The Sciences and Letters Curriculum major in Geology, administered by the Department of Geology, is designed for students who want a more flexible course of study than is provided by the Specialized Curriculum in Geology and Geophysics. It may be used by those wishing to obtain a more liberal education and/or background in geology for use in fields such as anthropology, business, mineral economics, regional planning, journalism, law, sales, or library and information science. It is not intended to prepare a student for graduate work in the geological sciences unless the student selects additional courses in mathematics, chemistry, and physics comparable to those required in the Specialized Geology and Geophysics Curriculum. Students must choose one concentration: Geology, Earth and Environmental Sciences, or Earth Science Teaching. The Earth Science Teaching Concentration is designed for students preparing to teach earth science at the secondary school level.

The Specialized Curriculum in Geology and Geophysics is designed for students who plan to pursue graduate study in geology or geophysics or who wish to work professionally in the environmental field upon obtaining the bachelor's degree. It consists of geology, geophysics, and environmental geology concentrations, and offers more training in geology and related science than is required of students who make geology their major in the Sciences and Letters Curriculum. Students must choose one concentration: Geology, Geophysics, or Environmental Geology.

The Department of Geology also sponsors the Minor in Geology.

For the Degree of Bachelor of Science in Liberal Arts and Sciences

Major in Sciences and Letters Curriculum
Select one concentration in consultation with an adviser.

- Earth and Environmental Science Concentration (https://catalog.illinois.edu/undergraduate/las/academic-units/geology/earth-environmental-science-concentration)
- Earth Science Teaching Concentration (https://catalog.illinois.edu/undergraduate/las/academic-units/geology/earth-science-teaching-concentration)
- Geology Concentration (https://catalog.illinois.edu/undergraduate/las/academic-units/geology/geology-concentration)

For the Degree of Bachelor of Science in Geology

Major in Specialized Curriculum in Geology and Geophysics
Select one concentration in consultation with an adviser.

- Geology Concentration (https://catalog.illinois.edu/undergraduate/las/academic-units/geology/geology-concentration/geology-concentration-specialized-curriculum)
- Geophysics Concentration (https://catalog.illinois.edu/undergraduate/las/academic-units/geology/geophysics-concentration)
- Environmental Geology Concentration (https://catalog.illinois.edu/undergraduate/las/academic-units/geology/environmental-geology-concentration)

Minor in Geology
The geology minor is designed for students who desire a significant background in Geology to support study and practice of their major field. Selection of courses at the 300- or 400-level will depend on the major and interests of the student.

E-mail: geology@illinois.edu

Web address for department: www.geology.illinois.edu (http://www.geology.illinois.edu)

GEOL 107  Physical Geology 1
GEOL 208  History of the Earth System
Select at least 10 hours of advanced geology courses from the following:

GEOL 333  Earth Materials and the Env
GEOL 380  Environmental Geology
400-level courses taught by the Department of Geology

Total Hours 18-19

1 Students who decide to follow the curriculum after first taking GEOL 100 or GEOL 103 should enroll in GEOL 208. GEOL 100 or GEOL 103 will be accepted as a substitute for GEOL 107, but students should be aware that these courses are not intended for science majors.

GEOL Class Schedule (https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/GEOL)

Courses

GEOL 100  Planet Earth  credit: 3 Hours.
Introduces non-science majors to physical aspects (earthquakes, volcanoes, floods, tsunamis, mountains, plate tectonics) and historical aspects (formation of earth and life, dinosaurs, ice age, evolution of climate) in earth science. Presents information on earth resources, natural hazards, and development of natural landscapes. Focuses on humanistic issues; provides context for understanding environmental change. Optional lab demonstrations and field trips with co-registration in GEOL 110. Credit is not given for both GEOL 100 and GEOL 101, GEOL 103 or GEOL 107.

This course satisfies the General Education Criteria for:
UIUC: Physical Sciences

GEOL 103  Planet Earth QRII  credit: 3 Hours.
Topics covered are very similar to those of GEOL 101. Emphasizes application of quantitative methods in deriving geological knowledge. A weekly computer laboratory is an essential component of the course. Credit is not given for both GEOL 103 and GEOL 100, GEOL 101 or GEOL 107.

This course satisfies the General Education Criteria for:
UIUC: Physical Sciences
UIUC: Quant Reasoning II

Information listed in this catalog is current as of 04/2016
GEOL 104 Geology of the National Parks credit: 3 Hours.
Develops geologic background, concepts, and principles through study of selected national parks and monuments. Examines the geologic framework and history, modern geologic processes, and factors influencing the present day landscape for each park area. Same as ESE 104.
This course satisfies the General Education Criteria for:
UIUC: Physical Sciences

GEOL 106 Extinction: Dinosaurs to Dodos credit: 3 Hours.
Same as ESE 126 and IB 106. See IB 106.
This course satisfies the General Education Criteria for:
UIUC: Life Sciences

GEOL 107 Physical Geology credit: 4 Hours.
Introduces Earth phenomena and processes. Includes minerals and rocks, continental drift, plate tectonics, rock deformation, igneous and sedimentary processes, geologic time, landscape evolution, internal structure and composition of the earth, groundwater, seismology and earthquakes, and formation of natural resources. Emphasizes the chemical and physical aspects of the Earth, and the basis for geological inference. Field trip required. Additional fees may apply. See Class Schedule. Credit is not given for both GEOL 107 and GEOL 100, GEOL 101 or GEOL 103. Prerequisite: Intended for science and science-oriented students.
This course satisfies the General Education Criteria for:
UIUC: Physical Sciences

GEOL 108 Exploring Geology in the Field credit: 1 Hour.
Introduces practical techniques for identification of rocks, minerals, and fossils; interpretation of geologic maps and cross-sections; appreciation of Midwestern geologic history and geologic features and landforms in the field. Additional fees may apply. See Class Schedule.

GEOL 111 Emergence of Life credit: 3 Hours.
Examines important theoretical and practical questions regarding the origin and evolution of life, as well as the search for life elsewhere in the universe. Uses the pioneering work of Carl Woese, whose "Tree of Life" revolutionized our understanding of the fundamental structure and evolutionary relatedness of all living entities on Earth. Same as ESE 111. Additional fees may apply. See Class Schedule.
This course satisfies the General Education Criteria for:
UIUC: Life Sciences

GEOL 117 The Oceans credit: 3 Hours.
Integrated introduction to oceanography and marine geology and geophysics. Topics include ocean-basin formation and evolution (in the context of plate tectonics), ocean ecology, the hydrologic cycle, water chemistry, currents and waves, the interaction of oceans with climate, coastal hazards, resources, pollution, and the Law of the Sea. Course is oriented toward students not majoring in science. Same as ESE 117.
This course satisfies the General Education Criteria for:
UIUC: Physical Sciences

GEOL 118 Natural Disasters credit: 3 Hours.
Introduces the nature, causes, risks, effects, and prediction of natural disasters including earthquakes, volcanoes, landslides, subsidence, global climate change, severe weather, coastal erosion, floods, mass extinctions, and meteorite impacts; covers scientific principles and case histories of natural disasters as well as human responses (societal impact, mitigation strategies, and public policy). Same as ESE 118 and GLBL 118.
This course satisfies the General Education Criteria for:
UIUC: Physical Sciences

GEOL 143 History of Life credit: 3 Hours.
Evolution of life from its beginning, illustrating changing faunas and floras through time; the invasion of land and of the skies; the effects of a changing atmosphere, changing climates, and continental drift. Emphasis on dinosaur evolution, ecology, and extinction; also other vertebrates, including mammal-like reptiles, mammals, and the emergence of humans, as well as plants and invertebrates. Same as ESE 143.
This course satisfies the General Education Criteria for:
UIUC: Life Sciences

GEOL 199 Undergraduate Open Seminar credit: 1 to 5 Hours.
May be repeated.

GEOL 201 History of Geology credit: 3 Hours.
Traces the development of key ideas in the science, beginning with musings of the ancient Greek and Roman philosophers and early observations of the Earth by European and Arab scholars. Considers advances in mapmaking that span thousands of years and examines the origins of the Geologic Time Scale, including determination of the ages of rocks. Looks at early geologists from around the world, in the US, in Illinois, and at the U of I. Reads some classic papers establishing the grand unifying theory of geology: plate tectonics. Prerequisite: A 100-level geology course (excluding GEOL 110 and GEOL 143). Intended for both non-science students and geology majors.
This course satisfies the General Education Criteria for:
UIUC: Advanced Composition
UIUC: HistPhilosoph Perspect

GEOL 208 History of the Earth System credit: 4 Hours.
Presents systematic analysis of formation and evolution of the Earth and its dynamic systems (lithosphere, hydrosphere, atmosphere, and biosphere). Also introduces methods of reconstructing Earth's history through use of geochronology, paleontology, and the stratigraphic records. Introduces the geological history of life evolution, mountain belts and continents, geochemical systems, climate, sea level, and the Earth's interior. Field trip required. Same as ESE 208. Additional fees may apply. See Class Schedule. Prerequisite: One of GEOL 100, GEOL 101, GEOL 103, GEOL 104 or GEOL 107; or consent of instructor.
This course satisfies the General Education Criteria for:
UIUC: Physical Sciences

GEOL 333 Earth Materials and the Env credit: 4 Hours.
Studies the origin, identification, and environmental significance of earth materials (minerals, rocks, and soil). Environmental topics include: mineral resources; acid mine drainage; volcanic hazards; swelling soils; engineering strength, porosity/permeability, and architectural uses of earth materials; and asbestos. One day field trip is required. Same as ESE 333. Additional fees may apply. See Class Schedule. Credit is not given for both GEOL 333 and GEOL 432. Prerequisite: CHEM 102 and CHEM 103; GEOL 100 and GEOL 110, or one of GEOL 101, GEOL 103, GEOL 104 or GEOL 107; or consent of instructor.

GEOL 370 Water Planet, Water Crisis credit: 3 Hours.
Same as ESE 320 and GEOG 370. See ESE 320.

GEOL 380 Environmental Geology credit: 4 Hours.
Increases student understanding of environmental issues of water supply and pollution, waste disposal, energy, environmental health, global change, and land evaluation and use by emphasizing the role of geology and its relationships to human activities. Course requires a one-day field trip. Same as ENVS 380. Additional fees may apply. See Class Schedule. Credit is not given for both GEOG 380 and ESE 445. Prerequisite: CHEM 102 and CHEM 103; and GEOL 100 and GEOL 110, or one of GEOL 101, GEOL 103, GEOL 104 or GEOL 107; or consent of instructor.
GEOL 390  Individual Study  credit: 1 to 4 Hours.
Research and individual study in geology. May be repeated. A maximum of 8 hours of GEOL 390 plus GEOL 391 may be counted toward graduation. Prerequisite: GEOL 208 or equivalent; consent of supervising faculty member; advance approval by Department of Geology.

GEOL 391  Individual Honors Study  credit: 1 to 4 Hours.
Research and individual study in geology for honors credit. May be repeated. A maximum of 8 hours of GEOL 390 plus GEOL 391 may be counted toward graduation. Prerequisite: GEOL 208 or equivalent; consent of supervising faculty member and of departmental honors advisor; advance approval by Department of Geology.

GEOL 401  Geomorphology  credit: 4 Hours.
History, origin, and characteristics of land forms produced by weathering, fluvial, glacial, wind, and wave processes or by a combination of these acting upon the major kinds of geologic materials and structures. Lectures, laboratory, and field trips. Same as ESE 411. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Prerequisite: GEOL 208 or consent of instructor.

GEOL 406  Fluvial Geomorphology  credit: 4 Hours.
Same as GEOG 406 and NRES 406. See GEOG 406.

GEOL 411  Structural Geol and Tectonics  credit: 4 Hours.
Introduction to principles of rock deformation, stress, and strain; description and interpretation of geologic structures; study of methods for structural analysis; outline of geotectonic processes; three hours of lecture and a three-hour lab per week. Required four-day field trip. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Prerequisite: GEOL 107 or consent of instructor.

GEOL 415  Field Geology  credit: 2 to 8 Hours.
Group field study in a prominent geologic locality; includes in-class meetings, student-led presentation, and field trip; trips run during spring break, winter break, in mid-end May or intercession; dates depend on location. Additional fees may apply. See Class Schedule. 2 to 8 undergraduate hours. 2 to 8 graduate hours. May be repeated. Prerequisite: Consent of instructor.

GEOL 417  Geol Field Methods, Western US  credit: 6 Hours.
Field course based in the mountains of the western United States. Provides intensive practical experience in geologic mapping, as well as instruction in field structural, stratigraphic, geomorphic, and petrologic analysis. Offered during summer session only. Additional fees may apply. See Class Schedule. 6 undergraduate hours. 6 graduate hours. Prerequisite: Eight hours of 400-level credit in geology, or consent of instructor; GEOL 411, GEOL 432, and GEOL 440 are recommended.

GEOL 432  Mineralogy and Mineral Optics  credit: 4 Hours.
Introduction to: crystallography; crystal optics; structure, composition, properties, stability and geological occurrences of minerals; and mineral identification. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Credit is not given for both GEOL 333 and GEOL 432. Prerequisite: GEOL 208 and CHEM 104 and CHEM 105.

GEOL 436  Petrology and Petrography  credit: 4 Hours.
Study of the minerals, compositions, textures, structures, classifications, and origins of igneous and metamorphic rocks; lectures emphasize rock forming processes (petrology), and laboratories emphasize use of the petrographic microscope (petrography). Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Prerequisite: GEOL 432.

GEOL 440  Sedimentology and Stratigraphy  credit: 4 Hours.
Introduces dynamics of sedimentation, geology of sedimentary basins, the distribution of geologic processes through time, definition and correlation of stratigraphic units, principles of paleogeography, stratigraphy and tectonics. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Prerequisite: GEOL 208 or consent of instructor.

GEOL 450  Probing the Earth's Interior  credit: 3 Hours.
Overview of how seismology, magnetics, gravity, geodesy, and surface geology can help us understand the Earth from its surface to its core as well as its temporal evolution. Topics include the internal composition and dynamics of Earth, generation of Earth's gravitational and geomagnetic fields, driving mechanisms for tectonic plate motion, continental deformation, and surface topography. Students wanting a more quantitative treatment of geophysics should enroll in GEOL 452. 3 undergraduate hours. 3 graduate hours. Credit is not given for both GEOL 450 and GEOL 452. Prerequisite: PHYS 102 or 212, GEOL 107 or 101, or consent of instructor.

GEOL 451  Env and Exploration Geophysics  credit: 4 Hours.
Discusses geophysical methods to reveal subsurface structures. Topics include seismic methods, gravity, magnetics, electrical methods, ground penetrating radar, borehole geophysics, and their applications to hydrocarbon and mineral exploration as well as engineering and environmental investigations. 4 undergraduate hours. 4 graduate hours. Several required local trips for field experiments. Prerequisite: MATH 241 and PHYS 212; or consent of instructor.

GEOL 452  Introduction to Geophysics  credit: 4 Hours.
Provides a broad overview of basic concepts and fundamental knowledge of the physics of the Earth. Topics include seismology, gravity, geomagnetism, Earth's thermal state, and geodynamics. Intended for undergraduates in the geophysics concentration and other students who want a more quantitative treatment of the subject than GEOL 450. 4 undergraduate hours. 4 graduate hours. Credit is not given for both GEOL 452 and GEOL 450. Prerequisite: MATH 241 and PHYS 211; or consent of instructor.

GEOL 454  Introduction to Seismology  credit: 3 or 4 Hours.
Introducing the basic theory of seismic wave generation and propagation and its application to Earth structure and earthquakes, including body waves, surface waves, inference of Earth structure, seismic prospecting, earthquake mechanisms, and strong ground motions. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Students participating in optional class projects receive an additional hour of credit. Prerequisite: MATH 285 or consent of instructor.

GEOL 460  Geochemistry  credit: 3 Hours.
Fundamental chemical and physical concepts applied to geological processes; topics include: origin, distribution, and geochemical behavior of elements; chemical evolution of the Earth; geochemistry of natural waters and sedimentary rocks; isotope geochemistry, crystal chemistry, trace element geochemistry and organic geochemistry. 3 undergraduate hours. 3 graduate hours. Prerequisite: GEOL 101 or GEOL 107; CHEM 104; CHEM 105; MATH 220 or MATH 221; or consent of instructor.

GEOL 470  Introduction to Hydrogeology  credit: 4 Hours.
Introduction to environmental and economic aspects of the occurrence and movement of groundwater through the earth's crust; topics include the hydrologic cycle, groundwater contamination, petroleum migration, formation of mineral resources, and groundwater chemistry. Same as ESE 470. 4 undergraduate hours. 4 graduate hours. Prerequisite: MATH 220 or MATH 221; senior standing is recommended; or consent of instructor.
GEOL 481  Earth Systems Modeling  credit: 4 Hours.
Same as ATMS 421, ESE 421, GEOG 421 and NRES 422. See ATMS 421.

GEOL 483  Challenges of Sustainability  credit: 3 Hours.
Same as ESE 482 and GEOG 482. See ESE 482.

GEOL 484  Paleoclimatology  credit: 4 Hours.
Survey of Earth's past climate variability, ranging from million-year to
interannual time scales. Introduction to paleoclimate proxies including
tree rings, marine and lake sediment cores, ice cores, corals, and
speleothems. Focus on the drivers of climate change, major modes of
climate variability, and how paleoclimate data can inform projections
of future climate change. Same as IB 484. 4 undergraduate hours. 4
graduate hours. Prerequisite: Junior standing required.

GEOL 485  Risk Analysis in Earth Science  credit: 3 or 4 Hours.
Same as ATMS 404. See ATMS 404.

GEOL 488  Environmental Stable Isotopes  credit: 3 Hours.
Same as ATMS 422, NRES 478, and IB 488. See IB 488.

GEOL 490  Undergraduate Research  credit: 1 to 3 Hours.
Students will conduct research under the direct supervision of a geology
faculty member. Research topics will vary, and either a summary paper
or a poster presentation at a regional or national science conference is
required. 1 to 3 undergraduate hours. No graduate credit. Approved for
Letter and S/U grading. May be repeated up to six hours. A maximum
of 6 credit hours of GEOL 490 and GEOL 491 may be counted toward
graduation. Prerequisite: GEOL 208 or equivalent; Consent of supervising
faculty member; advance approval by Department of Geology. Intended
primarily for sophomores and juniors; not available to freshman students.

GEOL 491  Honors Undergraduate Research  credit: 1 to 3 Hours.
Students will conduct research for honors credit under the direct
supervision of a geology faculty member. Research topics will vary,
and either a summary paper or a poster presentation at a regional or
national science conference is required. 1 to 3 undergraduate hours. No
graduate credit. May be repeated up to 6 hours. A maximum of 6 credit
hours of GEOL 490 and GEOL 491 may be counted toward graduation.
Prerequisite: GEOL 208 or equivalent; Consent of supervising faculty
member and of departmental honors advisor; advance approval by
Dept. of Geology. Intended primarily for sophomores and juniors who
are James Scholars or Chancellor's Scholars; not available to freshman
students.

GEOL 492  Senior Thesis  credit: 2 to 8 Hours.
Research in geology, with thesis; a thesis must be submitted for credit
to be received. 2 to 8 undergraduate hours. No graduate credit. May be
repeated. A maximum of 10 hours of GEOL 492 plus GEOL 493 may be
counted toward graduation. Prerequisite: Consent of supervising faculty
member.

GEOL 493  Honors Senior Thesis  credit: 2 to 8 Hours.
Research in geology with honors thesis; a thesis must be submitted for
credit to be received. 2 to 8 undergraduate hours. No graduate credit.
May be repeated. A maximum of 10 hours of GEOL 492 plus GEOL 493
may be counted toward graduation. Prerequisite: Consent of supervising
faculty member and of departmental honors advisor.

GEOL 497  Special Topics in Geology  credit: 1 to 4 Hours.
Seminar or lectures in subjects not covered by regular course offerings;
for advanced undergraduates and graduate students. Additional fees may
apply. See Class Schedule. 1 to 4 undergraduate hours. 1 to 4 graduate
hours. May be repeated if topics vary. Prerequisite: Consent of instructor.

Information listed in this catalog is current as of 04/2016