

# Department of Geology

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## Undergraduate Advisor:

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## Graduate Director:

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**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), and Master of Science (MS) in Geology; BS in Composite Teaching in Earth Science

**Undergraduate emphases:** *BS in Geology*—Hydrogeology-Engineering Geology and Geoarchaeology

**Graduate Specializations:** *MS in Geology*—Geomorphology, Hydrogeology, Igneous Petrology, Paleoecology, Sedimentary Geology, Structural Geology, and Tectonics

## Undergraduate Programs

### Objectives

Geology is the study of the planet Earth, the materials of which it is made, the processes that act on these materials, the products formed, and the history of the planet and its life forms since its origin. Geology considers the physical forces that act within and on the Earth, the chemistry of its constituent materials, and the biology of its past inhabitants as revealed by fossil evidence. Geologists integrate biology, chemistry, engineering, mathematics, and physics in the study of our natural surroundings. The knowledge thus obtained is used by geologists to explore for energy, mineral, and water resources; to identify geologically stable sites for major structures; and to provide foreknowledge of some of the dangers associated with the mobile forces of a dynamic Earth. Geologists provide fundamental information required by modern society to plan for cultural and industrial development, reduce geological hazards, identify potential resources, and assist in the design of waste-disposal facilities.

The Department of Geology prepares students for professional careers in the geosciences and provides the background required for advanced studies. The department offers three options of study to meet the growing demand for geoscientists with training in general geology (BS in geology without an emphasis), hydrogeology-engineering geology emphasis, or geoarchaeology emphasis. All options provide exposure to the sciences and an appreciation of our physical surroundings. The BS program in Geology meets the curriculum standards established by the American Institute of Professional Geologists.

The department also offers the Composite Teaching Major in Earth Science to prepare teachers of earth science at the secondary school level. Requirements for this major meet or exceed the standards of the National Science Teachers Association. Those students who major in earth science should be aware that state licensure is required of secondary education teachers. The Composite Teaching Major in Earth Science fulfills the requirements that provide eligibility for licensure. Licensure requirements vary from state to state, and students should investigate the requirements for the states in which they intend to seek

employment. Advising for the Secondary Teacher Education Program (STEP) and State of Utah secondary education licensure is provided by the USU Department of Secondary Education.

The Department of Geology is housed within the Geology Building, which is located at the northeast corner of the Old Main Quad. The Geology Building provides spacious, well-equipped teaching labs, classrooms, and facilities, including a display and study area for students, computer access, document room, map room, preparation facilities, and research labs.

## General College of Science Requirements

All general College of Science requirements are embedded within the various major requirements listed below. No extra coursework is required to fulfill the general college requirements.

### Requirements

#### Departmental Admission Requirements

New freshmen admitted to USU in good standing qualify for admission to this major. Transfer students from other institutions need a 2.2 GPA, and students transferring from other USU majors need a 2.0 GPA for admission to this major in good standing. Students seeking admission to the Composite Teaching Major in Earth Science should be aware that a 2.75 minimum GPA is required for admission to the Secondary Teacher Education Program (STEP) in the Department of Secondary Education. Students in the Hydrogeology-Engineering Geology emphasis must meet all College of Engineering GPA standards appropriate for the courses to be taken having either the ENGR or CEE prefix.

#### Field Trips and Labs

Most Geology courses have required laboratories and/or field trips. Those enrolled are expected to dress properly for the conditions and observe safety precautions issued by the instructors. Most courses require modest lab fees.

#### Bachelor of Arts Degree

For a BA in Geology, the foreign-language requirement must be satisfied in addition to the Bachelor of Science in Geology requirements.

#### Geology Major—General Geology Option

<b>GEOL 1150 (BPS)</b> The Dynamic Earth: Physical Geology (F,Sp).....	4
<b>GEOL 3200 (DSC)</b> The Earth Through Time (Sp).....	4
<b>GEOL 3500</b> Mineralogy and Crystallography (Sp).....	4
<b>GEOL 3520</b> Optical Mineralogy and Petrography (F).....	2
<b>GEOL 3550 (CI)</b> Sedimentation and Stratigraphy (F).....	4
<b>GEOL 3600</b> Geomorphology (F).....	4
<b>GEOL 3700</b> Structural Geology (Sp).....	4
<b>GEOL 4500</b> Igneous and Metamorphic Petrology (F).....	4
<b>GEOL 4700 (CI)</b> Geologic Field Methods (F).....	3
<b>GEOL 5200</b> Geology Field Camp (Su).....	5
<b>CHEM 1210</b> Principles of Chemistry I (F,Sp).....	4
<b>CHEM 1220 (BPS)</b> Principles of Chemistry II (F,Sp,Su).....	4
<b>CHEM 1230</b> Chemical Principles Laboratory I (F,Sp).....	1
<b>CHEM 1240</b> Chemical Principles Laboratory II (F,Sp).....	1
<b>MATH 1210 (QL)</b> <sup>1</sup> Calculus I (F,Sp,Su).....	4
<b>STAT 3000 (QI)</b> Statistics for Scientists (F,Sp) (3 cr) or	
<b>MATH 1220 (QL)</b> Calculus II (F,Sp,Su) (4 cr).....	3 or 4

# Department of Geology

**CS 1050** Problem Solving with Computers (F,Sp) (3 cr) **or**  
**CS 1700** Introduction to Computer Science—CS 1 (F,Sp,Su) (3 cr) **or**  
**CEE 5190** Geographic Information Systems for Civil Engineers  
 (Sp) (3 cr) **or**  
**AWER 4930** Geographic Information Systems (F) (4 cr) .....3 or 4  
**PHYX 2210 (QI)** General Physics—Science and Engineering I.....4  
**PHYX 2220 (BPS/QI)** General Physics—Science and Engineering II ..4

Students must also select 12 credits from any Geology courses numbered 4900 or above, except GEOL 5200 (Geology Field Camp).

## Geology Major—Hydrogeology-Engineering Geology Emphasis

**GEOL 1150 (BPS)** The Dynamic Earth: Physical Geology (F,Sp).....4  
**GEOL 3200 (DSC)** The Earth Through Time (Sp).....4  
**GEOL 3500** Mineralogy and Crystallography (Sp).....4  
**GEOL 3550 (CI)** Sedimentation and Stratigraphy (F) .....4  
**GEOL 3600** Geomorphology (F) .....4  
**GEOL 3700** Structural Geology (Sp).....4  
**GEOL 4700 (CI)** Geologic Field Methods (F).....3  
**GEOL 5200** Geology Field Camp (Su).....5  
**GEOL 5510 (QI)** Groundwater Geology (F) .....3  
**GEOL 5600** Geochemistry (F).....3  
**CHEM 1210** Principles of Chemistry I (F,Sp) .....4  
**CHEM 1220 (BPS)** Principles of Chemistry II (F,Sp,Su) .....4  
**CHEM 1230** Chemical Principles Laboratory I (F,Sp) .....1  
**CHEM 1240** Chemical Principles Laboratory II (F,Sp) .....1  
**MATH 1210 (QL)**<sup>1</sup> Calculus I (F,Sp,Su).....4  
**MATH 1220 (QL)** Calculus II (F,Sp,Su) .....4  
**MATH 2250 (QI)** Linear Algebra and Differential Equations (F,Sp,Su)..4  
**CS 1050** Problem Solving with Computers (F,Sp) (3 cr) **or**  
**CS 1700** Introduction to Computer Science—CS 1 (F,Sp,Su) (3 cr) **or**  
**CEE 5190** Geographic Information Systems for Civil Engineers  
 (Sp) (3 cr) **or**  
**AWER 4930** Geographic Information Systems (F) (4 cr) .....3 or 4  
**PHYX 2210 (QI)** General Physics—Science and Engineering I.....4  
**PHYX 2220 (BPS/QI)** General Physics—Science and Engineering II ..4  
**ENGR 2000** Engineering Mechanics Statics (F,Sp) .....2  
**ENGR 2040** Strength of Materials (F,Sp) .....2  
**CEE 3500** Civil and Environmental Engineering Fluid Mechanics  
 (F,Sp).....3  
**CEE 3430** Engineering Hydrology (Sp) (3 cr) **or**  
**CEE 4300** Engineering Soil Mechanics (Sp) (4 cr) .....3 or 4  
**SOIL 3000** Fundamentals of Soil Science (F,Sp) (4 cr) **or**  
**SOIL 5130** Soil Genesis, Morphology, and Classification (F) (4 cr) .....4

## Geology Major—Geoarchaeology Emphasis

**GEOL 1150 (BPS)** The Dynamic Earth: Physical Geology (F,Sp).....4  
**GEOL 3200 (DSC)** The Earth Through Time (Sp).....4  
**GEOL 3500** Mineralogy and Crystallography (Sp).....4  
**GEOL 3550 (CI)** Sedimentation and Stratigraphy (F) .....4  
**GEOL 3600** Geomorphology (F) .....4  
**GEOL 3700** Structural Geology (Sp).....4  
**GEOL 4700 (CI)** Geologic Field Methods (F).....3  
**GEOL 5430** Paleontology (F).....2  
**ANTH 1030 (CI/BSS)** World Archaeology (F,Sp) .....3  
**ANTH 4350** Archaeological Method/Theory and Cultural Resource  
 Management (Sp).....3  
**ANTH 4360 (DSS)** Ancient Desert West (F).....3-4  
**ANTH 5300** Archaeology Field School (Su) .....4-5  
**ANTH 5310** Archaeology Lab.....1-3

**CHEM 1110 (BPS)** General Chemistry I (F,Sp) (4 cr) **and**  
**CHEM 1120 (BPS)** General Chemistry II (Sp) (4 cr) **and**  
**CHEM 1130** General Chemistry Laboratory (Sp) (1 cr).....9  
**Or**  
**CHEM 1210** Principles of Chemistry I (F,Sp) (4 cr) **and**  
**CHEM 1220 (BPS)** Principles of Chemistry II (F,Sp,Su) (4 cr) **and**  
**CHEM 1230** Chemical Principles Laboratory I (F,Sp) (1 cr) **and**  
**CHEM 1240** Chemical Principles Laboratory II (F,Sp) (1 cr) .....10

**BIOL 3010 (CI/DSC)** Evolution (Sp).....3

### Two courses selected from:

**BIOL 2220** General Ecology (F,Sp) (3 cr) **and/or**  
**BIOL 3030 (DSC)** Genetics and Society (Sp) (3 cr) **and/or**  
**BIOL 3040 (DSC)** Plants and Civilization (F) (3 cr) **and/or**  
**BIOL 3220 (QI)** Field Ecology (F) (2 cr) .....5 or 6

**MATH 1210 (QL)**<sup>1</sup> Calculus I (F,Sp,Su).....4  
**STAT 3000 (QI)** Statistics for Scientists (F,Sp).....3  
**AWER 4930** Geographic Information Systems (F).....4  
**AWER 5930** Geographic Information Analysis (Sp) .....4  
**SOIL 3000** Fundamentals of Soil Science (F, Sp) (4 cr) **or**  
**SOIL 5130** Soil Genesis, Morphology, and Classification (F) (4 cr) .....4

## Composite Teaching Major in Earth Science

**GEOL 1150 (BPS)** The Dynamic Earth: Physical Geology (F,Sp).....4  
**GEOL 2500<sup>2</sup>** Geology Field Excursions (F,Sp).....2  
**GEOL 3200 (DSC)** The Earth Through Time (Sp).....4  
**GEOL 3500** Mineralogy and Crystallography (Sp).....4  
**GEOL 3550 (CI)** Sedimentation and Stratigraphy (F) .....4  
**GEOL 3600** Geomorphology (F) .....4  
**GEOL 3700** Structural Geology (Sp).....4  
**GEOL 4700 (CI)** Geologic Field Methods (F).....3  
**PHYX 1020 (BPS)**<sup>3</sup> Energy .....3  
**PHYX 2210 (QI)** General Physics—Science and Engineering I.....4  
**PHYX 2220 (BPS/QI)** General Physics—Science and Engineering II ..4  
**PHYX 3010 (QI/DSC)** Space Exploration from Earth to  
 the Solar System .....(3 cr) **or**  
**PHYX 3030 (QI/DSC)** The Universe (3 cr) .....3  
**CHEM 1210** Principles of Chemistry I (F,Sp) .....4  
**CHEM 1220 (BPS)** Principles of Chemistry II (F,Sp,Su) .....4  
**CHEM 1230** Chemical Principles Laboratory I (F,Sp) .....1  
**CHEM 1240** Chemical Principles Laboratory II (F,Sp) .....1  
**ENVS 5110** Environmental Education (Sp) (3 cr) **or**  
**FRWS 2200 (BLS)** Ecology of Our Changing World (F,Sp) (3 cr).....3  
**BMET 2000 (BPS)** The Atmosphere and Weather (F,Sp).....3  
**AWER 3000 (DSC)** Oceanography (Sp) (3 cr) **or**  
**GEOL 3300 (DSC)** Geology of the World's Oceans (Sp) (3 cr) .....3  
**SCI 4300** Science in Society (F,Sp) .....2  
**MATH 1210 (QL)**<sup>1</sup> Calculus I (F,Sp,Su).....4  
**STAT 3000 (QI)** Statistics for Scientists (F,Sp).....3  
**CS 1050** Problem Solving with Computers (F,Sp) (3 cr) **or**  
**CS 1700** Introduction to Computer Science—CS 1 (F,Sp,Su) (3 cr).....3

Students must also complete the Secondary Teacher Education Program (STEP) as follows:

### Level 1

**SCED 3100** Motivation and Classroom Management (F,Sp) .....3  
**SCED 3210 (CI/DSS)** Educational and Multicultural Foundations  
 (F,Sp).....3  
**SCED 3300** Clinical Experience I (F,Sp) .....1  
**SCED 3400** Teaching Science I (F,Sp).....3  
**INST 3500** Technology Tools for Secondary Teachers (F,Sp,Su) .....1

## Level 2

<b>SPED 4000</b> Education of Exceptional Individuals (may be taken anytime) (F,Sp,Su).....	2
<b>SCED 4200 (CI)</b> Reading, Writing, and Technology (F,Sp) .....	3
<b>SCED 4210</b> Cognition and Evaluation of Student Learning (F,Sp) .....	3
<b>SCED 4300</b> Clinical Experience II (F,Sp) .....	1
<b>SCED 4400</b> Teaching Science II (F,Sp).....	3

## Level 3 (12 credits)

<b>SCED 5500</b> Student Teaching Seminar (F,Sp).....	2
<b>SCED 5630</b> Student Teaching in Secondary Schools (F,Sp) .....	10

## Notes

This curriculum meets the standards of the Utah Core Curriculum—Science 7-12.

Beginning in 2006, all USU teacher education candidates will be required to take and pass the content exam approved by the Utah State Office of Education in their major content area prior to student teaching.

A 2.75 minimum GPA is required for admission to the Secondary Teacher Education Program (STEP).

## Geology Minor

<b>GEOL 1100 (BPS)</b> Geology of National Parks: Introduction to Geology (F,Su) (3 cr) <b>or</b>	
<b>GEOL 1150 (BPS)</b> <sup>4</sup> The Dynamic Earth: Physical Geology (F,Sp) (4 cr) .....	3 or 4
<b>GEOL 3200 (DSC)</b> The Earth Through Time (Sp).....	4

Students must also select 10 elective credits from Geology courses at the 3500 level or above.

<sup>1</sup>Students may need to complete prerequisite courses prior to enrolling in MATH 1210.  
<sup>2</sup>GEOL 2500 (a 1-credit course) is repeatable for credit, and must be taken twice for the student to earn the required 2 credits.  
<sup>3</sup>PHYX 1020 may also be listed as USU 1360, ST: Energy.  
<sup>4</sup>GEOL 1150 is preferred.

## Senior Thesis

Geology majors in good academic standing may elect to complete a senior thesis. This is an endeavor which normally spans a year in its preparation and presentation. Senior thesis credits may be applied toward the elective requirements in the General Geology option. For further information, students should contact their geology advisor or the geology department head.

## Departmental Honors

Students who would like to experience greater academic depth within their major are encouraged to enroll in departmental honors. This is a departmental recognition which is separate from the University Honors program. Through original, independent work, Honors students enjoy the benefits of close supervision and mentoring, as they work one-on-one with faculty in select upper-division departmental courses. Honors students also complete a senior project, which provides another opportunity to collaborate with faculty on a problem that is significant, both personally and in the student's discipline. Participating in departmental honors enhances students' chances for obtaining fellowships and admission to graduate school.

Geology majors with a minimum GPA of 3.30 may elect to complete

the requirements for the Geology Honors degree option. For further information, students should contact their geology advisor or the geology department head.

## Undergraduate Research Opportunities

The Department of Geology offers a range of opportunities for undergraduate students to participate in research activities under the guidance of a faculty mentor. All departmental undergraduate research activities are coordinated by the departmental undergraduate research coordinator, James Evans, (435) 797-1267, [jpevans@cc.usu.edu](mailto:jpevans@cc.usu.edu). More information may be found on the Geology Department website: <http://www.usu.edu/geoldept/>

## Learning Objectives

Upon graduation, geology majors are expected to be able to: (1) identify common minerals; (2) identify common fossils, as well as their ages and the conditions under which they lived; (3) describe sedimentary rocks and measure a stratigraphic section in the field; (4) create a surficial geologic map; (5) define and distinguish between, and determine the type of stress responsible for forming, various structural features; (6) use a Brunton compass; (7) read topographic maps, as well as construct profiles from them; (8) read and make geologic maps, as well as construct cross sections from them; (9) use aerial photographs in geological investigations; (10) know the ages of important geologic features and events in the Earth's history, as well as explain how and why the Earth has changed over time; (11) know the Earth's internal processes and the features produced by them; (12) collect and evaluate geologic data; (13) interpret and create graphs of quantitative data; and (14) communicate observations and interpretations, both orally and in writing.

## Assessment

The Department of Geology relies on a variety of tools to periodically assess its undergraduate program, including: (1) student input in assessment; (2) value-added assessment; (3) college-level assessment; (4) alumni participation in assessment; and (5) faculty program assessment. For more information, please refer to the Geology Department assessment website at: <http://www.usu.edu/geoldept/assessment/assessment.htm>

## Additional Information

For more information about bachelor's degree requirements for Geology programs, see the Geology Major Requirement Sheet, available from the department, or online at: <http://www.usu.edu/ats/majorsheets/>

## Graduate Programs

### Admission Requirements

See general admission requirements on pages 93-94. In addition, applicants must have acceptable GRE scores. Minimum scores of 40th percentile on the Verbal section and 40th percentile on the Quantitative section and a combined minimum of 1,000 are required. A member of the Geology faculty must agree to serve as the major professor for the applicant prior to acceptance.

# Department of Geology

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Applications will be considered throughout the year, but program entry in fall semester is preferred. Students who wish to be considered for assistantships or other financial aid must have complete applications on file no later than February 15 for entry into the program the following fall semester.

## Prerequisites for Matriculation

Completion of a BS or BA in geology, biology, physics, chemistry, or engineering is required for matriculated status. Suggested prerequisite courses include: CHEM 1210, 1220, 1230, 1240; PHYX 2210, 2220; MATH 1210; STAT 3000; and CS 1050 or CS 1700 or CEE 5190 or AWER 4930. Deficiencies in geology are determined based on current USU undergraduate degree requirements for either the Geology or Hydrogeology-Engineering Geology option, as appropriate. The following geology courses or their equivalents are expected: GEOL 1150, 3200, 3500, 3550, 3600, 3700, 4700, and 5200. It is expected that any deficiencies will be made up before the end of the first year of study.

## Degree Program

### Master of Science Degree

The department offers advanced study and research opportunities leading to the MS degree in Geology. Although many research specialties require advanced courses selected primarily from Geology offerings, additional courses may be selected from other departments on campus, such as Civil and Environmental Engineering; Plants, Soils, and Biometeorology; Biology; Mathematics and Statistics; Aquatic, Watershed, and Earth Resources; Environment and Society; and Forest, Range, and Wildlife Sciences.

## Specializations

Fields of specialization for graduate research include the following: hydrogeology, igneous petrology, paleoecology (including invertebrate paleontology), sedimentary geology (including petrology, basin analysis, sedimentation, stratigraphy, and petroleum geology), process geomorphology, Quaternary geology, structural geology, and regional tectonics.

## Degree Requirements

Only the Plan A thesis option is allowed for the MS degree in Geology. The recommended distribution is 20 credits of coursework and 10 credits of thesis to obtain the required 30 credits for the MS degree. A minimum of five 6000-level geology courses (other than GEOL 6800) is recommended for the degree program. Only two grades of less than B (C to B-) will be accepted as part of the required degree program as listed on the "Program of Study for Master's Degree." A 3.0 grade point average must be obtained in required coursework as listed on the Program of Study. Thesis credits will be graded *P-F* only (i.e., no letter grade will be given). Geology graduate students using department or University facilities and/or under geology faculty supervision must register for a minimum of 3 credits every semester, up to and including the semester in which the thesis is cleared by the School of Graduate Studies. Registration may not be required during the summer.

## Research

There are six broad areas of research emphasis within the department: (1) sedimentary geology, (2) structural geology (3) regional tectonics, (4) igneous petrology and geochemistry, (5) geomorphology, and (6) hydrogeology.

Research in **sedimentary geology** is diverse: sedimentation and development of coral reefs and associated carbonate environments during Pleistocene and Holocene times, changes in shallow-water carbonate environments through early Paleozoic time, nonmarine siliciclastic depositional systems and petroleum reservoirs, geochemical provenance methods, and large-scale architecture of Mesozoic-Cenozoic intracontinental basins in Asia. Research activities are dominantly field-oriented, and often have a subsurface component. Studies are ongoing in the western United States, Mexico, the Caribbean, China, and west Africa.

Research in **structural geology** includes the examination of the mechanical and chemical evolution of fault zones, the development of fold-and-thrust structures in Idaho, Montana, Wyoming, and Utah, and the characterization of fluid-flow properties in fractured crystalline rocks.

Research in **regional and global tectonics** examines the structural and tectonic development of extensional structures in the Great Basin and Salton Trough; collisional and accretionary tectonics in the Western U.S., Pakistan, and the southern Appalachians; the relationship of ophiolites to active margin processes; and the application of basin analysis to the tectonics of basin formation and large scale crustal structures in China, Mongolia, Pakistan, and west Africa.

Research in **igneous petrology and geochemistry** focuses on the origin and evolution of basic to intermediate magmatic systems, and their relationship to global tectonic processes. Current projects include plume-related volcanism and its interaction with continental lithosphere in the Snake River Plain, Idaho; the origin and tectonic evolution of accreted arc terranes; the multi-stage origin of ophiolites; and the formation and evolution of lunar highlands crust.

**Geomorphology** research includes the study of climate and anthropogenic controls on landscape change and sedimentation; controls on alluvial stratigraphy; hillslope processes; numerical modeling of climate controls on basin stratigraphy; Quaternary landscape evolution of the Grand Canyon; and the integration and evolution of the Colorado River.

Research activity in **hydrogeology** includes wellhead protection in confined to semiconfined aquifers, the relationships between stream losses and water table depths, and the identification and geochemical characterization of groundwater recharge to surface streams.

Geology faculty members commonly interact with the faculty and staff of the Utah Water Research Laboratory; the College of Natural Resources; the Department of Plants, Soils, and Biometeorology; and the Department of Civil and Environmental Engineering.

## Financial Assistance

Departmental financial support for incoming graduate students consists primarily of graduate teaching assistantships, which are awarded on a competitive basis. There is often other financial support available, such as research assistantships, resulting from grants or other external funding. Students requesting financial support should apply directly to the department no later than February 15. Admission to the MS program does not guarantee financial assistance.

## Additional Information

Additional information on the research activities of faculty and graduate students may be obtained directly from the Department of Geology's website at <http://www.usu.edu/geoldept>

## Geology Faculty

### Professors

*James P. Evans*, structural geology, structural petrology  
*W. David Liddell*, marine ecology, paleoecology, sedimentology  
*John W. Shervais*, igneous petrology, geochemistry, tectonics

### Adjunct Professors

*Lynn M. Dudley*, soil chemistry  
*David G. Tarboton*, water resources and hydrology

### Professor Emeritus

*Robert Q. Oaks, Jr.*, sedimentary petrology, stratigraphy

### Associate Professors

*Donald W. Fiesinger*, igneous petrology, Dean of College of Science  
*Susanne U. Janecke*, tectonics, structural geology  
*Peter T. Kolesar*, carbonate petrology, geochemistry  
*Thomas E. Lachmar*, hydrogeology

### Adjunct Associate Professors

*Janis L. Boettinger*, soil mineralogy  
*John C. Schmidt*, fluvial geomorphology

### Assistant Professors

*Carol M. Dehler*, sedimentation, geochemical cycles  
*Joel L. Pederson*, process geomorphology, Quaternary geology  
*Bradley D. Ritts*, basin analysis

### Adjunct Assistant Professor

*David G. Chandler*, surface hydrology

### Lecturer

*Susan K. Morgan*, science education, carbonate petrology

## Course Descriptions

Geology (GEOL), pages 526-528