GEOLOGY, MINOR

Program Description
The mission of the Geology Program is to provide integrated and process-oriented curricula, based on fundamental scientific principles and processes that enable graduates to pursue challenging careers and maintain lifelong learning. The Geology Program is designed to serve students majoring in geology and environmental science as well as students in other fields who are interested in adding to their knowledge of the Earth. Support is also provided for students preparing to earn certification for teaching at the K-12 level, and interested non-science majors. Members of the geoscience faculty provide majors with a broad overview of geologic processes while offering the opportunity to pursue specialized knowledge in selected areas of geoscience in preparation for graduate study and careers in government, industry, or academia.

Program Requirements
Students majoring in other academic fields who wish to earn a minor in geology must complete the following requirements:

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<th>Code</th>
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<tr>
<td>GEOL 1403</td>
<td>Physical Geology</td>
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<td>Historical Geology</td>
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<td>GEOL 3411</td>
<td>Mineralogy</td>
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<td>GEOL 3443</td>
<td>Environmental Geology</td>
<td>4</td>
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<td>GEOL 4421</td>
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Courses

**GEOL 1303 Essentials of Geology**
3 Semester Credit Hours (3 Lecture Hours)
ONE-SEMESTER INTRODUCTORY EARTH SCIENCE COURSE FOR STUDENTS MAJORING IN A NON-SCIENCE SUBJECT AREA. COVERS BASIC GEOLOGIC MATERIAL AND CONCEPTS, SUCH AS MINERALS, ROCKS, THE ROCK CYCLE, AND PLATE TECTONICS THEORY. ORIGIN, COMPOSITION, AND EVOLUTION OF OUR PLANET, AS WELL AS THE IMPORTANCE OF GEOLOGY IN EVERYDAY LIFE, INCLUDING GEOLOGIC RESOURCES, GLOBAL CHANGE, EARTHQUAKES, AND VOLCANISM ARE EXAMINED. THIS COURSE IS NOT RECOMMENDED FOR STUDENTS MAJORING IN GEOLOGY OR ENVIRONMENTAL SCIENCES. COURSE COUNTS TOWARD THE NATURAL SCIENCE COMPONENT OF THE CORE CURRICULUM PROGRAM.

**TCCNS:** GEOL 1303

**GEOL 1403 Physical Geology**
4 Semester Credit Hours (4 Lecture Hours)
INTRODUCTION TO THE ORIGIN, CLASSIFICATION, AND COMPOSITION OF EARTH MATERIALS. STUDY OF INTERNAL AND SURFACE PROCESSES WHICH SHAPE AND MODIFY EARTH. LABORATORY STUDIES OF MINERALS AND ROCKS, AS WELL AS TOPOGRAPHIC MAPS, GEOLOGIC MAPS AND GEOLOGIC CROSS-SECTIONS.

**Co-requisite:** SMTE 0094.

**TCCNS:** GEOL 1403

**GEOL 1404 Historical Geology**
4 Semester Credit Hours (4 Lecture Hours)
INTRODUCTION TO THE ORIGIN AND EVOLUTION OF EARTH AND OTHER PLANETS. CHANGES IN THE FORM AND DISTRIBUTION OF EARTH'S CONTINENTS AND OCEANS, AND SUCCESION OF PLANTS AND ANIMALS THROUGH GEOLOGIC TIME. LABORATORY STUDIES OF FOSSILS, GEOLOGICAL MAPS, AND THE INTERPRETATION OF ANCIENT ENVIRONMENTS OF ROCK FORMATION.

**Prerequisite:** GEOL 1403 or 1303.

**Co-requisite:** SMTE 0094.

**TCCNS:** GEOL 1404

**GEOL 2102 Undergraduate Seminar in Geology-Careers in the Geosciences**
1 Semester Credit Hour (1 Lecture Hour)
INTRODUCTORY LEVEL SEMINAR FEATURING DIVERSE TOPICS AND SPEAKERS. FOCUS ON CAREERS IN THE GEOSCIENCES AS WELL AS ON HOW TO SUCCESSFULLY PLAN A COLLEGE CAREER. IN-HOUSE AS WELL AS EXTERNAL SPEAKERS. MAY NOT BE REPEATED FOR CREDIT BUT ATTENDANCE IN SUBSEQUENT SEMESTERS IS ENCOURAGED.

**GEOL 2103 Undergraduate Seminar in Geology-Research in the Geosciences**
1 Semester Credit Hour (1 Lecture Hour)
INTRODUCTORY LEVEL SEMINAR FEATURING DIVERSE TOPICS AND SPEAKERS. FOCUS ON CURRENT GEOLOGIC RESEARCH. IN-HOUSE AS WELL AS EXTERNAL SPEAKERS. MAY NOT BE REPEATED FOR CREDIT BUT ATTENDANCE IN SUBSEQUENT SEMESTERS IS HIGHLY ENCOURAGED. CREDIT/NO CREDIT

**GEOL 2222 Karst Geology and Paleoclimatology**
2 Semester Credit Hours (1 Lecture Hour, 2 Lab Hours)
THIS COURSE DESCRIBES THE DIFFERENT TYPES OF CAVES AND KARST ROCKS, THE WATER ROCK INTERACTIONS IN Carbonate ROCK SYSTEMS, AND IT EXPLAINS CAVE FORMATION VIA HYDROLOGICAL AND GEOCHEMICAL PROCESSES. IT ALSO DEALS WITH HOW SPELEOTHEM PROXIES SUCH AS OXYGEN AND CARBON STABLE ISOTOPE, TRACE ELEMENTS, CARBONATE PETROGRAPHY ARE USED TO DECIPHER PAST CHANGES IN CLIMATE.

**GEOL 2490 Selected Topics**
1-4 Semester Credit Hours (1-4 Lecture Hours, 6 Lab Hours)
MAY BE REPEATED FOR CREDIT IF TOPICS ARE SIGNIFICANTLY DIFFERENT. SUBJECT MATERIAL VARIABLE. FACULTY APPROVAL REQUIRED.

**GEOL 3326 Introduction to Geological Field Methods**
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCTION TO THE BASIC TECHNIQUES OF GEOLOGICAL FIELDWORK. NOTE TAKING IN THE FIELD, PROPER USE OF GEOLOGICAL FIELD EQUIPMENT, MEASUREMENT AND DESCRIPTION OF ROCK SECTIONS BY SEVERAL METHODS AND DEGREES OF DETAIL, PLUS SMALL AREA MAPPING OF SEVERAL TYPES OF TERRAIN WITH TOPOGRAPHIC MAPS. REPORTS, SECTIONS, AND MAPS WILL BE PRODUCED FROM THE FIELD NOTES. FIELD TRIPS REQUIRED.

**Prerequisite:** GEOL 1403 and 1404 and (GEOL 3411 or 3411*).

*May be taken concurrently.

**Co-requisite:** SMTE 0094.
GEOL 3329  Geology of National Parks
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCTION TO THE REGIONAL GEOLOGY OF THE UNITED STATES USING SELECTED U.S. NATIONAL PARKS REPRESENTING A WIDE VARIETY OF GEOLOGIC SETTINGS AS EXAMPLES. APPLICATION OF MAJOR GEOLOGIC PRINCIPLES AND BASIC GEOLOGIC CONCEPTS SUCH AS PLATE TECTONICS, ROCK CYCLE, STRATIGRAPHY, AND GEOLOGIC TIME.
Prerequisite: GEOL 1303, 1403 or 1404.

GEOL 3411  Mineralogy
4 Semester Credit Hours (4 Lecture Hours)
STUDY OF THE PHYSICAL AND CHEMICAL PROPERTIES OF MINERALS. INTRODUCTION TO THE CRYSTALLOGRAPHY OF MINERALS, OPTICAL MINERALOGY, AND THE USE OF THE POLARIZED LIGHT MICROSCOPE. LABORATORY STUDY OF MINERAL IDENTIFICATION IN HAND SPECIMENS AND THIN SECTIONS.
Prerequisite: GEOL 1403 and CHEM 1411 and (CHEM 1412 or 1412*).
* May be taken concurrently.
Co-requisite: SMTE 0094.

GEOL 3414  IGNEOUS AND METAMORPHIC PETROLOGY
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
GENESIS AND OCCURRENCE OF IGNEOUS AND METAMORPHIC ROCKS. MINERALOGICAL COMPOSITION AND THERMODYNAMICS OF GEOLOGIC SYSTEMS. DETERMINATION OF ROCK TYPES IN HAND SPECIMENS AND THIN SECTIONS. PREREQUISITES: GEOL 1403 - PHYSICAL GEOLOGY, CHEM 1411 - GENERAL CHEMISTRY I*, CHEM 1412 - GENERAL CHEMISTRY II, GEOL 3411 - MINERALOGY.
Prerequisite: GEOL 1403, CHEM 1411, 1412 and GEOL 3411.
Co-requisite: SMTE 0094.

GEOL 3441  Invertebrate Paleontology
4 Semester Credit Hours (4 Lecture Hours)
MORPHOLOGY, CLASSIFICATION, AND PALEOECOLOGY OF FOSSIL INVERTEBRATES. APPLICATIONS TO MARINE GEOLOGY INCLUDING PALEOCEANOGRAPHY, STRATIGRAPHY, ECONOMIC GEOLOGY. FIELD TRIP TO TEXAS INVERTEBRATE FOSSIL BEDS.
Prerequisite: GEOL 1404.
Co-requisite: SMTE 0094.

GEOL 3442  Geomorphology
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
STUDY OF LANDSCAPES AND LANDFORMS AT THE SURFACE OF THE EARTH, AND THE PROCESSES AND MECHANISMS BY WHICH THEY ARE DEVELOPED.
Prerequisite: GEOL 1403.
Co-requisite: SMTE 0094.

GEOL 3443  Environmental Geology
4 Semester Credit Hours (4 Lecture Hours)
STUDY OF THE RELATIONSHIPS OF HUMANS TO EARTH'S PHYSICAL ENVIRONMENT. GEOLOGIC ASPECTS OF WASTE DISPOSAL, RESOURCES, CONSERVATION, LAND RECLAMATION, GEOLOGIC HAZARDS, AND LAND-USE PLANNING.
Prerequisite: GEOL 1403.
Co-requisite: SMTE 0094.

GEOL 3490  Selected Topics
1-4 Semester Credit Hours (1-4 Lecture Hours)
MAY BE REPEATED FOR CREDIT IF TOPICS ARE SIGNIFICANTLY DIFFERENT. SUBJECT MATERIALS VARIABLE.

GEOL 4050  Geology Field Safety Seminar
0 Semester Credit Hours
RESTRICTED TO GEOLOGY MAJORS ATTENDING FIELD CAMP. STUDENTS REQUIRED TO MEET WITH GEOLOGY PROGRAM COORDINATOR PRIOR TO REGISTRATION FOR THIS COURSE.

GEOL 4311  Paleoclimatology
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCTION TO THE GEOLOGY OF THE MARINE ENVIRONMENT. REVIEW OF PLATE TECTONIC PROCESSES RELEVANT TO THE EVOLUTION OF CONTINENTAL MARGINS AND PLATE BOUNDARIES; GEOPHYSICS AND OCEAN MORPHOLOGY; GEOLOGY OF OCEAN CRUST; CONTROLS ON THE TYPES, ORIGIN, AND DISTRIBUTION OF MARINE SEDIMENTS; MARINE GEOCHEMISTRY; NEARSHORE GEOLOGICAL PROCESSES AND THE CONTINENTAL SHELF; INTRODUCTION TO PALEOCEANOGRAPHY; GLOBAL PALEOCEANOGRAPHIC EVOLUTION; CRITICAL EVENTS IN OCEAN HISTORY. SPECIAL FOCUS ON THE GULF OF MEXICO.
Prerequisite: GEOL 1403, 1404, CHEM 1411 and 1412.

GEOL 4316  Marine Geoscience
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCTION TO THE GEOLOGY OF THE MARINE ENVIRONMENT. REVIEW OF PLATE TECTONIC PROCESSES RELEVANT TO THE EVOLUTION OF CONTINENTAL MARGINS AND PLATE BOUNDARIES; GEOPHYSICS AND OCEAN MORPHOLOGY; GEOLOGY OF OCEAN CRUST; CONTROLS ON THE TYPES, ORIGIN, AND DISTRIBUTION OF MARINE SEDIMENTS; MARINE GEOCHEMISTRY; NEARSHORE GEOLOGICAL PROCESSES AND THE CONTINENTAL SHELF; INTRODUCTION TO PALEOCEANOGRAPHY; GLOBAL PALEOCEANOGRAPHIC EVOLUTION; CRITICAL EVENTS IN OCEAN HISTORY. SPECIAL FOCUS ON THE GULF OF MEXICO.
Prerequisite: GEOL 1403, 1404, CHEM 1411 and 1412.

GEOL 4321  Introduction to Soil and Groundwater Restoration
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCTION TO METHODS FOR RESTORING CONTAMINATED SOIL AND GROUNDWATER BY EXAMINING THE FACTORS AND PROCESSES INFLUENCING THE EFFICACY OF REMEDIATION SYSTEMS. AN EMPHASIS WILL BE PLACED ON THE SCIENTIFIC PRINCIPLES UPON WHICH SOIL AND GROUNDWATER REMEDIATION IS BASED. PREREQUISITES: GEOL 1403 - PHYSICAL GEOLOGY, CHEM 1411 - GENERAL CHEMISTRY I*, CHEM 1412 - GENERAL CHEMISTRY II, GEOL 3411 - MINERALOGY.
Prerequisite: GEOL 1403, CHEM 1411, 1412 and GEOL 3443.

GEOL 4326  Field Seminar in Geology
3 Semester Credit Hours (4 Lecture Hours, 1 Lab Hour)
DESIGNED TO PREPARE STUDENTS FOR SUMMER FIELD CAMP. BASIC TECHNIQUES OF GEOLOGIC MAPPING IN THE FIELD, DATA ANALYSIS AND INTERPRETATION, AND REPORT WRITING.
Prerequisite: GEOL 4411 and 4421.
Co-requisite: SMTE 0094.

GEOL 4411  Sedimentation and Stratigraphy
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
COMPOSITION AND ORIGIN OF SEDIMENTS AND SEDIMENTARY ROCKS. DESCRIPTION AND CLASSIFICATION OF ROCKS IN HAND SPECIMEN. PRINCIPLES OF STRATIGRAPHY, INCLUDING STRATIGRAPHIC UNITS AND CORRELATION. FACIES MODELS FOR MAJOR DEPOSITIONAL SYSTEMS. FIELD TRIPS.
Prerequisite: (GEOL 1403) and (GEOL 1404) and (GEOL 3411*).
* May be taken concurrently.
Co-requisite: SMTE 0094.
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*May be taken concurrently.*
GEOL 4650 Field Geology
6 Semester Credit Hours (12 Lab Hours)
FIELD COURSE INVOLVING PRACTICAL APPLICATION OF GEOLOGIC PRINCIPLES TO FIELD PROBLEMS. LOCATIONS VISITED AND MATERIAL COVERED DEPENDS ON HOSTING INSTITUTION. GENERALLY SHOULD INCLUDE: MAPPING AND OUTCROP DATA COLLECTION; MEASUREMENT OF STRATIGRAPHIC SECTIONS; MAPPING AND PREPARATION OF GEOLOGIC CROSS-SECTIONS; PREPARATION OF GEOLOGIC REPORTS.
Prerequisite: GEOL 3326, 3414, 3441, 4411 and 4421.
Co-requisite: SMTE 0094.