	Physical Geography	3
or GEOG 2320	Sustainability & Environment	
GEOG 3301	Environmental Geography	3
Select one of the following:		3
GEOG 1300	People, Place and the Envrnmt	
GEOG 2355	World Reg Geo-Eur Asia Aust	
GEOG 2356	Reg Geo-Lat Am Africa So Asia	
Select one of the following technique courses:		3
GEOG 2464	Intro to Geographic Info Sys	
GEOG 3363	Computer Cartography	
GEOG 4333	Field Studies	
GEOG 4361	Geographic Information Systems for Public Health	
GEOG 4365	Applied Geographic Info Systms	
GEOG 4468	Remote Sensing	
Select three of the following:		9
GEOG 3310	Sustainable Development	
GEOG 4430	Hydrology and Water Resources	
GEOG 4331	Conservation of Natural Res	
GEOG 4432	Geomorphology	
Advanced Human Geography		6
GEOG 3350	Cultural Geography	

GEOG 3352	Tourism Geography	
GEOG 4351	Economic Geography	
GEOG 4356	Urban Geography	
GEOG 4357	Population Geography	
GEOG 4359	Transportation Geography	
Advanced Geography Electives		3
General Geography Electives		3
Total Hours		37

Bachelor of Science, environmental geography concentration

The above requirements, plus additional degree specific requirements (see below)

Bachelor of Science, geo-spatial information science concentration

Code	Title	Hours
Course Requirements		
Select two of the following:		6
GEOG 1300	People, Place and the Envrnmt	
GEOG 1401	Weather and Climate	
GEOG 2355	World Reg Geo-Eur Asia Aust	
GEOG 2356	Reg Geo-Lat Am Africa So Asia	
GEOG 3301	Environmental Geography	3
or GEOG 3350	Cultural Geography	
Concentration Specific		17
GEOG 2464	Intro to Geographic Info Sys	
GEOG 3363	Computer Cartography	
GEOG 4361	Geographic Information Systems for Public Health	
GEOG 4365	Applied Geographic Info Systems	
GEOG 4468	Remote Sensing	
Applied Cognate		6
GEOG 4331	Conservation of Natural Res	
GEOG 4333	Field Studies	
GEOG 4351	Economic Geography	
GEOG 4356	Urban Geography	
GEOG 4357	Population Geography	
GEOG 4359	Transportation Geography	
GEOG 4432	Geomorphology	
Advanced Geography Electives		3
General Geography Elective		3
Total Hours		38

In addition to these requirements, students must take the degree-specific courses particular to their respective degree (BA or BS).

Geology Program

Coordinator: Brian J. Cooper (bio_bjc@shsu.edu) (936) 294-1566

Website: Department of Geography and Geology (<http://www.shsu.edu/academics/geography-geology>)

Geology is the ultimate integrated science because all of the principles and methods of the other sciences, as well as geologic principles and methods, are applied to an understanding of the Earth. Geologists study rocks, of course, but they study them from the context of providing information that may eventually be used to forecast earthquakes, volcanic eruptions, and other geologic hazards. The information obtained may also be applied to help geologists locate various natural resources. Therefore, geology serves to enhance human existence by attempting to reduce risk and by providing the materials necessary for the expansion of civilization.

Academic Programs

The Geology Degree is designed for the person seeking a position in industry or planning to attend graduate school. The Geoscience Plan is designed for the person with a general interest in geology. Each plan is designed to provide an education in the fundamentals of geology. The required geology

courses will give the student an understanding of the Earth and will provide an opportunity to observe, investigate, analyze, and interpret geological materials, processes, and structures.

Highlights

Located on the third floor of the Lee Drain Building, the department places considerable emphasis on the integration of lab-based analytical science with similarly rigorous analysis conducted by means of field work. In support, the department maintains a range of field and laboratory equipment including a Mackereth coring system, a vibracorer, a research flume, a portable XRF, an X-ray diffractometer, a catholuminescence microscope, plus a variety of GPS and GIS-linked surveying equipment. Many of our students obtain internships and work with faculty members on research projects.

Career Opportunities

Geology majors generally pursue careers in three areas:

- the environmental industry
- the petroleum industry
- teaching

Geology students are provided with the knowledge and skills required to pursue an applied profession, a career in education, and/or continued education at the graduate level.

Suggested Minors

- Computer Sciences
- Geography
- Geographic Information Systems
- Mathematics
- Other sciences (Biology, Chemistry, or Physics)

Program Specific Requirements

Geology program specific requirements include 8 hours in each of CHEM and PHYS; plus 7-8 hours of MATH.

Curriculum

Required Courses for Geology Major

Bachelor of Science, Geology

Code	Title	Hours
Required Courses		
GEOL 1403 or GEOL 1405	Physical Geology Geologic Hazards & Resources	4
GEOL 1404	Historical Geology	4
GEOL 3301	Field Methods	3
GEOL 3404	Mineralogy	4
GEOL 3405	Petrology	4
GEOL 4304	Geochemistry	3
GEOL 4400	Stratigraphy & Sedimentation	4
GEOL 4402	Structural Geology	4
GEOL 4413	Methods in Applied Geophysics	4
GEOL 4360	Field Geology	3
GEOL 4361	Field Geology	3
Three Advanced GEOL Electives		9
Total Hours		49

Bachelor of Science, Geoscience

Code	Title	Hours
Required Courses		
GEOL 1403 or GEOL 1405	Physical Geology Geologic Hazards & Resources	4
GEOL 1404	Historical Geology	4

GEOL 3301	Field Methods	3
GEOL 3404	Mineralogy	4
GEOL 3405	Petrology	4
GEOL 4304	Geochemistry	3
GEOL 4400	Stratigraphy & Sedimentation	4
GEOL 4402	Structural Geology	4
GEOL 4413	Methods in Applied Geophysics	4
Five Advanced GEOL Electives		15
Total Hours		49

Academic Programs

- Bachelor of Arts, Major in Geography (Human Geography) (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/ba-geography-human-geography)
- Bachelor of Science, Major in Geography (Human Geography) (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/bs-geography-human-geography)
- Bachelor of Arts, Major in Geography (Environmental Geography) (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/ba-geography-environmental-geography)
- Bachelor of Science, Major in Geography (Environmental Geography) (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/bs-geography-environmental-geography)
- Bachelor of Science, Major in Geography, Geo-spatial Information Sciences (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/bs-geography-geo-spatial-information-sciences)
- Bachelor of Science, Major in Geology (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/bs-geology)
- Bachelor of Science, Major in Geology (Geoscience) (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/bs-geology-geoscience)
- Bachelor of Science, Major in Composite Science-Geology Concentration (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/bs-composite-science)
- Minor in Geography (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/minor-geography)
- Minor in Geo-Spatial Science (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/minor-geo-spatial-science)
- Minor in Geology (catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/geography-geology/minor-geology)

Geography

Student Organizations

- **Geographers of Sam Houston (GOSH)** - GOSH is intended to enhance appreciation for geography through club-sponsored field trips, guest lectures, and other activities, and to promote camaraderie among geography students.
- **Gamma Theta Upsilon (GTU)** - GTU is the National Geography Honor Society and was established to promote geographic awareness and the pursuit of geographic knowledge. To be eligible for membership in this honor society, students must have at least 12 hours of geography coursework, a minimum GPA of 3.25 in their geography coursework, and an overall GPA of at least 3.0.

Internships

Educational and research opportunities using GIS are available through a variety of internship opportunities that will increase students' skills and employment opportunities.

Richardson Endowment Awards

- **C. ALLEN WILLIAMS AWARD FOR GEOGRAPHY STUDENTS:** \$500-\$700 one semester. Geography majors or minors, senior status.
- **CODY BARRON AWARD FOR GEOGRAPHY STUDENTS:** \$500-\$700 one semester.

Geography majors or minors, senior status.

- **GERALD L. HOLDER AWARD FOR GEOGRAPHY STUDENTS:** \$500 – \$700 one semester. Geography majors or minors, senior status, 3.0 GPA Geography overall.
- **JAMES ELLISON KIRKLEY AWARD:** Two awards (amounts vary) to majors in history, political science, geography, or sociology. Recipients are selected on basis of high academic achievement.
- **JOHN H. BOUNDS AWARD FOR GEOGRAPHY STUDENTS:** \$500-\$700 for one semester. Geography majors or minors, senior status.
- **THE ELTON M. SCOTT AWARD FOR GEOGRAPHY STUDENTS:** \$500 – \$700 one semester. Geography majors or minors, senior status. 3.0 GPA Geography overall.

Request information from:

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 Geography Program Coordinator
 (936) 294-4077
 Department of Geography and Geology
 Box 2148
 Huntsville, TX 77341-2148
 (936) 294-1233

Geology

Student Organizations

Sam Houston Association of Geology Students (SHAGS) - SHAGS is a very active student organization that sponsors field trips to sites in Texas, Oklahoma, and Arkansas. Alumni, professors, and other professional geologists are invited to speak at SHAGS meetings. Geology majors benefit greatly from the sense of camaraderie gained during the field trips, meetings, and other activities.

Internships

Educational and research opportunities are available through a variety of internship opportunities in the fields of GIS, hydrocarbons, and environmental geology that will increase students' skills and employment opportunities.

Awards and Scholarships

- **CANNAN GEOLOGICAL SCHOLARSHIPS:** \$600 per year, junior or senior status, Geology majors, minimum GPA of 3.2 in Geology and overall 3.0, faculty recommendations required.
- **HOUSTON GEOLOGICAL SOCIETY OUTSTANDING SENIOR AWARD:** Awards and scholarships funded by the Houston Geological Society given to just seven universities in Texas.
- **HOUSTON GEOLOGICAL SOCIETY SCHOLARSHIP:** Award recipients are determined by a faculty committee during the Spring semester.
- **SHAGS Award:** \$500 per year, awarded to two students, junior or senior status, Geology majors, minimum GPA of 3.0, faculty recommendations required.

Geography

GEOG 1300. People, Place and the Environment. 3 Hours.

The basic concepts of meteorology and climatology are introduced. Atmospheric temperature, pressure, winds, moisture, and air masses and storms are systematically covered, followed by an overview of the major climates and ecosystems of the earth. Environmental problems related to weather, climate, and ecosystems are considered throughout.

GEOG 1401. Weather and Climate. 4 Hours.

The basic concepts of meteorology and climatology are introduced. Atmospheric temperature, pressure, winds, moisture, and air masses and storms are systematically covered, followed by an overview of the major climates and ecosystems of the earth. Environmental problems related to weather, climate, and ecosystems are considered throughout. The lab portion of weather and climate is an activity-related treatment of the basic components of meteorology and climatology. Specific topics covered are similar to the lecture.

GEOG 2320. Sustainability & Environment. 3 Hours.

Students investigate and assess the impacts that human activity can have on the environment and will seek to identify innovative, cross-disciplinary solutions to many of the world's most pressing environmental challenges. Given that Sustainability Science involves making decisions and taking actions that are in the interest of protecting the natural world, course topics will include current sustainability issues related to population growth, agriculture, natural resources, energy usage, habitat degradation and ecological economics. This course is typically be offered every other fall semester.

Prerequisite: BIOL 1401.

GEOG 2341. Physical Geography. 3 Hours.

Students examine the basic physical and biological systems of planet Earth, including the atmosphere, oceans, landforms, soils, and ecosystems. Emphasis is placed on understanding the distribution, scale, and dynamic inter-relationships and processes, which shape the physical and biological landscape as well as the ways in which humans alter the environment and are, in turn, affected by the environment.

GEOG 2355. World Reg Geo-Eur Asia Aust. 3 Hours.

Students are provided a general overview of the land and people. Topics discussed may include the physical environment, cultural characteristics and the various ways people live and make their living. Attention is focused upon the relationships which exist between location, the physical environment and human activity. Examples of countries covered are Russia, Germany, France, China, Japan, and United Kingdom.

GEOG 2356. Reg Geo-Lat Am Africa So Asia. 3 Hours.

Students are provided a general overview of the land and people. Topics discussed may include the physical environment, cultural characteristics and the various ways people live and make their living. Attention is focused upon the relationships which exist between location, the physical environment and human activity. Examples of countries covered are Mexico, Brazil, Argentina, Egypt, Republic of South Africa, Israel, Iran, and India.

GEOG 2364. Geo-Spatial Technology. 3 Hours.

Students are introduced to technologies, such as geographic information systems (GIS) and global positioning systems (GPS), that are used to map and study the Earth. The emphasis is placed on the application of these technologies in areas of environmental and natural resources management, business and marketing, and law enforcement and national security.

GEOG 2464. Intro to Geographic Info Sys. 4 Hours.

Students are introduced to the basics of geographic information systems (GIS) with an emphasis on environmental and resource management applications. Students design and develop a digital spatial database, perform spatial analyses, create hardcopy maps, and generate reports. Students are introduced to several GIS software packages. This course does incorporate a laboratory component.

GEOG 3301. Environmental Geography. 3 Hours.

Environmental Geography is a study of the spatial dimensions of the interaction between humans and their physical environment. Key principles of how the earth and the earth's ecosystems work, how they are interconnected, and how humans use and impact these natural resource systems will be introduced.

GEOG 3310. Sustainable Development. 3 Hours.

Sustainable development is both a fundamental concept used to understand the modern world and a tool to address global issues. Students examine this concept using the framework of geography and a global perspective. Students focus on the intersections of environment and society, including environmental, economic, and social barriers to development, environmental and social impacts of development, and the role of environmental sustainability in achieving global development goals.

Prerequisite: GEOG 1321 or GEOG 2355 or GEOG 2356.

GEOG 3350. Cultural Geography. 3 Hours.

Students focus on the concept of culture from a spatial or geographical perspective, examining culture as it relates to the geographic landscape. Topics may include the spatial dynamics of language, religion, race, ethnicity, music, sport, folk and popular cultures, and the built environment. In addition, students are provided an examination of symbolic landscapes, contested spaces, subaltern geographies, representations of place in film and literature, gendered spaces, and place-situated identities.

GEOG 3352. Tourism Geography. 3 Hours.

Students are provided an introduction to the geography of tourism. Topics may include the historical development of travel and tourism, place promotion, location of tourism destinations, geographic resources of tourism, and the physical and social outcomes of tourism.

Prerequisite: GEOG 1321 or GEOG 2355 or GEOG 2356.

GEOG 3358. Historical Geog of the U.S.. 3 Hours.

Students survey the changing geography of the United States including initial exploration, European perception of North America, geographical expansion of the United States to the Pacific, and geographical factors underlying the urbanization and industrialization of the nation.

GEOG 3359. Regional Geography:US & Canada. 3 Hours.

Students are provided a general overview of the land and people of the United States and Canada. Topics covered may include the physical environment (weather patterns, landforms and water resources), cultural differences, and the various ways people live and make their living. Attention is focused upon the relationships which exist between location, the physical environment and human activity. This course is available on-line and via traditional classroom delivery.

GEOG 3362. Map Use & Map Interpretation. 3 Hours.

Students learn how to use and interpret topographic maps and helps them to develop an appreciation of their use as tools by geographers. Students are familiarized to map projections and their limitations, various coordinate systems, map measurements, GPS, and the basics of air photo interpretation.

GEOG 3363. Computer Cartography. 3 Hours.

Fundamentals of thematic mapping, including appropriate usage, projections, base-map compilation, data measurement and analysis, map design and construction, color principles, and other cartographic concepts are emphasized.

Prerequisite: GEOG 2464.

GEOG 4075. Readings in Geography. 1-3 Hours.

A course designed specifically for advanced students of geography who are capable of independent study. Registration is permitted only upon approval of the program coordinator. This course may be taken for Academic Distinction credit. See Academic Distinction Program in this catalog. Variable Credit (1-3).

GEOG 4076. Special Topics. 1-3 Hours.

This course of faculty-led study is designed to explore geographical topics and concepts in a course setting. Students engage in either an in-depth, interdisciplinary study of a particular geographic region in the world, or a systematic study of a geographic topic. The course is repeatable for different regions or different topics. Variable Credit (1 to 3).

Prerequisite: GEOG 1321, or GEOG 2355, or GEOG 2356, or permission of instructor.

GEOG 4331. Conservation of Natural Res. 3 Hours.

Students explore the impact of human activities on the natural world, environmental protection, and the wise use of the earth's resources. Topics may include: environmental history, economics, law and ethics, ecology, population issues, agriculture and grazing, soil conservation, forestry, endangered and exotic species, water availability and water pollution, hazardous and solid waste management, air pollution (including global warming), energy resources (fossil, nuclear, and renewable), and the impact of technology on the future health of the planet.

GEOG 4333. Field Studies. 3 Hours.

Use of geospatial technologies such as Global Positioning Systems (GPS), laser surveying, digital aerial photography and computerized mapping (GIS) are stressed. Applications of these technologies will include surveying, water resources, forestry, soil science, wetlands delineation, urban and transportation planning, automobile accident reconstruction and crime scene evidence recovery. Half of the class meetings take place at a variety of outdoor locations.

GEOG 4351. Economic Geography. 3 Hours.

Students examine of the importance of location to human activity. The locational characteristics of primary, secondary, and tertiary economic activities are examined, with an emphasis on land use and urban form, its theory, and descriptive analysis as well as an explanation of market forces and their consequences. Writing enhanced.

GEOG 4356. Urban Geography. 3 Hours.

Students are introduced to the scope and nature of urban areas from a geographical or spatial perspective. Students focus on the spatial structure of urban areas and examine the geography of cities using an urban systems approach. Emphasis is placed on the North American city and its problems: land use, transportation, political fragmentation, physical environment, demographic and social change, economic dynamics, residential patterns, urban culture, poverty, etc. Trends in urbanization in both developed and developing worlds are discussed. Writing enhanced. **Prerequisite:** GEOG 1321 or GEOG 2355 or GEOG 2356.

GEOG 4357. Population Geography. 3 Hours.

Students examine spatial patterns and processes influencing the distribution, density, composition, and growth in human populations. Students focus on migration, and to a lesser extent, on fertility and mortality together with socio-economic, political, and environmental causes and consequences of population dynamics that vary between regions and over time. Writing enhanced.

Prerequisite: GEOG 1321 or GEOG 2355 or GEOG 2356.

GEOG 4358. Geography of Texas. 3 Hours.

Students engage in a survey of the regional geography of Texas. Consideration is given to the significance of primary and secondary activity within the state, urbanization, and potential for development.

GEOG 4359. Transportation Geography. 3 Hours.

Students are introduced to the concepts, theories, and methods of transportation geography. Students cover transportation infrastructure, modes of terminals, transportation economics, urban transportation, logistics, and transportation planning. In addition, students course cover various analytical techniques applied in transportation analysis, such as network analysis, gravity models, location-allocation modeling, and geographic information systems in transportation studies.

Prerequisite: GEOG 1321 or GEOG 2355 or GEOG 2356 or permission of instructor.

GEOG 4360. Cultural Field Study. 3 Hours.

Students focus on a number of topics and concepts that fall within the sub-discipline of cultural geography. Students engage in place-based learning, with the primary emphasis being a field experience that directly exposes students to processes and concepts introduced and discussed in the classroom. These may include migration, urbanization, economic transformations, demographic change, social and technological change, racial segregation, civil rights, heritage tourism and other topics. Writing enhanced.

Prerequisite: 6 GEOG advanced hours or permission of Instructor.

GEOG 4361. Geographic Information Systems for Public Health. 3 Hours.

Students cover the theory and application of Geographic Information Systems (GIS) for public health. Topics include an overview of the principles of GIS in public health and practical experience in its use. In addition, students cover the application of GIS mapping and analyzing the geographic distribution of populations at risk and health outcomes. The practical component involves the use of desktop GIS software packages.

GEOG 4365. Applied Geographic Info Systms. 3 Hours.

Applied GIS is designed to meet the needs for a highly applied course with realistic practical training extending the fundamental principles learned in Introduction to Geographic Information Systems (GEOG 2464). The application of GIS technology to mapping, modeling and management of large data bases are emphasized.

Prerequisite: GEOG 2464.

GEOG 4367. GIS Programming. 3 Hours.

Students learn computer programming principles and their applications in a Geographic Information Systems (GIS) environment, as well as modern programming languages for working within a variety of GIS software platforms. Students master the use of programming scripts to manipulate basic mapping objects, complete geo-processing tasks, debug and error handling, and create custom geospatial tools.

Prerequisite: GEOG 2464 or approval of instructor.

GEOG 4430. Hydrology and Water Resources. 4 Hours.

Students examine the hydrologic cycle with an emphasis on surface water processes. Specific topics may include precipitation, infiltration, evapotranspiration, fluvial processes, and sediment transport. Using the physical concepts and equations related to these topics, students analyze water-related hazards, including flooding and drought, as well as water management and policy. While Texas-specific issues are emphasized, students explore both U.S. and international geographies of hydrology, water resources, and water management.

Prerequisite: GEOL 1403 or GEOG 2341 or GEOG 4432 and MATH 1314 or MATH 1369 or MATH 1420; or permission of instructor.

GEOG 4432. Geomorphology. 4 Hours.

Students focus on surficial geological processes and the resulting landforms. Specific topics may include landscape processes associated with streams, glaciers, wind, coasts, mass wasting, weathering and soil development, and geologic structure. Labs emphasize landform analysis through interpretation of topographic maps and aerial photos. Two-hour laboratory. Two-hour laboratory.

Prerequisite: GEOL 1303.

GEOG 4468. Remote Sensing. 4 Hours.

Students are introduced to the methods used to analyze and interpret aerial photography and satellite imagery. Emphasis is placed on multispectral satellite imagery, digital image processing, and land use and land cover analysis using remotely sensed imagery. Lab included.

Geology

GEOL 1403. Physical Geology. 4 Hours.

Students are introduced to the materials, processes, and structure of the earth. Topics may include earthquakes, volcanoes, plate tectonics, mountain building, weathering and erosion, glaciation, oceans, and mineral resources. The laboratory taken concurrently with the lecture includes experiences that involve the study of rocks, minerals, and map interpretations.

GEOL 1404. Historical Geology. 4 Hours.

Students are introduced to the history of the earth and its past inhabitants, including a section on the dinosaurs and their extinction. Students are given a broad overview of the tectonic evolution of the planet, indicated by various major mountain-building events; ancient environments and changing sea levels recorded in sedimentary deposits; and the evolution of life represented by the fossil record. The laboratory taken concurrently with the lecture includes the study of common animal and plant fossils and problems that illustrate practical applications of geological principles.

GEOL 1405. Geologic Hazards & Resources. 4 Hours.

Students are introduced to the interrelationship between humans and the geologic environment, which includes the potential hazards posed by geologic processes and the planning that needs to be done to lessen their impact. Earth materials and their uses by humans are also emphasized. The laboratory taken concurrently with the lecture includes map and air photo interpretation, analysis of remote sensing data, and study of economically important earth materials. Field trips and take-home computer exercises are also required.

GEOL 1436. Foundations of Science. 4 Hours.

Students focus on the nature of science as a reliable method of acquiring knowledge about the natural world. Students learn how to apply key scientific facts, concepts, laws and theories to distinguish science from non-science, bad science, and pseudoscience by analyzing a variety of claims and case studies. By employing an innovative, interdisciplinary approach to science education, this course is designed to increase science literacy and critical thinking skills for introductory-level science students. Students must enroll concurrently in the corresponding lab for this course.

GEOL 3301. Field Methods. 3 Hours.

Students are provided experience with common field techniques used in geologic mapping and geologic investigations. An emphasis is placed on techniques and skills used for systematic field observations and data collection for construction of stratigraphic columns, structural cross-sections, and the development of geologic maps. The course has a mandatory two-week field component.

Prerequisite: GEOL 1304/GEOL 1104 or GEOL 1404 and GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/GEOL 1105 or GEOL 1405.

GEOL 3326. Environmental Geology. 3 Hours.

Students are introduced to geological processes and materials, and how they affect people and the environment. Specific topics include earthquakes, volcanism, mass wasting, floods, coastal hazards, and climatic change. Optional topics may include such items as energy and water resources, subsidence, and waste disposal.

Prerequisite: GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/ GEOL 1105 or GEOL 1405.

GEOL 3330. Oceanography. 3 Hours.

Students engage in a survey of the general principles of oceanography is made. The geology of ocean basins, tide-water processes and the chemistry of sea water are studied. Biophysics of the sea and environmental problems are considered.

Prerequisite: GEOL 1303/1103 or GEOL 1403 or GEOL 1305/1105 or GEOL 1405.

GEOL 3332. Forensic Geology. 3 Hours.

Students cover many of the basic geological principles and techniques used in solving crime. A significant part of the course involves case studies as well as hands-on field and laboratory analyses.

Prerequisite: GEL132/112 or GEOL 1303, GEOL 1103 plus CHEM 1311, CHEM 1111, CHEM 1312, CHEM 1112, and MATH 1316.

GEOL 3404. Mineralogy. 4 Hours.

Students cover crystallography, genesis of minerals, identification and classification of minerals, and optical mineralogy. Includes lab work.

Prerequisite: GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/GEOL1105 or GEOL 1405 and GEOL 1304/GEOL 1104 or GEOL 1404 and CHEM 1311/CHEM 1111 or CHEM 1411 and CHEM 1312/CHEM 1112 or CHEM 1412 and MATH 1316 or MATH 1410.

GEOL 3405. Petrology. 4 Hours.

Students engage in the classification, origin, occurrence and associations of igneous, sedimentary, and metamorphic rocks. Includes optical petrology using thin sections.

Prerequisite: GEOL 3404.

GEOL 3415. Paleontology of Invertebrates. 4 Hours.

Students focus on the fundamental concepts, principles, and methods involved in deciphering the origin, development, and extinction of past life as revealed through the study of invertebrate fossils.

Prerequisite: GEOL 1304/GEOL 1104 or GEOL 1404.

GEOL 4095. Special Topics in Geology. 1-3 Hours.

Individual study in special areas of geology. Topic content is usually selected and agreed upon by the student and a member of the Geology faculty. Sometimes special topics courses are offered by the Geology faculty. This course may be taken for Academic Distinction credit. See Academic Distinction Program in this catalog.. Variable Credit (1-3). May be repeated for credit. May be repeated for credit.

Prerequisite: Prerequisites and credit will be determined by the faculty member.

GEOL 4304. Geochemistry. 3 Hours.

Students are provided a general introduction to all types of geochemistry that includes a discussion of the underlying chemical concepts, with an emphasis on the applications to geological environments. The chemical concepts include isotopic chemistry, thermodynamics, crystal chemistry, and aqueous solutions. The geological metasomatism, geothermobarometry, and environmental geochemistry. Even year Fall.

Prerequisite: CHEM 1411 and GEOL 3404 and GEOL 1405 or GEOL 1403.

GEOL 4312. Economic Geology. 3 Hours.

Students explore the origin and occurrence of economically important minerals. A portion of the course is devoted to petroleum.

Prerequisite: GEOL 1403 or GEOL 1405 plus GEOL 1404.

GEOL 4320. Petroleum Geology. 3 Hours.

Students review the origin and development of petroleum and natural gas deposits, and surveys the various tools used to prospect for commercial deposits of oil and natural gas.

Prerequisite: GEOL 1403 or GEOL 1405 plus GEOL 1404.

GEOL 4331. Geology of North America. 3 Hours.

Students study of the geologic history of the continent of North America. Topics may include paleogeography, major depositional areas and stratigraphic units, and paleotectonics.

Prerequisite: GEOL 1403 or GEOL 1405 plus GEOL 1404.

GEOL 4337. Plate Tectonics. 3 Hours.

Students are introduced to the movement of lithospheric plates. Topics to be covered may include earthquakes, volcanism, seismic tomography, the evolution of continents and ocean basins, and the influence of the earth's interior on these processes. Lecture only.

Prerequisite: GEOL 1303/1103 or GEOL 1403 or GEOL 1305/1105 or GEOL 1405 and GEOL 1304/1104 or GEOL 1404.

GEOL 4360. Field Geology. 3 Hours.

These courses will consist of on-site studies in structure, stratigraphy, petrology and paleontology. Field trips are taken to appropriate areas in Texas and/or surrounding states. T

Prerequisite: Senior standing.

GEOL 4361. Field Geology. 3 Hours.

These courses will consist of on-site studies in structure, stratigraphy, petrology and paleontology. Field trips will be taken to appropriate areas in Texas and/or surrounding states. T

Prerequisite: Senior standing.

GEOL 4400. Stratigraphy & Sedimentation. 4 Hours.

Students study the principles and methods used in describing, classifying, and correlating strata, which includes studies of modern and ancient depositional environments. Lab/field work included.

Prerequisite: GEOL 1304/GEOL 1104 or GEOL 1404 and GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/GEOL 1105 or GEOL 1405.

GEOL 4402. Structural Geology. 4 Hours.

Students cover the principles of deformation of the Earth's lithosphere with emphasis on mechanical principles, identification and interpretation of structures from the microscopic scale to the scale of mountain belts. Other topics may include regional tectonics and application in petroleum exploration. Lab work focuses on graphical and quantitative techniques of analyzing geologic structures.

Prerequisite: GEOL 1303, GEOL 1103, PHYS 1301, PHYS 1101, MATH 1316.

GEOL 4413. Methods in Applied Geophysics. 4 Hours.

Applied Geophysics involves measurements made on the surface of the Earth that are interpreted to yield the distribution of subsurface properties, particularly those having economic and engineering importance. Students are provided an introduction to the latest methods used to map the distribution of physical properties beneath the surface of the Earth and is widely recommended for students who plan to pursue careers that directly or indirectly involve subsurface imaging and analysis.

Prerequisite: GEOL 1305, GEOL 1105 or GEOL 1303, GEOL 1103, MATH 1420, PHYS 1301, PHYS 1101, PHYS 1302, PHYS 1102, or by permission of instructor.

GEOL 4414. Sea Level Chg&Geological Rec. 4 Hours.

Students examine the various modern causes of relative and absolute sea level change. In addition, students engage in an analysis of ancient geological sedimentary and stratigraphic records from the perspective of what they reveal about rates and scales of sea level change in the past as well as implications for the future. Sequence stratigraphic concepts (commonly used in the petroleum industry) are critically examined via field-based and paper and core-based studies.

Prerequisite: GEOL 1403 or GEOL 1405 plus GEOL 1404.

GEOL 4426. Hydrogeology. 4 Hours.

Students are introduced to the study of groundwater and its role in the hydrologic cycle. Topics may include properties and distribution of water on the surface, in the vadose zone and in aquifers; behavior, modeling, and geology of groundwater aquifers; human use and abuse of water resources, including groundwater contamination and extraction; and water law economics, and aquatic ecology. A lab with field trips focus on measurement and modeling of groundwater.

Prerequisite: GEOL 1403 and MATH 1316.

Faculty

Director/Chair: **Brian Jay Cooper**

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