Geography and Environmental Resources is the study of place and space; the intersection of the physical environment and human activities; patterns of climate, land forms, soils and water. Majors earning a Bachelor of Science degree in Geography and Environmental Resources study the environment in the field, the computer laboratory, and the traditional classroom. Job opportunities for our degree are broad and diverse. For example, graduates of our program have careers that include: Recycling Coordinator, Social Studies Teacher, GIS Coordinator, Geospatial Intelligence Analyst, Environmental Educator, Cartographer, Emergency Manager, Natural Resource Consultant, Regional Planner, Water Quality Manager, among others.

SIU Carbondale's programs in Geography and Environmental Resources focus on environmental geography. Faculty expertise is in water resources, land use, climatology, and geospatial techniques. Our courses are taught by faculty with excellent national and international reputations in their fields. We take an integrated environmental problem-solving approach in our courses. Our Environmental GIS Laboratory provides our students with current GIS and remote sensing technologies for environmental analysis. Many courses have labs to provide students with more personal attention. We also have an active mentoring program, through which every undergraduate has access to a faculty mentor and hands-on learning experiences.

Our undergraduate program is divided into two parts: Major Courses and Specialization. First, there are seven courses taken by all Geography and Environmental Resources majors to ensure that all of our students have an understanding of key concepts and tools used by professionals in the field. Then, students select one of two areas of specialization: 1) Environmental Geography and Sustainability is intended for students who want a broad background in the social and environmental sciences that relates to applied environmental management, or 2) Geographic Information Science is intended for students who are interested in applying geospatial technologies to geographic and environmental problems.

Practical experience is an important part of our program. We have an active internship program that places students with local natural resource agencies. Students receive academic credit for these internship and cooperative work experiences. Our program provides several awards and scholarships for outstanding undergraduate majors. We welcome all students and invite them to participate in program activities. We have a diverse faculty and we actively promote diversity among our faculty, staff, and students.

GENV students need a solid mathematics background to prepare them for advanced-level courses. We strongly recommend that GENV majors fulfill the University Core Curriculum requirement by taking MATH 108, College Algebra.

**Bachelor of Science (B.S.) in Geography and Environmental Resources Degree Requirements**

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>University Core Curriculum Requirements</td>
<td>39</td>
</tr>
<tr>
<td>Requirements for Major in Geography and Environmental Resources</td>
<td>42</td>
</tr>
<tr>
<td>Degree Requirements</td>
<td>Credit Hours</td>
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<tr>
<td>------------------------------------------------------------------------------------</td>
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<tr>
<td>Geography and Environmental Resources Major Courses</td>
<td>15</td>
</tr>
<tr>
<td>GEOG 300I, GEOG 303I, GEOG 401, GEOG 433, and GEOG 404 or GEOG 412</td>
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<tr>
<td>Two of the following: GEOG 100, GEOG 103, GEOG 104, GEOG 304, GEOG 310I, GEOG 320, or GEOG 330</td>
<td>6</td>
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<tr>
<td>Specialization (one of the following)</td>
<td>21</td>
</tr>
<tr>
<td>Environmental Geography and Sustainability</td>
<td></td>
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<tr>
<td>GEOG 320, GEOG 330, GEOG 424, GEOG 436, and GEOG 470; and two additional GEOG classes at the 400-level</td>
<td>21 or 21</td>
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<tr>
<td>Geographic Information Science (GIS):</td>
<td></td>
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<tr>
<td>GEOG 406, GEOG 408, GEOG 416, GEOG 420 and three additional GEOG classes at the 400-level</td>
<td>21 or 21</td>
</tr>
<tr>
<td>Electives</td>
<td>39</td>
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<td>Total</td>
<td>120</td>
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**Geography and Environmental Resources Minor**

A minor in geography and environmental resources consists of 15 credit-hours from a combination of the core courses and any one of the specializations.

**GIS Minor**

The Undergraduate GIS Minor enables students to focus on the fundamentals of geospatial techniques and analytical skills. This minor meets the needs of the expanding job opportunities for undergraduate students. This minor ensures that students understand earth-map relationships; understand principles of cartography; know the technical aspects of remote sensing and have competence in visual interpretation and digital processing and analysis of imagery; understand the basic representation and modeling of spatial data in GIS. Further, they will demonstrate an understanding of GIS concepts, database management, and the process of decision-making in the GIS context and obtain yield basic skills of spatial analysis and modeling and the analytical capabilities of ESRI’s ArcGIS and ERDAS IMAGINE. Finally, they will be competent in planning, developing, and implementing a major GIS project.

Course Requirement: The program requires students to complete 15 credit hours of undergraduate level coursework, selected from the following list: GEOG 310I, GEOG 401, GEOG 404, GEOG 406, GEOG 408, GEOG 416, GEOG 417, GEOG 420, GEOG 428, and GEOG 458.

**Sustainability Minor**

The Undergraduate Minor in Sustainability enables students to expand their knowledge and understanding of the long-term sustainable use of the earth’s resources, including water, land use and food systems, climate change, urban sustainability, and “green” energy. This minor meets the needs of the expanding job opportunities in environmental sustainability.
Course Requirement: Students must maintain a 2.7 GPA in the certification courses. The program requires students to complete at least 15 credit hours of coursework, as follows: GEOG 300I, GEOG 320, and GEOG 424, and two of the following: GEOG 421, GEOG 422, GEOG 426, GEOG 429, GEOG 431, GEOG 435, GEOG 436, GEOG 439, GEOG 454, GEOG 480, GEOG 481.

**Geography and Environmental Resources Honors Program**

The Geography and Environmental Resources Honors Program is a program within the major that is designed to recognize the outstanding scholarship of our top students and reward them with additional challenging and stimulating course options. Participation in the GENV Honors Program is contingent upon a student's admission to the University Honors Program (UHP). The UHP requirements are found at: [honors.siu.edu](http://honors.siu.edu). Honors students in our major should meet with the program director to discuss their interests and determine their course schedules.

Honors courses in Geography and Environmental Resources are: open to GENV majors; have prerequisites as listed by course number in the next section below; and have special assignments as arranged with each instructor.

**Geography and Environmental Resources Courses**

**GEOL111 - Geology and the Environment** 111-2 Geology and the Environment. (University Core Curriculum Course) [IAI Course: P1 908] Examines human interaction with geologic processes and hazards, including earthquakes, volcanoes, landslides and flooding; occurrences and availability of geologic resources, such as energy, water and minerals; and human impacts on the environment including global warming, waste disposal, and pollution. Two lectures per week. Must be taken concurrently with or upon completion of Geology 112 or 113. If Geology 111 is dropped the laboratory course must also be dropped.

**GEOL112 - Geology Environment Lab** 112-1 Geology and the Environment Laboratory Learning. (University Core Curriculum) [IAI course: P1 908L] Laboratory to accompany Geology 111. Hands-on and inquiry-based learning in topics such as earth materials, topographic maps, stream dynamics, floods, coastal processes, landslides, groundwater, earthquakes, volcanoes, and human impacts on the environment. One laboratory session per week. Must be taken concurrently with or upon completion of Geology 111. Lab fee: $10.

**GEOL113 - Field Geology** 113-1 Field Geology of Southern Illinois and Vicinity. (University Core Curriculum Course) Class will highlight the geological history and geological processes that have shaped southern Illinois and its surroundings, using the field as a natural laboratory. Schedule will include up to 7 Saturday field trips to nearby parks and outcrops, with a possible weekend trip outside of Illinois. Prerequisite: This class must be taken concurrently or following completion of GEOL 111, 220, 221, or 222. If GEOL 111, 220, 221, or 222 are dropped, then GEOL 113 must also be dropped. Activities fee: $150.

**GEOL121 - The History of the Earth** 121-2 The History of the Earth. (University Core Curriculum Course) Geological processes shape the surface of our planet over millions of years. These forces provide the ever changing conditions for life. Fossils are "footprints" in time which recorded those changes, giving us the opportunity to unravel Earth’s past. This class will study the story of Earth's geological and evolutionary past events. Two lectures per week. Must be taken concurrently with or upon completion of GEOL 124 or GEOL 113. If GEOL 124 or GEOL 113 is dropped then GEOL 121 must be dropped.

**GEOL122 - Hazards and Catastrophes** 122-2 Natural Hazards and Catastrophes. (University Core Curriculum Course) The Earth is shaped by dynamic geological forces such as earthquakes, volcanoes, and floods. While these phenomena construct the landscapes around us, they can be extremely destructive when in contact with human civilization and/or infrastructure. This class examines the natural forces capable of catastrophic impact on society providing a greater understanding of the sometimes violent geologic processes that shape the planet along with their human impact. Two lectures per week.
Must be taken concurrently with or upon completion of GEOL 123 or GEOL 113. If GEOL 123 or GEOL 113 is dropped then GEOL 122 must be dropped.

**GEOL123 - Hazards Lab** 123-1 Natural Hazards and Catastrophes Laboratory. (University Core Curriculum Course) Laboratory to accompany GEOL 122. This lab examines natural processes associated with hazard and catastrophe in human history and modern society, such as earthquakes, volcanoes, landslides, and floods. Labs provide a greater understanding of the processes and driving forces shaping the planet along with their human impact while fostering skills of scientific inquiry. One laboratory session per week. Must be taken concurrently with or upon completion of GEOL 122. If GEOL 123 is dropped then GEOL 122 must be dropped. $10 Lab Fee.

**GEOL124 - History of the Earth Lab** 124-1 History of the Earth Laboratory. (University Core Curriculum Course) Laboratory to accompany GEOL 121. Inquiry based laboratory sessions teaching the concepts of deep time, plate tectonics, evolution and the fossil record, biostratigraphy, rise and fall of the dinosaurs, evolution of mammals and humans. One laboratory session per week. Must be taken concurrently with or upon completion of GEOL 121. If GEOL 124 is dropped then GEOL 121 must be dropped. $10 Field Trip Fee.

**GEOL128 - The Dinosaurian World** 128-2 The Dinosaurian World. (University Core Curriculum Course) An introduction to Dinosaurs and the world in which they lived, and died. Topics will include Mesozoic continents; Plants of the Mesozoic; Dinosaur paleoenvironments; Dinosaur origins; Dinosaur biology; Dinosaur fossilization; Dinosaur hunters and Dinosaur extinction. Must be taken concurrently with or upon completion of GEOL 129 or GEOL 113. If GEOL 129 or GEOL 113 is dropped then GEOL 128 must be dropped.

**GEOL129 - DinoLab** 129-1 DinoLab. (University Core Curriculum Course) A physical science lab that provides hands-on and inquiry based learning in geologic concepts necessary to fully understand dinosaur paleontology and paleobiology. Must be taken concurrently with or upon completion of GEOL 128, The Dinosaurian World. If GEOL 128 is dropped then GEOL 129 must be dropped. $10 Lab Fee.

**GEOL130 - The Planets** 130-2 The Planets. (University Core Curriculum) This course provides a general overview of the origin of the solar system, the composition of the planets and moons of the solar system, and the search for other planetary systems and life in the universe. The planetary processes of meteorite impact, volcanism, tectonics, and weathering on the various planets and the newest discoveries by NASA and other Space Agencies will be discussed. Planetary exploration efforts center on the search for life itself—"extant" life that is either active today or is dormant but still alive will be examined and compared across the solar system. Examines the methods of discovering information about the solar system involving the interdisciplinary application of pertinent basic scientific concepts of geology, chemistry, biology, meteorology, and cosmology. Two lectures per week. Must be taken concurrently or upon completion of laboratory course GEOL 131. If GEOL 130 is dropped then GEOL 131 must also be dropped.

**GEOL131 - Planets Lab** 131-1 The Planets Laboratory Learning. (University Core Curriculum) Laboratory to accompany GEOL 130. This lab will provide hands on inquiry-based learning in topics such as building materials of planets and their moons, meteorites and their origin and composition, volcanoes and plate movement, the internal structure and the atmospheric composition of planetary bodies across the solar system, the sun-earth interactions, the impacts and their effects on planetary development, and the search for "extant" life that is either active today or is dormant but still alive across the solar system. One laboratory session per week. Must be taken concurrently with Geology 130.

**GEOL220 - The Dynamic Earth** 220-3 The Dynamic Earth. (University Core Curriculum Course) [IAI Course: P1 907] Introduction to the materials which form the Earth and the dynamic processes that change them. Three lectures per week. With 223 satisfies University Core Curriculum Science Group I requirement in lieu of 111 and 112. Field trip required. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field Trip Fee not to exceed $25.

**GEOL220H - The Dynamic Earth** 220H-3 The Dynamic Earth. (University Honors Course) (University Core Curriculum Course) [IAI Course: P1 907] Introduction to the materials which form the Earth and the dynamic processes that change them. Three lectures per week. With 223 satisfies University Core Curriculum Science Group I requirement in lieu of 111 and 112. Field trip required. Expense will vary in
proportion to distance traveled and locations visited and will be determined before each semester. Field Trip Fee not to exceed $25. Restricted to University Honors Program students.

GEOL221 - Earth Through Time 221-3 Earth Through Time. (University Core Curriculum Course) [IAI Course: P1 907] Concepts and methods of interpreting earth history. Development of earth's major features and environment systems. Emphasis on ancient environments and life forms, major changes in paleoclimate, paleocommunities and biodiversity. Students must complete a research project. With 224 satisfies University Core Curriculum Group I Science requirement in lieu of Geology 111 and 112. Field trips required. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field Trip Fee not to exceed $15. Restricted to University Honors Program students.

GEOL221H - Earth Through Time 221H-3 Earth Through Time. (University Honors Course) (University Core Curriculum Course) [IAI Course: P1 907] Concepts and methods of interpreting earth history. Development of earth's major features and environment systems. Emphasis on ancient environments and life forms, major changes in paleoclimate, paleocommunities and biodiversity. Students must complete a research project. With 224 satisfies University Core Curriculum Group I Science requirement in lieu of Geology 111 and 112. Field trips required. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field Trip Fee not to exceed $15. Restricted to University Honors Program students.

GEOL222 - Environmental Geology 222-3 Environmental Geology. (University Core Curriculum course) A study of the environment from a geological perspective. A critical study of geological hazards (earthquakes, floods), earth resources (minerals, water), proper land use (waste disposal), and other environmental concerns. Three lectures per week. One Saturday field trip required. Prerequisite: with 223 satisfies University Core Curriculum Science Group I requirement in lieu of 111 and 112. Lab fee: $5.

GEOL223 - Intro Geology Lab 223-1 Introductory Geology Laboratory. (University Core Curriculum Course) Understanding the earth's processes, materials and environment through hands-on laboratory and field experience. One three-hour session per week. Prerequisite: completion of, or concurrent enrollment in, 220 or 222, with 220 or 222 satisfies University Core Curriculum Science Group I requirement in lieu of 111 and 112. Lab fee: $10.

GEOL224 - Earth Through Time Laboratory 224-1 Earth Through Time Laboratory. (University Core Curriculum Course) Concepts and methods of interpreting earth's history. One two-hour laboratory per week. Weekend day field trip required. Prerequisite: completion of or concurrent enrollment in 221. With 221 satisfies University Core Curriculum Group I Science requirement in lieu of Geology 111 and 112. Lab fee: $10.

GEOL225 - Physical Geology in the Field 225-3 Physical Geology in the Field. (University Core Curriculum Course) This class is an introductory geology course performed exclusively in the field and fulfills the introductory science course with lab requirement. The class will spend three weeks in the field and visit Yellowstone, Grand Tetons, Craters of the Moon, and Glacier National Parks, as well as spending time near Dillon, MT. Students will learn the basics of rock and mineral identification, how to recognize and identify types of faults, introductory stratigraphy, map reading, and landscape evolution.

GEOL302 - Structural Geology 302-4 Fundamentals of Structural Geology. An introduction to structural geology including a study of the forces involved in the deformation of the earth's crust, with special emphasis on the recognition and interpretation of the resultant geologic features. Laboratory required. Up to 3 one- or two-day field trips may be required on weekends. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Prerequisite: GEOL 220 or 222 with a grade of C or better; 223 with a grade of C or better; MATH 109 or 111. Recommended: Physics 203 or 205, or concurrent enrollment. Field trip fee not to exceed $199.

GEOL302H - Structural Geology 302H-4 Fundamentals of Structural Geology. (University Honors Course) An introduction to structural geology including a study of the forces involved in the deformation of the earth's crust, with special emphasis on the recognition and interpretation of the resultant geologic features. Laboratory required. Up to 3 one- or two-day field trips may be required on weekends. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $199. Prerequisite: GEOL 220 or 222 with a grade of C or better;
GEOL310 - Mineralogy 310-4 Mineralogy. Introduction to the internal structure morphology and chemistry of crystals. Study of the properties, chemistry, occurrence and identification of rock-forming and economically important minerals. Rudiments of the use of a petrographic microscope and the optical properties of common rock-forming minerals. Up to 3 one- or two-day field trips may be required on weekends. Prerequisite: GEOL 220 or 222 with a grade of C or better; 223 with a grade of C or better; CHEM 200, 201 recommended. Lab fee: $15.

GEOL315 - Petrology 315-4 Petrology. Introduction to the classification, nature, origin and processes of igneous, sedimentary and metamorphic rocks. Hand specimen and thin-section analysis of rocks. Lecture-laboratory. Up to 3 one- or two-day field trips may be required on weekends. Prerequisite: GEOL 310 with a grade of C or better. Lab fee: $15.

GEOL315H - Petrology 315H-4 Petrology. (University Honors Course) Introduction to the classification, nature, origin and processes of igneous, sedimentary and metamorphic rocks. Hand specimen and thin-section analysis of rocks. Lecture-laboratory. Up to 3 one- or two-day field trips may be required on weekends. Prerequisite: GEOL 310 with a grade of C or better. Lab fee: $15. Restricted to University Honors Program students.

GEOL325 - Sedimentology & Stratigraphy 325-4 Sedimentology and Stratigraphy. An overview of the relationship between tectonics and climate, and the origin of sedimentary rocks; the course outlines: the plate-tectonics setting of sedimentary basins, their geometry, and subsidence mechanisms; the relationship between sediment supply, basin subsidence, and global sea-level change in determining the sequence stratigraphy of sedimentary-basin fill; and principles of interpretation of environment of deposition within a sequence stratigraphic framework. Prerequisite: GEOL 220 or 222 with a grade of C or better, 221 with a grade of C or better, 223 with a grade of C or better, 224 with a grade of C or better. Lab and field trips required. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $60.

GEOL327I - The World's Oceans 327I-3 The World's Oceans. (University Core Curriculum: Students with a catalog year prior to Summer, 2012 only) The world's ocean comprises up to 80% of the earth's surface. It plays a significant role in global climate, contains mineral resources and harbors a wealth of plant and animal life. "The World's Oceans", through the scientific method, will provide a greater understanding of the processes and components of the oceans and their importance to our everyday life. The course will include lectures, discussion sessions, readings and exercises from the text, laboratory exercises and short field excursions.

GEOL329H - Geomythology 329H-3 Geomythology. (University Core Curriculum Course) (University Honors Course) Natural disasters have been the source of countless myths and legends throughout human history. This course will examine ways in which regional geology influenced ancient civilizations, and explore the possibility that some of their myths and legends preserve a record of actual geologic events. This class will include lectures, discussions, media sources and readings. An introductory geology course is recommended but not necessary. Prerequisite: GEOL 111, 220, 221 or 222 recommended. Restricted to University Honors Program students.

GEOL329I - Geomythology 329I-3 Geomythology. (University Core Curriculum Course) Natural disasters have been the source of countless myths and legends throughout human history. This course will examine ways in which regional geology influenced ancient civilizations, and explore the possibility that some of their myths and legends preserve a record of actual geologic events. This class will include lectures, discussions, media sources and readings. An introductory geology course is recommended but not necessary. Prerequisite: GEOL 111, 220, 221 or 222 recommended.

GEOL330H - The Planets 330H-3 The Planets. (University Honors Course) (University Core Curriculum: Students with a catalog year prior to Summer 2012 only) The geology of the planets and moons of the solar system, their origin and history, the origin of the universe and the solar system and the search for other planetary systems and life in the universe. The geologic processes of vulcanism, tectonism, weathering and meteorite impact on the various planets will be examined and compared. A main focus of the course will be examining the methods for discovering information about the solar system involving the
interdisciplinary application of pertinent basic scientific concepts of geology, geochemistry, geophysics, meteorology and cosmology. Restricted to University Honors Program students.

**GEOL330I - The Planets** 330I-3 The Planets. (University Core Curriculum: Students with a catalog year prior to Summer 2012 only) The geology of the planets and moons of the solar system, their origin and history, the origin of the universe and the search for other planetary systems and life in the universe. The geologic processes of vulcanism, tectonism, weathering and meteorite impact on the various planets will be examined and compared. A main focus of the course will be examining the methods for discovering information about the solar system involving the interdisciplinary application of pertinent basic scientific concepts of geology, geochemistry, geophysics, meteorology and cosmology.

**GEOL360 - Old Humans, New Humans** 360-3 Old Humans, New Humans. The evolution of humans and the development of civilization depended and depends on the immediate and surrounding environment. Climate, availability of natural resources, and susceptibility to natural hazards all have and continue to play a role in directing evolution and civilization. This course will give the student context of the exquisite hominid fossils and natural resources presented today in South Africa. Drawing on these examples, we will examine how geologic processes and hazards influence human evolution and how our dependence on resources influence civilization today.

**GEOL401 - Phys Earth for Teachers** 401-3 Physical Nature of the Earth for Teachers. This is an online course that offers an overview of the materials that form the Earth and the dynamic processes that shape the Earth, including both surficial processes and plate tectonics. This course will cover content appropriate for science teachers preparing to teach Physical Geology as a Dual-Credit course in high schools. Topics include: components and processes that create rocks and the cycles that change one rock into another; how plate tectonics has shaped the Earth; surficial processes (weathering, landslides, movement of ice, water, and wind); hazardous processes (earthquakes, volcanoes, flooding); and resources such as water, soil, and mineral and energy sources. This course is designed to be taken in conjunction with GEOL 402, a 1-hr laboratory course. Only open to students in the Dual Credit Certificate for Teachers program.

**GEOL402 - Phys Earth Lab Teachers** 402-1 Physical Nature of the Earth Laboratory for Teachers. Through active learning activities, this course offers examination of the materials that form the Earth and the dynamic processes that shape the earth, including surficial processes and plate tectonics. This course will cover content appropriate for science teachers preparing to teach labs associated with Physical Geology as a Dual-Credit course in high schools. This is offered as a hybrid distance education (online) class and includes both at-home and in-class laboratory assignments. For the in-class components, students will come to SIUC’s campus for 2 half days (Saturdays) as indicated in the schedule. This course is designed to be taken in conjunction with GEOL 401, a 3-hr online course in which the students learn about earth materials and earth processes in greater depths. Only open to students in the Dual Credit Certificate for Teachers program.

**GEOL403 - Hist Geol Teacher Enhancement** 403-3 Historical Geology Teacher Enhancement. GEOL 403 is an online course designed to train science teachers to teach Historical Geology as a Dual Credit course in high schools. This course covers the basic principles involved in the study of geology and the history of the Earth preserved in the rock record. We begin with the large-scale components of Earth systems and geologic time, and then learn about the evolution of life recorded in the fossil record from the earliest life through the present. This course covers not just WHAT we know, but how we know it. This course is designed to be taken in conjunction with GEOL 404, a 1-hr laboratory course. Only open to students in the Dual Credit Certificate for Teachers program.

**GEOL404 - Hist Geol Teacher Enhance Lab** 404-1 Historical Geology Teacher Enhancement Lab. GEOL 404 is the laboratory section that accompanies the online Historical Geology Teacher Enhancement. This laboratory course offers hands-on activities to complement the online lectures and will provide teachers with a structure to teach labs in their own Dual Credit high school courses. This course covers the basic principles involved in the study of geology and the history of the Earth preserved in the rock record. We study sedimentary rocks, and learn how to read the clues to past environments and life preserved within samples. This course is done partially at home, but requires a six hour in house lab session. Only open to students in the Dual Credit Certificate for Teachers program.

**GEOL405 - Science Writing** 405-2 Science Writing and Scientific Communication. Course will teach "survival skills" in scientific reading, writing, communicating, and publishing for new graduate students.
Topics will include database search, analysis of journal articles, abstracts, figures, and tables, Powerpoint presentations, proposals, posters, thesis writing, and preparation of journal submissions. Enrollment is open to graduate students in the sciences and is by permission of the instructor.

**GEOL411 - Volcanology** 411-3 Volcanology. Study of volcanoes, their distribution, forms, composition, eruptive products and styles of potential hazards. Relationship of magmatic characteristic, eruptive style, and depositional products to the geologic framework is examined. Prerequisite: GEOL 315.

**GEOL412 - Advanced Petrology** 412-3 Advanced Petrology. In-depth study of the rock forming processes. The relations of rock forming processes to petrographic analysis will be emphasized. Laboratories will deal with hand-specimen and thin-section analysis from selected rock suites with genetic modeling of the resulting data. Prerequisite: GEOL 310, 315.

**GEOL413 - Quantitative Methods-Geology** 413-3 Quantitative Methods of Geology. An introduction to quantitative methods in a geological and earth sciences context. Topics introduced include sampling plans for geologic studies, non-parametric test of geological data, comparisons of geological samples, analysis of sequential geological data. Laboratories will deal with numerical examples from all areas of geology. Restricted to advanced standing. Special approval needed from the instructor.

**GEOL415 - Optical Mineralogy** 415-3 Optical Mineralogy. The optical properties of minerals and the use of the petrographic microscope for identification of crystals by the immersion method and by thin section. Lecture, laboratory. Prerequisite: GEOL 310, PHYS 203B or 205B.

**GEOL416 - Geochem Natural Waters** 416-3 The Geochemistry of Natural Waters. The purpose of this class is to provide students with a strong theoretical background in aqueous geochemistry, environmental geochemistry, and groundwater geochemistry for application in a wide range of research topics. The approach combines conceptual knowledge with quantitative skills in a cyclic fashion to build independent understanding and chemical intuition. Prerequisites: GEOL 310, CHEM 200, 201, 210, 211 or consent of instructor. Lab fee: $15.

**GEOL417 - Isotope Geochemistry** 417-3 Isotope Geochemistry. Isotope fractionation in natural systems containing D/H, carbon, oxygen, nitrogen, and sulfur. Application of stable isotope studies to environmental processes, paleoclimatology, and geothermometry. Stable and radioactive isotopes as tracers in hydrologic processes, ore deposits, sedimentology, and in crust-mantle differentiation processes. Prerequisite: GEOL 310, CHEM 200, 201, 210, 211 or equivalent.

**GEOL418 - Low Temp Geochemistry** 418-3 Low Temperature Geochemistry. The application of chemical principles to geologic processes that occur on and near the earth's surface. Lecture, laboratory. Prerequisite: GEOL 310, CHEM 200, 201, 210, 211 or equivalent.

**GEOL419 - Ore Deposits** 419-3 Ore Deposits. Overview of the occurrence, geology and origin of metalliferous mineral deposits. Geologic principles and research techniques important to the understanding of mineral deposits. Introduction to exploration and mining methods. Lectures, laboratories and field trips required. Prerequisite: GEOL 302, 315 or consent of instructor. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $60.

**GEOL420 - Petroleum Geology** 420-3 Petroleum Geology. The geological occurrences of petroleum including origin, migration and accumulation; a survey of exploration methods, and production problems and techniques. Laboratory study applies geological knowledge to the search for and production of petroleum and natural gas. Prerequisite: GEOL 221, 224.

**GEOL421 - Organic Geochemistry** 421-3 Organic Geochemistry. The nature, origin and fate of natural and artificial organic materials in rocks and sediments. Topics include characterization of fossil fuels using biological marker compounds, petroleum source rock evaluation, and organic pollutants in the environment. Prerequisite: GEOL 325 or consent of instructor.

**GEOL423 - Geomicrobiology** 423-3 Geomicrobiology. (Same as MICR 423 and MBMB 423) The course will focus on the role that microorganisms play in fundamental geological processes. Topics will include an outline of the present understanding of microbial involvement of weathering of rocks, formation and transformation of soils and sediments, and genesis and degradation of minerals. Elemental cycles...
will also be covered with emphasis on the interrelationships between the various geochemical cycles and the microbial tropic groups involved. Prerequisite: Microbiology 301 and Chemistry 210 and 211. Recommended: GEOL 220, 221 or 222.

GEOL425 - Invertebrate Paleo & Paleoeol 425-3 Invertebrate Paleontology and Paleoeology. (Same as ZOOL 425) Concepts of paleontology and paleoecology. Emphasis on functional morphology, lifestyles and habitats of fossil invertebrates and algae. The nature and evolution of marine and coastal paleocommunities. The effects of extinction events on paleocommunities and biodiversity. Laboratory. Field trips required. Prerequisite: GEOL 325 or a biology course. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $199.

GEOL428 - Paleoeology & Envrns Depstn 428-3 Paleoeology and Environments of Deposition. Characteristics, distribution, and classification of recent and ancient environments. Criteria for recognizing ancient environments. Sedimentological and paleoecological approaches. Recognition of ancient environments and environmental associations. Laboratory. Field trips required. Prerequisite: GEOL 425, 325, or concurrent enrollment. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $199.

GEOL430 - Planetary Geology 430-3 Planetary Geology. Study of the solar system and planet formation, focusing on formation, differentiation and secondary processes. Geologic histories and geological processes of other planets are examined and compared with our understanding of the Earth. Prerequisite: GEOL 310.

GEOL431 - Catastrophes & Consequences 431-3 Catastrophes and Consequences. Much has been written in recent years about the impact of human civilization on the environment. There has been much less discussion of the impact of the environment on human civilization, but the fact is that gradual or rapid changes in the environment can profoundly affect human populations-in both direct and indirect ways. This is an interdisciplinary course that reviews both the short term/short range and long term/long range effects of natural perturbations of the environment on the development of civilization and the course of history. We will review historical case studies of the consequences of various kinds of natural disasters which resulted in major disruptions to the environment from local and regional phenomena to those that affected the entire planet. Examples include major volcanic eruptions, earthquakes and climate change.

GEOL435 - Solid Earth Geophysics 435-3 Solid Earth Geophysics. Earth's size, shape, mass, age, composition, and internal structure are reviewed in detail as understood from its volcanism, gravity, magnetic fields, seismicity, and motion of continents and ocean basins; plate tectonics. Prerequisite: MATH 150 or MATH 151 with a C or better.

GEOL436 - Applied Geophysics 436-3 Applied Geophysics. Theory and practice of geophysics applied to exploration for natural resources including oil, minerals, coal, groundwater, and for archaeology, environmental, and meteorite impact sites and earthquake zones. Methods include seismic reflection, refraction, and surface waves also gravity, magnetic, and electrical. Up to 3 one-day field trips may be conducted on weekends. Recommend: GEOL 220 or 222, PHYS 203A/B or PHYS 253A/B. Prerequisite: MATH 150. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $80.

GEOL437 - Field Course in Geophysics 437-3 Field Course in Geophysics. Use of geophysical equipment for collection, analysis and interpretation of seismic, gravity, magnetic, electrical, and other types of geophysical data. Field trips required. Prerequisite: GEOL 436 or consent. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $199.

GEOL440 - Adv Topics Geological Sciences 440-1 to 9 Advanced Topics in the Geological Sciences. Individual study or research or advanced studies in various topics. Restricted to advanced standing. Special approval needed from the instructor.

GEOL445 - Museum Studies in Geology 445-3 Museum Studies in Geology. History, nature and purpose of geology in museums, relationships of geology to other museum disciplines, application of
geologic methods to museum functions, preparation and preservation of specimens; nature, acquisition and utilization of geologic collections in museums; role of research in museums.

**GEOL450 - Intro to Field Geology** 450-3 Introduction to Field Geology. Introduction to field techniques, principles of geologic mapping and map interpretation. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Prerequisite: GEOL 310 with a grade of C or better.

**GEOL451 - Field Experience in Geology** 451-1 to 12 Field Experience in Geology. Preparation for and participation in academically rigorous field trips guided by faculty members. Trips will be to areas of geological interest and will occur during official breaks within or between semesters. Expense will vary in proportion to the distance traveled and duration of trip and will be determined before each trip. A student may only take a specific trip once for credit. Special approval needed from the instructor.

**GEOL454 - Field Geology** 454-6 Field Geology. Advanced field mapping in the Rocky Mountains, including problems in stratigraphy, structure, petrology, paleontology, geomorphology, and economic geology. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Prerequisite: GEOL 302, 315, 325. GEOL 450 recommended. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $1,000.

**GEOL464 - Earth's Deep Interior** 464-3 Earth's Deep Interior. Structure and composition of Earth's interior from the lithospheric mantle to the inner core. Mineralogy and petrology of the upper mantle, transition zone, lower mantle, outer core, and inner core, equilibrium phase relations and phase changes, equations of state, spin transitions, seismic discontinuities, seismic anisotropy, geomagnetic field, laboratory and seismic methods used to explore Earth's interior. Prerequisite: GEOL 310 and 315 with a grade of C or better, graduate status, or instructor approval.

**GEOL466 - Tectonics** 466-3 Tectonics. Fundamentals of geodynamics applied to plate tectonics: mantle composition and rheology, deformation of the lithosphere, structural characteristics of plate margins, stability of triple junctions, diachronous tectonics, and orogenesis will be examined in detail. One 3-day field trip is required. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $150. Prerequisite: GEOL 302, MATH 150, or consent.

**GEOL466H - Tectonics** 466H-3 Tectonics. (University Honors Course) Fundamentals of geodynamics applied to plate tectonics: mantle composition and rheology, deformation of the lithosphere, structural characteristics of plate margins, stability of triple junctions, diachronous tectonics, and orogenesis will be examined in detail. One 3-day field trip is required. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $150. Prerequisite: GEOL 302, MATH 150, or consent. Restricted to University Honors Program students.

**GEOL470 - Hydrogeology** 470-3 Hydrogeology. Study of the distribution, origin, and movement of groundwater, and the properties of geologic materials that control groundwater flow and contaminant transport. Includes topics on the sustainable development of groundwater resources. Prerequisite: GEOL 220 or 222 with a C or better; or consent of instructor.

**GEOL471 - Hydrogeology Laboratory** 471-1 Hydrogeology Laboratory. Problem sets, laboratory experiments, and field exercises in hydrogeology. Includes projects on the sustainable development of groundwater resources. Field trips required. Prerequisite: GEOL 220 or 222 with a C or better; or consent of instructor. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $150.

**GEOL474 - Geomorphology** 474-3 Geomorphology. Study of erosional and depositional processes operating at the earth's surface and landforms resulting from these processes. Relationship of processes and landforms to the geologic framework is examined. Laboratory. Field trips required. Prerequisite: GEOL 220 or 222; 223. Expense will vary in proportion to distance traveled and locations visited and will be determined before each semester. Field trip fee not to exceed $60.

**GEOL476 - Quaternary Geology** 476-3 Quaternary Geology. Methods used to identify, map, date and correlate Quaternary deposits and interpret Quaternary history. Covers glacial, fluvial, coastal, lacustrine
and eolian chronologies, oxygen-isotope records from ocean sediments and continental ice cores, volcanic activity, and Quaternary climate change. Field trips required. Prerequisite: GEOL 220 or 222; 221, 223, 224; or consent of instructor; GEOL 474 recommended.

**GEOL480 - Geology of Coal** 480-3 Geology of Coal. Stratigraphy, sedimentation and structure of coal deposits; modern analogs; origin of splits and partings in coal seams; coal quality and rank; coal exploration and mining; methods of resource evaluation. Prerequisite: GEOL 220 or 222; 221, 223, and 224; or consent of instructor.

**GEOL481 - Sedimentary Basin Analysis** 481-3 Sedimentary Basin Analysis. The use of stratigraphy, structure, sedimentology and geophysics to determine the paleogeographic evolution of sedimentary basins. Topics include the study of the relationships between host strata and both primary and post-depositional non-renewable resources, plate tectonics and basin evolution and subsurface geologic methods. Special approval needed from the instructor. Lab fee: $10.

**GEOL482 - Organic Petrology** 482-3 Organic Petrology. Petrology and geochemistry of coals and dispersed organics; emphasis on applications to the coal and oil industries; origin of coal and source rock constituents; geochemical and petrographic changes with increased maturation. Prerequisite: GEOL 220 or 222; 221, 223, and 224; or consent of instructor. Lab fee: $50.

**GEOL483 - Forensic Geology** 483-3 Forensic Geology. An introduction to the use of geological materials and techniques in criminal investigation. Details from actual criminal cases will be used as examples in all the topics covered which include rock and mineral types, geological and topographic maps, fossils, sand, soils, spores and pollen, geological building materials, art fraud and gemstones. Techniques covered will include optical microscopy, scanning electron microscopy and x-ray diffraction. Lab fee: $10.

**GEOL484 - Geologic Remote Sensing** 484-3 Geologic Remote Sensing. Applications of remote sensing using aerial photographs, multi-spectral imagery, hyperspectral imagery, thermal infrared imagery, and radar imagery, in structural geology, stratigraphy, geomorphology, oil and mineral exploration, geologic hazard analysis and planetary exploration. Prerequisite: GEOL 220 or consent of the instructor. Lab fee: $25.

**GEOL490 - Internship** 490-1 to 3 Internship. Credit for supervised practical experience with an external geological agency or company; prior approval of the sponsoring agency and the department is required. Restricted to advanced standing.

**Geography and Environmental Resources Faculty**


**Li, Ruopu**, Associate Professor, Geography and Environmental Resources, Ph.D., University of Nebraska, 2012; 2015. GIS analysis and modeling, water resources modeling and management, energy geography, agricultural land use.

**Remo, Jonathan**, Associate Professor, Geography and Environmental Resources, Ph.D., Southern Illinois University, 2008; 2012. Fluvial geomorphology, flood hydrology, hydraulic modeling, disaster mitigation planning, disaster loss modeling.

**Schoof, Justin**, Professor and Director School of Earth Systems and Sustainability, Geography and Environmental Resources, Ph.D., Indiana University, 2004; 2006. Climate variability and change, synoptic climatology, statistical climatology, climate extremes.


Weinert, Julie, Professor of Practice, Ph.D., The Ohio State University, 2008; 2005. Tourism geography, ecotourism, feminist geography, globalization, geography of development.

Emeriti Faculty

Baumann, Duane D., Professor, Emeritus, Ph.D., Clark University, 1968
Dziegielewski, Benedykt, Professor, Emeritus, Ph.D., Southern Illinois University, 1983.
Horsley, Doc, Assistant Professor, Emeritus, Ph.D., Southern Illinois University, 1974.
Lieber, Stanley R., Professor, Emeritus, Ph.D., University of Iowa, 1974.
Sharpe, David M., Professor, Emeritus, Ph.D., Southern Illinois University, 1968.

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