Department of Geology and Geography

The Department of Geology and Geography offers a balance of teaching, research, and service to the region served by the University, and beyond. Areas of focus among geology faculty include igneous and metamorphic petrology, paleontology, sedimentology, structural geology, hydrogeology, coastal geology, environmental geology, geoscience education, and natural history of the Coastal Plain. Geography faculty interests include climatology, geomorphology, geospatial analysis, economic geography, health geography, cultural geography, ecohdrology, hazards, and biogeography. Both programs emphasize the application of Geographic Information Science.

Geology and Geography Majors


Geology and Geography Minors


Geology and Geography Concentration


GEOG 1101 Introduction to Human Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Basic concepts of cultural geography including characteristics and spatial patterns of population, religions, settlements, economies, languages, nutrition, health, migration, economic development, art, music, and other cultural phenomena.
Cross Listing(s): GEOG 1101H, GEOG 1101S.

GEOG 1101H Introduction to Human Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Basic concepts of cultural geography including characteristics and spatial patterns of population, religions, settlements, economies, languages, nutrition, health, migration, economic development, art, music, and other cultural phenomena.
Cross Listing(s): GEOG 1101, GEOG 1101S.

GEOG 1110 Climate and the Landscape Lab
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
A series of laboratories and exercises designed to provide hands-on applications of general theories regarding earth processes discussed in GEOG 1111, Climate and the Landscape.
Prerequisite(s): Highly recommended to be taken concurrently with GEOG 1111.

GEOG 1111 Climate and the Landscape
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The earth's surface in its areal differentiation. Focuses on the various elements of physical geography that act as a foundation to the discipline, including location and interaction of physical surficial phenomena.
Prerequisite(s): Highly recommended to be taken concurrently with GEOG 1110.

GEOG 1130 World Regional Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Study of geographic regions of the world emphasizing physical landscapes, resources, economies, culture and politics. Selected problems or situations of contemporary interest will be incorporated.
Cross Listing(s): GEOG 1130H, GEOG 1130S.

GEOG 1130H World Regional Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Study of geographic regions of the world emphasizing Physical landscapes, resources, economies, culture and politics. Selected problems or situations of contemporary interest will be incorporated.
Cross Listing(s): GEOG 1130, GEOG 1130S.

GEOG 3130 Conservation
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Examination of environmental factors in the setting of human activities. Emphasis is on modern efforts in conservation and resource management concerning wildlife, forests, fisheries, agriculture, rangeland, water, soils and oceans.
Prerequisite(s): GEOG 1111 or BIOL 1130 or BIOL 1230 or BIOL 1331 or BIOL 1335 or TCCT 1530 or permission of instructor.
Cross Listing(s): GEOG 3130S.

GEOG 3130S Conservation
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Examination of environmental factors in the setting of human activities. Emphasis is on modern efforts in conservation and resource management concerning wildlife, forests, fisheries, agriculture, rangeland, water, soils and oceans.
Prerequisite(s): BIOL 1130, or BIOL 1230 or BIOL 1331, or BIOL 1335 or TCCT 1530 or GEOG 1111 or permission of instructor.
Cross Listing(s): GEOG 3130.

GEOG 3230 Economic Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Study of the distribution, production and utilization of the world's basic commodities.
Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 3230.
GEOG 3230S Economic Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Study of the distribution, production and utilization of the world’s basic commodities.
Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 3230.

GEOG 3330 Weather and Climate
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Elements and controls of weather and climate and the distribution and characteristics of climate regions.
Prerequisite(s): GEOG 1111.

GEOG 3440 Introduction to GIS and Cartography
0,4 Credit Hours. 0,2 Lecture Hours. 0,4 Lab Hours.
An introduction to the basic concepts, theories, techniques, and applications of Geographic Information Systems (GIS) and cartography. Students will learn and apply GIS and cartographic concepts to gain extensive hands-on experience in thematic mapping and manipulation of geo-referenced spatial information using GIS software.

GEOG 3530 Cultural Geography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An examination of the world’s diverse cultural landscapes. Emphasis on the connections between social, political, religious and agricultural patterns and the impact of societies on the natural environment.
Prerequisite(s): GEOG 1101 or GEOG 1130.

GEOG 3741 Remote Sensing
0,4 Credit Hours. 0,2 Lecture Hours. 0,4 Lab Hours.
Introduction to the concepts, theory, collection, analysis and applications of remotely sensed spatial information.
Prerequisite(s): Permission of instructor required.
Cross Listing(s): GEOL 3741.

GEOG 4120 Introduction to Research
2 Credit Hours. 2 Lecture Hours. 0 Lab Hours.
The process of research utilizing the scientific method will be studied. Research methods in human and physical geography are discussed and critiqued. Methodologies including literature searches, topic selection and refinement, and research problem solving will be discussed. A proposal for a research project will be selected or assigned, a proposal written, and an oral presentation of the proposed research will be made. A minimum grade of “B” is required to continue in the research sequence.
Prerequisite(s): Permission of instructor required.

GEOG 4130 Biogeography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Introduces students to biogeography: the study of the distribution of plants and animals. Both historical taxonomic and ecosystems biogeography are covered. The analysis and explanation of spatial patterns of plant and animal distribution, while addressing change in species distribution and evolution in response to climate change and the process of continental drift that have taken place in the past and are taking place today, will be emphasized.
Prerequisite(s): GEOG 1111 or BIOL 1130 or BIOL 1230 or BIOL 1331 or BIOL 1335 or GEOL 1430.

GEOG 4131 Geography of the American South
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Systematic regional treatment of the South including the physical, cultural and economic aspects of its various regions.

GEOG 4232 Geography of Latin America
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Study of the physical, cultural and economic geography of Latin America, including Mexico.
Cross Listing(s): LAST 4232.

GEOG 4233 Geography of Asia
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of the physical, cultural, political and economic geography of the countries of Asia. Selected problems or situations of contemporary interest will be incorporated.
Cross Listing(s): GEOG 4233S.

GEOG 4233S Geography of Asia
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of the physical, cultural, political and economic geography of the countries of Asia. Selected problems or situations of contemporary interest will be incorporated.
Cross Listing(s): GEOG 4233.

GEOG 4330 Geography of Africa South of the Sahara
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Survey of the physical, cultural, political and economic geography of Africa south of the Sahara Desert. Selected problems or situations of contemporary interest will be incorporated.
Cross Listing(s): AAST 4330.

GEOG 4430 Geography of Europe
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Survey of the physical, cultural, political and economic geography of Europe. Situations of contemporary interest will be included.
Cross Listing(s): GEOG 4430S.

GEOG 4430S Geography of Europe
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Survey of the physical, cultural, political and economic geography of Europe. Situations of contemporary interest will be included.
Cross Listing(s): GEOG 4430.

GEOG 4524 Intermediate GIS
0,4 Credit Hours. 0,2 Lecture Hours. 0,4 Lab Hours.
An introduction to advanced data models and spatial data analysis functions of Geographic Information Systems (GIS) software, with an emphasis on the conversion among various GIS data formats and geodatabase construction and management.
Prerequisite(s): GEOG 3440.

GEOG 4543 Advanced GIS: Spatial Analysis and Modeling
4 Credit Hours. 2 Lecture Hours. 4 Lab Hours.
This course covers the advanced spatial analysis and modeling functions of GIS and offers both fundamental theoretical background and extensive hands-on experience in spatial analysis and modeling. Major topics include network analysis, surface modeling, spatial patterns analysis, spatial data visualization, and basics of spatial statistics.
Prerequisite(s): GEOG 3440 and GEOG 4542.

GEOG 4610 Senior Thesis Seminar
1 Credit Hour. 1 Lecture Hour. 0 Lab Hours.
Proficiency in formal scientific paper presentation will be demonstrated. The student’s senior research topic from GEOG 4820 will generate both written and oral presentations made in a formal setting to an audience of professors and peers.
Prerequisite(s): GEOG 4120.

GEOG 4700 Internship in Geography
1-6 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
The internship allows students to work in a professional setting related to their chosen concentration in the field. Undergraduate students can earn between one and six credits for internships approved by their academic advisor and the Department’s Internship Director. Students must maintain contact with the Internship Director through the course of the internship work, and must submit a written report and a work product at the end of the project. Internship credits can be used for elective credit only and may not substitute for specific degree requirements.
Prerequisite(s): Permission of the Geology and Geography Internship Director is required.
GEOG 4830 Senior Thesis Research I 3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Students will complete a literature review and evaluation and conduct independent research as outlined in their research proposal formulated during Introduction to Research (GEOG 4120). Research is conducted under the direction of a faculty advisor and will lead to the completion of the senior thesis. 
Prerequisite(s): A minimum grade of "B" in GEOG 4120 and a minimum GPA of 3.0.

GEOG 4831 Senior Thesis Research II 3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
The process of scientific communication will be investigated and practiced through completion of a senior thesis project. This project includes both a written thesis and research presentation. Students will format a thesis manuscript suitable for publication in a professional journal and design and deliver an oral presentation suitable for a professional conference.
Prerequisite(s): A minimum grade of "B" in GEOG 4830.

GEOG 5000 Selected Topics 1-9 Credit Hours. 0-9 Lecture Hours. 0-9 Lab Hours.
Offered with or without a lab on an experimental basis. Graduate students will complete an individual term project or special report. 
Cross Listing(s): GEOG 5000S, GEOG 5000G.

GEOG 5000S Selected Topics 1-9 Credit Hours. 0-9 Lecture Hours. 0-9 Lab Hours.
Offered with or without a lab on an experimental basis. Graduate students will complete an individual term project or special report. 
Cross Listing(s): GEOG 5000S, GEOG 5000G.

GEOG 5090 Applied GIS 4 Credit Hours. 0 Lecture Hours. 8 Lab Hours.
Applications of advanced GIS design and modeling to a specific topical and/or geographic area. Topics and studies will be varied over time.
Prerequisite(s): GEOG 3440 and GEOG 4542 and GEOG 4543.

GEOG 5130 Geography of North America 3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Systematic regional treatment of Canada and the United States including the physical, cultural, and economic aspects of various sub regions. Special attention will be paid to comparative themes such as resource development, trade, and migration. Graduate students will complete an individual term project or special report. 
Cross Listing(s): GEOG 5130G.

GEOG 5230 Urban Geography 3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An analysis of site, situation, base, principal functions, distribution, supporting areas and internal structure of urban settlements. Graduate students will complete an individual term project or special report.
Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 5230S, GEOG 5230G.

GEOG 5230S Urban Geography 3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An analysis of site, situation, base, principal functions, distribution, supporting areas and internal structure of urban settlements. Graduate students will complete an individual term project or special report.
Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 5230S, GEOG 5230G.

GEOG 5330 Population Geography 3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course explores issues and themes related to the patterns, processes, and consequences of the spatial distribution of the world’s population. The course is organized around the fundamental components of population change, fertility, mortality, and migration. Current events related to population change and distribution in multiple geographical contexts will constitute a primary focus of the course. Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 5330G.

GEOG 5430 Political Geography 3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will cover the geography of political behavior from the local to the global scale by examining the relationship of geography and politics. Students will investigate the rapidly changing geopolitics of the era in which they live, with special emphasis on international relations, sovereignty, war, and terrorism. Additionally, the course will focus on redistricting, the Electoral College, and other geographic elements of our American democratic system. Graduate students will learn how to undertake an independent, supervised research project in the field of political geography.
Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 5430S, GEOG 5430G.

GEOG 5430S Political Geography 3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will cover the geography of political behavior from the local to the global scale by examining the relationship of geography and politics. Students will investigate the rapidly changing geopolitics of the era in which they live, with special emphasis on international relations, sovereignty, war, and terrorism. Additionally, the course will focus on redistricting, the Electoral College, and other geographic elements of our American democratic system. Graduate students will learn how to undertake an independent, supervised research project in the field of political geography.
Prerequisite(s): GEOG 1101 or GEOG 1130.
Cross Listing(s): GEOG 5430.

GEOG 5590 Field Studies in Geography 3-8 Credit Hours. 3-8 Lecture Hours. 0 Lab Hours.
An intensive course on a specific region of the world conducted in that region combining lecture, observation and travel. Students usually will bear tuition, travel and living expenses during the course. May be repeated for credit in different regions. Graduate students will complete an individual term project or special report. 
Cross Listing(s): GEOG 5590S, GEOG 5590G.

GEOG 5590S Field Studies in Geography 3-8 Credit Hours. 3-8 Lecture Hours. 0 Lab Hours.
An intensive course on a specific region of the world conducted in that region combining lecture, observation and travel. Students usually will bear tuition, travel and living expenses during the course. May be repeated for credit in different regions. Graduate students will complete an individual term project or special report. 
Cross Listing(s): GEOG 5590S.

GEOG 5890 Directed Study 1-4 Credit Hours. 1-4 Lecture Hours. 0 Lab Hours.
Independent study for advanced students. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): Approval of Department Chair is required.
Cross Listing(s): GEOG 5890S, GEOG 5890G.

GEOG 5890S Directed Study 1-4 Credit Hours. 1-4 Lecture Hours. 0 Lab Hours.
Independent study for advanced students. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): Approval of Department Chair is required.
Cross Listing(s): GEOG 5890S, GEOG 5890G.

GEOL 1011K Introductory Geosciences I 0,4 Credit Hours. 0,3 Lecture Hours. 0,2 Lab Hours.
This course covers Earth materials and processes.
GEOL 1110  Earth Laboratory
1 Credit Hour.  0 Lecture Hours.  2 Lab Hours.
A series of laboratory components that involve hands-on exercises with earth materials and processes which modify the Earth's interior and exterior. Concurrent or prior completion of GEOL 1121. Strongly recommend to be taken concurrently with GEOL 1121.
Corequisite(s): GEOL 1121.
GEOL 1121  Introduction to the Earth
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introductory study of the origin and structure of earth materials and the processes which modify Earth's interior and exterior. The laboratory component of this course offers hands-on exercises related to Earth materials, interpretation of topographic and geologic maps, principles of geologic time, and plate tectonic processes.
Cross Listing(s): GEOL 1121H, GEOL 1121S.

GEOL 1121H  Introduction to the Earth
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introductory study of the origin and structure of earth materials and the processes which modify Earth's interior and exterior. The laboratory component of this course offers hands-on exercises related to Earth materials, interpretation of topographic and geologic maps, principles of geologic time, and plate tectonic processes.
Cross Listing(s): GEOL 1121 and GEOL 1121S.

GEOL 1121S  Introduction to the Earth
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introductory study of the origin and structure of earth materials and the processes which modify Earth's interior and exterior. The laboratory component of this course offers hands-on exercises related to Earth materials, interpretation of topographic and geologic maps, principles of geologic time, and plate tectonic processes.
Cross Listing(s): GEOL 1121, GEOL 1121H.

GEOL 1122  General Historical Geology
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
Discusses the origin and geological history of Earth. Methods of interpretation, fossils, geologic time measurements, time scales, physical and organic development of Earth are taught.
Prerequisite(s): GEOL 1121 may be taken concurrently with permission of instructor.

GEOL 1310  Environmental Geology Lab
1 Credit Hour.  0 Lecture Hours.  2 Lab Hours.
A series of laboratory components that involve hands-on exercises with earth materials and processes which modify the Earth's interior and exterior.
Prerequisite(s): Concurrent or prior completion of GEOL 1121; strongly recommended to be taken concurrently with GEOL 1121.
Cross Listing(s): GEOL 1310H.

GEOL 1310H  Environ Geol Lab (Honors)
1 Credit Hour.  1 Lecture Hour.  0 Lab Hours.
A series of laboratory components that involve hands-on exercises with earth materials and processes which modify the Earth's interior and exterior.
Prerequisite(s): Concurrent or prior completion of GEOL 1121; strongly recommended to be taken concurrently with GEOL 1121.
Cross Listing(s): GEOL 1310.

GEOL 1340  Environmental Geology
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introduction to using geologic principles and knowledge to address problems arising from the interaction between humans and the geologic environment. One major component of the course examines geologic hazards, including flooding, earthquakes, volcanic eruptions, and coastal erosion. The other component explores important geologic resources, including water, soils, mineral, and energy, and the way modern society depends on these resources. The laboratory portion of the course consists of hands-on data collection, analysis, and problem solving of geologic and environmental problems related to natural hazards and society's use of Earth resources.
Cross Listing(s): GEOL 1310, GEOL 1310H.

GEOL 1340H  Environmental Geology (Honors)
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introduction to using geologic principles and knowledge to address problems arising from the interaction between humans and the geologic environment. One major component of the course examines geologic hazards, including flooding, earthquakes, volcanic eruptions, and coastal erosion. The other component explores important geologic resources, including water, soils, mineral, and energy, and the way modern society depends on these resources. The laboratory portion of the course consists of hands-on data collection, analysis, and problem solving of geologic and environmental problems related to natural hazards and society's use of Earth resources.

GEOL 1430  Dinosaurs, Extinctions and Disasters
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
A review of the dynamic processes of extinction, evolution, and change in ancient animal assemblages. Particular attention will be paid to the unique terrestrial communities that were dominated by dinosaurs, mammoths, and other megafauna. We will focus on the effects of meteorite collisions, ice ages, and mass extinction events.

GEOL 1530  Principles of Oceanography
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
This course is a survey course dealing with the physical, geological, and ecological features of ocean basins and coastlines, as well as chemical composition of ocean water and oceanic circulation processes.

GEOL 3520  Field Methods
2 Credit Hours.  0 Lecture Hours.  0 Lab Hours.
Instruction in the tools and techniques used in the collection of field data, compilation of geologic maps and crossed sections. Students will construct topographic and geologic maps and write geologic reports and abstracts. The course will consist of three main areas; data sources, data collection, and post-processing. Two weekend field trips are required.
Prerequisite(s): GEOL 1122 and MATH 1112 or MATH 1113; two-day field trips are required.

GEOL 3541  Mineralogy
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introduction to morphological crystallography, physical properties and the optical characteristics of the common minerals. Examines the genesis, occurrence, and uses of minerals. Laboratory work consists of study of common crystal forms, hand specimen identification and optical study via the petrographic microscope.
Prerequisite(s): GEOL 1110 or GEOL 1121, and CHEM 1145.

GEOL 3542  Petrology and Petrography
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introduction to using geologic principles and knowledge to address problems arising from the interaction between humans and the geologic environment. One major component of the course examines geologic hazards, including flooding, earthquakes, volcanic eruptions, and coastal erosion. The other component explores important geologic resources, including water, soils, mineral, and energy, and the way modern society depends on these resources. The laboratory portion of the course consists of hands-on data collection, analysis, and problem solving of geologic and environmental problems related to natural hazards and society's use of Earth resources.

GEOL 3542H  Petrology and Petrography (Honors)
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introduction to using geologic principles and knowledge to address problems arising from the interaction between humans and the geologic environment. One major component of the course examines geologic hazards, including flooding, earthquakes, volcanic eruptions, and coastal erosion. The other component explores important geologic resources, including water, soils, mineral, and energy, and the way modern society depends on these resources. The laboratory portion of the course consists of hands-on data collection, analysis, and problem solving of geologic and environmental problems related to natural hazards and society's use of Earth resources.

GEOL 3542H  Petrology and Petrography (Honors)
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introduction to using geologic principles and knowledge to address problems arising from the interaction between humans and the geologic environment. One major component of the course examines geologic hazards, including flooding, earthquakes, volcanic eruptions, and coastal erosion. The other component explores important geologic resources, including water, soils, mineral, and energy, and the way modern society depends on these resources. The laboratory portion of the course consists of hands-on data collection, analysis, and problem solving of geologic and environmental problems related to natural hazards and society's use of Earth resources.

GEOL 1110  Earth Laboratory
1 Credit Hour.  0 Lecture Hours.  2 Lab Hours.
A series of laboratory components that involve hands-on exercises with earth materials and processes which modify the Earth's interior and exterior. Concurrent or prior completion of GEOL 1121. Strongly recommend to be taken concurrently with GEOL 1121.
Corequisite(s): GEOL 1121.
GEOL 1121  Introduction to the Earth
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introductory study of the origin and structure of earth materials and the processes which modify Earth's interior and exterior. The laboratory component of this course offers hands-on exercises related to Earth materials, interpretation of topographic and geologic maps, principles of geologic time, and plate tectonic processes.
Cross Listing(s): GEOL 1121H, GEOL 1121S.

GEOL 1121H  Introduction to the Earth
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introductory study of the origin and structure of earth materials and the processes which modify Earth's interior and exterior. The laboratory component of this course offers hands-on exercises related to Earth materials, interpretation of topographic and geologic maps, principles of geologic time, and plate tectonic processes.
Cross Listing(s): GEOL 1121 and GEOL 1121S.

GEOL 1121S  Introduction to the Earth
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
An introductory study of the origin and structure of earth materials and the processes which modify Earth's interior and exterior. The laboratory component of this course offers hands-on exercises related to Earth materials, interpretation of topographic and geologic maps, principles of geologic time, and plate tectonic processes.
Cross Listing(s): GEOL 1121, GEOL 1121H.

GEOL 1122  General Historical Geology
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
Discusses the origin and geological history of Earth. Methods of interpretation, fossils, geologic time measurements, time scales, physical and organic development of Earth are taught.
Prerequisite(s): GEOL 1121 may be taken concurrently with permission of instructor.

GEOL 1310  Environmental Geology Lab
1 Credit Hour.  0 Lecture Hours.  2 Lab Hours.
A series of laboratory components that involve hands-on exercises with earth materials and processes which modify the Earth's interior and exterior.
Prerequisite(s): Concurrent or prior completion of GEOL 1121; strongly recommended to be taken concurrently with GEOL 1121.
Cross Listing(s): GEOL 1310H.

GEOL 1310H  Environ Geol Lab (Honors)
1 Credit Hour.  1 Lecture Hour.  0 Lab Hours.
A series of laboratory components that involve hands-on exercises with earth materials and processes which modify the Earth's interior and exterior.
Prerequisite(s): Concurrent or prior completion of GEOL 1121; strongly recommended to be taken concurrently with GEOL 1121.
Cross Listing(s): GEOL 1310.
GEOL 3741 Remote Sensing  
4 Credit Hours. 2 Lecture Hours. 4 Lab Hours.  
Introduction to the concepts, theory, collection, analysis and applications of remotely sensed spatial information.  
**Prerequisite(s):** Permission of instructor required.  
**Cross Listing(s):** GEOG 3741.

**GEOL 3790 Teaching Internship in Geology**  
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
Student interns in Introduction to the Earth (GEOL 1121), General Historical Geology (GEOL 1122), or Environmental Geology (GEOL 1340) will participate in teaching the course under the mentorship of a faculty member. Student interns will attend an introductory workshop immediately prior to the start of the semester, will intern in one of the above courses, and will meet with the faculty mentor one hour each week. One credit hour is awarded per laboratory section in which the student interns.  
**Prerequisite(s):** A minimum grade of "B" in GEOL 1121 or GEOL 1122 or GEOL 1340.

**GEOL 4120 Introduction to Research**  
2 Credit Hours. 2 Lecture Hours. 0 Lab Hours.  
The process of research will be studied from the scientific method through the process of writing a scientific proposal. Construction of a technical paper and the technical oral presentation will be examined and practiced. Usages of geologic terms will be explained and learned. A proposal for a research paper will be selected or assigned, a proposal written and an oral presentation of the proposal research will be made. A minimum grade of "B" is required to continue in the research sequence.  
**Prerequisite(s):** Permission of instructor required.

**GEOL 4530 Tectonics**  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
Processes, structures, and landforms associated with the deformation of the earth's crust are studied including the changes that take place on structures and landforms over time. Scales ranging from local to, regional, to global are incorporated.  
**Prerequisite(s):** GEOL 1121 or GEOL 1110.

**GEOL 4610 Senior Seminar**  
1 Credit Hour. 1 Lecture Hour. 0 Lab Hours.  
The process of scientific communication will be investigated and practiced. A final paper on the student's senior research topic will be written and an oral presentation made in a formal "Technical Session" format. The student will learn to prepare visual aids to illustrate his/her paper and talk. The "Technical Session" will be organized and run by students.  
**Prerequisite(s):** GEOL 4830.

**GEOL 4790 Internship in Geology**  
1-6 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
The internship allows students to work in a professional setting related to their chosen concentration in the field. Undergraduate students can earn between one and six credits for internships approved by their academic advisor and the Department's Internship Director. Students must maintain contact with the Internship Director through the course of the internship work, and must submit a written report and a work product at the end of the project. Internship credits can be used for elective credit only and may not substitute for specific degree requirements.  
**Prerequisite(s):** Permission of Geology and Geography Internship Director is required.

**GEOL 4830 Senior Thesis Research I**  
3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
Students will complete a literature review and evaluation and conduct independent research as outlined in their research proposal formulated during Introduction to Research (GEOL 4120). Research is conducted under the direction of a faculty advisor and will lead to the completion of the senior thesis.  
**Prerequisite(s):** A minimum grade of "B" in GEOL 4120 and minimum GPA of 3.0.

**GEOL 4831 Senior Thesis Research II**  
3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
The process of scientific communication will be investigated and practiced through completion of a senior thesis project. This project includes both a written thesis and research presentation. Students will format a thesis manuscript suitable for publication in a professional journal, and design and deliver an oral presentation suitable for a professional conference.  
**Prerequisite(s):** A minimum grade of "B" in GEOL 4830.

**GEOL 5090 Selected Topics**  
1-9 Credit Hours. 0-9 Lecture Hours. 0-9 Lab Hours.  
This course provides a means by which new courses can be offered for experimental purposes. Graduate students will complete an individual term project or special report.  
**Prerequisite(s):** Permission of instructor required.  
**Cross Listing(s):** GEOL 5090S, GEOL 5090G.

**GEOL 5090S Selected Topics**  
1-9 Credit Hours. 0-9 Lecture Hours. 0-9 Lab Hours.  
This course provides a means by which new courses can be offered for experimental purposes. Graduate students will complete an individual term project or special report.  
**Prerequisite(s):** Permission of instructor required.  
**Cross Listing(s):** GEOL 5090, GEOL 5090G.

**GEOL 5130 Geochemistry**  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
This course covers the theory and applications of stable and radiogenic isotope geochemistry as applied to low-temperature geological processes. Graduate students will complete an individual term project or special report.  
**Prerequisite(s):** CHEM 1146 and GEOL 3541.  
**Cross Listing(s):** GEOL 5130G.

**GEOL 5131 Economic Mineralogy**  
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.  
An introduction to the origins of industrial and metallic mineral resources, and the exploration, discovery and use of such resources. Laboratory work includes identification and evaluation of mineral resources and visits to mines. Graduate students must complete a paper on an assigned topic.  
**Prerequisite(s):** GEOL 3541.  
**Cross Listing(s):** GEOL 5131G.

**GEOL 5132 Regional Field Geology**  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
A field expedition involving geological investigation of a major geologic region of North America. Students will be expected to make geological observations through such techniques as mapping, measuring sections, collecting scientific samples, or other standard techniques, then to analyze and interpret their observations or measurements. A scientific journal or notebook will be used by each student to record data and observations. A final report will be required. Students usually will bear tuition, travel, and living expenses in the field. Graduate students will complete an individual term project or special report.  
**Prerequisite(s):** GEOL 1121.  
**Cross Listing(s):** GEOL 5132G.

**GEOL 5140 Vertebrate Paleontology**  
4 Credit Hours. 3 Lecture Hours. 2 Lab Hours.  
A study of the morphology, classification and geologic significance of vertebrate fossils. Graduate students will complete an individual term project or special report.  
**Prerequisite(s):** GEOL 1122 or permission of instructor; GEOL 5141 strongly recommended.  
**Cross Listing(s):** GEOL 5140G.
GEOL 5141  Paleontology  
0.4 Credit Hours.  0.4 Lecture Hours.  3 Lab Hours.  
This course provides an overview of the major principles, applications, and methods of paleontology. Topics covered in the course include, but are not limited to: the formation of fossils, fossil identification and classification, evolution and extinction, biostratigraphy, biogeography, paleoecology, and functional morphology. Labs utilize a diverse collection of invertebrate fossils and paleontology software. Graduate students will complete a special report, not required of undergraduates.  
Prerequisite(s): GEOL 1122.  
Cross Listing(s): GEOL 5141G.  

GEOL 5142  Stratigraphy and Sedimentation  
4 Credit Hours.  3 Lecture Hours.  2 Lab Hours.  
Introduction to the principles and application of stratigraphy and biostratigraphy, and principles of sedimentation. Emphasis is placed on concepts of time, time-rock, rock units, sedimentary facies, guide fossils and fossil range and description of rocks in time and space, their correlation and interpretation. Petrologic interpretation and basic laboratory techniques are also demonstrated. The origin and distribution of sedimentary rocks is examined from initial weathering through erosion and transportation, to environments and mechanisms of deposition. Graduate students will complete an individual term project or special report.  
Prerequisite(s): GEOL 3541.  
Cross Listing(s): GEOL 5142G.  

GEOL 5230  Earth Science  
3 Credit Hours.  2 Lecture Hours.  3 Lab Hours.  
A systematic study of the earth as a planet, including aspects of its atmosphere, oceans, lithosphere, soils and physiography. The laboratory will emphasize the location and utilization of local, as well as regional materials for earth science teaching and learning. Graduate students will complete an individual term project or special report. This course cannot be used for upper-level course credit in the Geology BA, Geology BS, or Geology Minor programs.  
Prerequisite(s): Permission of instructor required.  
Cross Listing(s): GEOL 5230G.  

GEOL 5231  General Oceanography  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course is an integrated approach to the study of oceans with special emphasis on geology, chemistry, and biology of ocean basins. Studies will include the ecological, physical, and geological features of ocean basins, as well as chemical composition of ocean water and oceanic circulation processes. This course cannot be used for upper-level course credit in the Geology BA, Geology BS, or Geology Minor programs.  
Prerequisite(s): GEOL 1121 or GEOL 5230.  
Cross Listing(s): GEOL 5231G.  

GEOL 5431  Coastal Geology  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
Coastal Geology will comprise an introduction to a variety of coastal environments and landforms as well as the physical and geological processes that shape them. Coastal hazards and issues related to the ecology and management of the coast will also be discussed. The course will include two required weekend fieldtrips to coastal areas in the southeastern United States. Graduate students will complete an individual term project or a special report.  
Prerequisite(s): GEOL 1122 or permission of instructor; prior completion of GEOL 5142 strongly recommended.  
Cross Listing(s): GEOL 5431G.  

GEOL 5440  Structural Geology  
0.4 Credit Hours.  0.4 Lecture Hours.  0 Lab Hours.  
GA study of geologic structures resulting from rock formation and deformation. Attention will be given to recognition and solution of structural problems. Graduate students will complete an individual term project or special report.  
Prerequisite(s): GEOL 3542 and MATH 1112 or MATH 1113.  
Cross Listing(s): GEOL 5440G.  

GEOL 5530  Geomorphology  
0.3 Credit Hours.  0.2 Lecture Hours.  0.3 Lab Hours.  
A systematic study of landforms and the processes which create and modify them. Graduate students will complete an individual term project or special report.  
Prerequisite(s): GEOL 1122 or GEOG 1111.  
Cross Listing(s): GEOL 5530G.  

GEOL 5541  Hydrogeology  
4 Credit Hours.  3 Lecture Hours.  2 Lab Hours.  
A survey of hydrogeology that includes the occurrence, distribution, movement and chemistry of subsurface waters. Emphasizes subsurface hydrology (hydrogeology), but will also include related aspects of surface systems. Major topics covered will include: 1) relationships between precipitation, runoff, and infiltration; 2) porosity and permeability of various earth materials; 3) subsurface movement of water through earth materials; 4) basic chemical characteristics of natural waters; and 5) current water resource issues such as supply, quality, contamination, and remediation. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Prerequisite(s): GEOL 3542.  
Cross Listing(s): GEOL 5541G.  

GEOL 5542  Advanced Hydrogeology  
4 Credit Hours.  3 Lecture Hours.  2 Lab Hours.  
In-depth study of hydrogeologic and geochemical principles with emphasis on quantitative techniques. Various laboratory and field techniques will be covered, including the use of numerical models and aquifer testing. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Prerequisite(s): GEOL 5541.  
Cross Listing(s): GEOL 5542G.  

GEOL 5740  Sea Turtle Natural History  
4 Credit Hours.  0 Lecture Hours.  0 Lab Hours.  
Designed primarily for in-service teachers, will allow students to earn 4 hours credit for research monitoring sea turtle nesting on St. Catherine's Island, Ga. Students will attend two distance learning training sessions, reside on the island for seven days to observe sea turtle nesting evidence, participate in sea turtle conservation activities, study barrier island natural history with lectures by leading scientists, and collect natural history specimens for their classrooms, and attend a follow-up meeting. Graduate students will complete a resource notebook or term project.  
Cross Listing(s): GEOL 5740G.  

GEOL 5741  Sea Turtle Conservation  
4 Credit Hours.  3 Lecture Hours.  8 Lab Hours.  
Designed primarily for pre-service and in-service teachers, will introduce students to conservation through the study of Georgia's sea turtles, content and process skills of science through conservation, and the integration of teaching resources and electronic technologies into their classrooms. May meet by distance learning with laboratory content delivered by Internet, distance learning, fax, or e-mail or by self-contained web-based video streaming (SREC). Will average 3 hours of lecture alternate weeks via distance learning and 4-8 credit hours of laboratory on alternate weekends via Internet, e-mail, and hands-on exercises. Permission of instructor required. Graduate students will complete an endangered species teaching unit or paper.  
Cross Listing(s): GEOL 5741G.  

GEOL 5890  Directed Study  
1-4 Credit Hours.  0-3 Lecture Hours.  0-3 Lab Hours.  
Well prepared geology majors may be permitted to carry on independent study upon the recommendation of one of the geology/geography faculty. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Prerequisite(s): Permission of instructor required.  
Cross Listing(s): GEOL 5890G.