# REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN GEOLOGY

**COLLEGE OF EARTH AND ENERGY**

**THE UNIVERSITY OF OKLAHOMA**

## GENERAL REQUIREMENTS

| Total Credit Hours | ........................................................................ | 127* |
| Total Upper-Division Credit Hours | ........................................................................ | 48 |

**Minimum Retention/Graduation Grade Point Averages:**

- Minimum in OU Coursework .................................. 2.00
- Minimum in Major Coursework- Combined and OU .... 2.00

**Overall - Combined and OU** .................................. 2.00

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### For Students Entering the Oklahoma State System for Higher Education

**SUMMER 2007 through SPRING 2008**

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### Paleontology

**Bachelor of Science in Geology**

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<table>
<thead>
<tr>
<th>Year</th>
<th>FIRST SEMESTER</th>
<th>Hours</th>
<th>SECOND SEMESTER</th>
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<tr>
<td>FRESHMAN</td>
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<td>ENGL 1113, Principles of English Composition (Core I)</td>
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<td>ENGL 1213, Principles of English Composition (Core I), or</td>
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<td>MATH 1023, Calculus &amp; Analytic Geometry I (Core I)</td>
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<td>CHEM 1315, General Chemistry (Core II)</td>
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<td>CHEM 1415, General Chemistry (Continued)</td>
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<td>GEOL 1114, Physical Geology for Science and Engineering Majors</td>
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<td>GEOL 1124, Earth History</td>
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<td>MATH 2433, Calculus &amp; Analytic Geometry III</td>
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<td>MATH 2443, Calculus &amp; Analytic Geometry IV</td>
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<td>HIST 1483 or 1493, U.S. (Core IV)</td>
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<td>ZOO 1114, Introductory Zoology</td>
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<td>GEOL 3223, Sedimentary Petrology and Sedimentology</td>
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<td>General Education Understanding Artistic Forms (Core IV)</td>
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<td>PSC 1113, American Federal Government (Core III)</td>
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<td>GEOL 4413, Paleobiology</td>
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<td>GEOL 3513, Fundamentals of Invertebrate Paleontology</td>
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<td>General Education Social Science (Core III)</td>
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<td>GEOL 4113, Depositional Systems &amp; Stratigraphy</td>
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<td>GPHY 3413, Principles of Geophysics</td>
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<td>CS 1313, Programming for Non-Majors</td>
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<td>ZOO 3403, Principles of Ecology</td>
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<td>ZOO 5204, Vertebrate Paleobiology</td>
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<td>General Education Non-Western Culture (Core IV)</td>
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### SUMMER

**GEOL 4136, Field Geology (Capstone)—6 CREDIT HOURS**

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**University-Wide General Education Requirements (minimum 40 hours)**

Courses designated as Core I, II, III, IV, or Capstone are part of the General Education curriculum. Students must complete a minimum of 40 hours of General Education courses, chosen from the approved list, including at least one upper-division Gen. Ed. course outside of the student’s major. Courses graded S/U or P/NP will not apply.

**Core I**

- Symbolic and Oral Communication (9–19 hours, 3–5 courses)
  - English Composition—6 hours, 2 courses
  - Mathematics—3 hours, 1 course
  - Foreign Language—0–10 hours, 2 courses in the same language, (can be met by successfully completing 2 years of the same foreign language in high school)
  - Other (courses such as communication, logic or public speaking)

**Core II**

- Natural Science (7 hours, 2 courses)
  - Courses must be taken from different disciplines in the biological and/or physical sciences; one of which must include a laboratory.

**Core III**

- Social Science (6 hours, 2 courses)
  - One course must be PSC 1113, “American Federal Government”

**Core IV**

- Humanities (12 hours, 4 courses)
  - Understanding Artistic Forms—3 hours, 1 course
  - Western Civilization and Culture—6 hours, 2 courses, including HIST 1483 or HIST 1493
  - Non-Western Cultures—3 hours, 1 course

**Senior Capstone Experience (3 hours, 1 course)**
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COURSES IN COMPUTER SCIENCE (CS)

1133 Programming for Nonmajors. Prerequisite: Mathematics 1523 or equivalent. Introduction to the design and implementation of computer programs. Emphasis on problem solving. (F, Sp)

COURSES IN GEOLOGY (GEO)

1114 Physical Geology for Science and Engineering Majors. Prerequisite: equivalent knowledge of high school chemistry, algebra and trigonometry. Laboratory included. Plate tectonics, the makeup of continents and mountain building. Heat flow, magmatism, gravity, rock deformation, earthquakes and the earth's interior. Surface processes including weathering, soil formation and deposition. Landforms, streams, groundwater, glaciers, ocean processes, and volcanoes. Minerals and rocks. Application of geology to land-use, groundwater, mineral and fossil fuel exploration. Laboratory (F, Sp) [II-LAB]

1124 Earth History. Prerequisite: none; 1114 helpful but not required. Laboratory included; field trips. Origin and growth of the earth from its origin as a planet through the Great Ice age. Origin and growth of continents and ocean basins. Systematic survey of the history of continents with emphasis on North America: growth and leveling of mountain chains, rift valleys, transgressions and regressions of seas; continental fragmentation, assembly and relative motion of plate tectonics, particularly as it relates to continental history. Climate and evolutionary changes through geologic time. Principles and methods used to interpret earth history and date rocks. Geologic time. Laboratory includes historical studies of specific regions; study of maps and fossils. Laboratory (F, Sp)

2224 Introductory Mineralogy. Prerequisite: 1114 or permission; Chemistry 1415 or concurrent enrollment. Crystallography, crystal chemistry, optical properties and identification of minerals utilizing the petrographic microscope; an introduction to the rock-forming minerals and their relationships within igneous, metamorphic, and sedimentary rocks. Laboratory (F)

3114 Structural Geology. Prerequisite: 2224, Physics 2524 or concurrent enrollment. Introduction to the concepts of stress, strain, the mechanisms of rock deformation, the mechanics of folding and fracturing, and description of structural styles in various tectonic settings. Laboratory (F)

3123 Introductory Field Geology. Prerequisite: 3114 or concurrent enrollment; or permission. Laboratory included. Field trips; students will be charged transportation costs. Techniques of geologic fieldwork. Use of Brunton compass, alidade and plane table and topographic maps. Field examination of common geologic situations. Field exercises. Laboratory (F, Sp)

FC3154 Environmental Geology. Prerequisite: college algebra and permission of instructor; completion of one college level science course recommended. Designed for students who are wanting to know about relationship between earth materials and environmental issues. Topics include minerals, rocks, depositional environments, porosity, permeability, water occurrence and chemistry, petroleum, natural gas, sand, oil shales, land subsidence, and earthquakes. Laboratory includes the study of minerals, rocks, maps, and well cuttings. Laboratory (F)

3223 Igneous and Metamorphic Petrology. Prerequisite: 2224 or permission. Laboratory included. Heat exchange; classification of igneous rocks utilizing hand specimens and thin sections. Laboratory (F)

3233 Sedimentary Petrology and Sedimentology. Prerequisite: 2224 or permission. Laboratory included. Field trips; students will be charged transportation costs. Origin, evolution and interpretation of sedimentary rocks with an emphasis on terrigenous systems; interpretation of mineralogy, textures and structures of terrigenous clastic and carbonate rocks in hand specimen and thin section. Laboratory (Sp)

3513 Fundamentals of Invertebrate Paleontology. Prerequisite: 1124 or permission. Laboratory included. Field trips; students will be charged transportation costs. Systematic approach to the animal invertebrate phyla, emphasizing fossil forms as they occur in the fossil record. Paleontologic principles and methods with emphasis on evolutionary paleontology, paleoecology and stratigraphic paleontology. Brief treatments of biostratigraphy and paleobiogeography. Laboratory (F)

3633 Introduction to Oceanography. General survey of the scientific framework of the four specialties of the oceanographic study—biological, chemical, geological/physical and physical oceanography. Applications of ocean research to social and economic problems; interrelationships between the ocean disciplines and other fields of study. Laboratory (Sp) [II-LAB]

4113 Depositional Systems and Stratigraphy (Slashed with 5113). Prerequisite: 3114, 3233 or permission. Basic stratigraphic principles as well as reconstruction of ancient depositional systems. The controls on deposition of stratigraphic sequences, completeness of the rock record, biostratigraphy, magnetostratigraphy, and seismic stratigraphy. Field trips; students will be charged transportation costs. Laboratory (F)

4136 Field Geology. Prerequisite: 3123; senior standing or permission. A six-week summer course held at the Oklahoma Geology Camp at Canon City, Colorado. Applications of field techniques, including use of aerial photographs, construction of geological maps and geophysical profiles, to the recognition and interpretation of geologic phenomena. (Su) [V]

4413 Paleobotany (Crosslisted with Botany 4413; Slashed with 5413). Prerequisite: permission of instructor. Introduction to the fossil record of terrestrial plants from algae to flowering plants. Lectures will address anatomy, morphology, taphonomy and paleoecology, including climate and plant-animal interactions. Laboratories will put lecture topics into practice using fossil plants from the Oklahoma Museum of Natural History collection and from fieldwork. Field trips. No student may earn credit for both 4413 and 5413. Laboratory (F, even-numbered years)

4513 Evolutionary Paleobiology (Slashed with 5513). Prerequisite: 3513. Evolutionary patterns in the fossil record. Time resolution and bias in fossil assemblages. Taxonomic diversity and community replacement over geologic time. Mass extinctions and evolutionary radiations. Heterochrony and evolution. Application of methods in biosystematics to fossils, including computer-based techniques. No student may earn credit for both 4513 and 5513. (Ar, Sp)

G4633 Hydrogeology. Prerequisite: Mathematics 2443, Physics 2524, senior standing in geology, or permission of instructor. Darcy's law, Hubbert's fluid potential, equations of groundwater flow. Physical properties of geologic materials and fluids. Free convection, compaction- and gravity-driven flow. Role of fluids in geologic phenomena, including mineralization, metamorphism, hydrocarbon migration, sedimentary diagenesis, faulting and earthquakes, paleomagnetism. Application of geologic and geochemical techniques to fluid flow problems. (F)

4983 Senior Thesis in Geology. Prerequisite: senior standing with a major in geology and permission. May not be repeated. Individual research of a geological topic selected by the student in consultation with the instructor. The project may involve fieldwork, theoretical analysis, computer modeling, and/or data analysis and interpretation, culminating in a written thesis. (F, Sp, Su)

COURSES IN GEOPHYSICS (GPHY)

3413 Principles of Geophysics. Prerequisite: Mathematics 2423; Physics 2524; or equivalent or permission. A survey of current methods of geophysical measurements and their interpretations. The earth's gravity, magnetic, seismic, mechanical and thermal properties will be discussed. (Sp)

COURSES IN MATHEMATICS (MATH)

1823 Calculus and Analytic Geometry I. Prerequisite: 1523 at OU, or satisfactory score on the placement test, or satisfactory score on the ACT/SAT. Topics covered include equations of straight lines; conic sections; functions, limits and continuity; differentiation; maximum-minimum theory and curve sketching. A student may not receive credit for this course and 1743. (F, Sp, Su) [II-M]

2423 Calculus and Analytic Geometry II. Prerequisite: 1823. Integration and its applications; the calculus of transcendental functions; techniques of integration; and the introduction to differential equations. A student may not receive credit for this course and 2123. (F, Sp, Su) [I-M]

2433 Calculus and Analytic Geometry III. Prerequisite: 2423. Polar coordinates, parametric equations, sequences, infinite series, vector analysis. (F, Sp, Su)

2443 Calculus and Analytic Geometry IV. Prerequisite: 2433. Vector calculus; functions of several variables; partial derivatives; gradients, extreme values and differentials of multivariate functions; multiple integrals; line and surface integrals. (F, Sp, Su)

COURSES IN PHYSICS (PHYS)

2514 General Physics for Engineering and Science Majors. Prerequisite: Mathematics 1223. Not open to students with credit in 1205. Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, waves. (F, Sp, Su) [II-NL]

2524 General Physics for Engineering and Science Majors. Prerequisite: 2514 and Mathematics 2423. Not open to students with credit in 1215. Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)

COURSES IN ZOOLOGY (ZOO)

1114 Introductory Zoology. Major biological principles and concepts as illustrated in the structure, function and evolution of animals. Emphasis is on self-regulatory mechanisms, especially in the vertebrates, and their adaptive significance. (F, Sp, Su) [II-NL]

1121 Introductory Zoology Laboratory. Prerequisite: previous completion or concurrent enrollment in 1114. Laboratory study of structure and development of organ systems. Experiments on physiological process of selected vertebrates and invertebrates. (F, Sp, Su) [II-LAB]

IG3013 Evolution. Prerequisite: eight hours of zoology and/or botany, or five hours of zoology or botany and permission. Process of evolution. Differentiation and natural selection in populations, the nature of species, the origins of species, and evolution above the species level. (F)

IG403 Principles of Ecology. Prerequisite: eight hours of zoology. Patterns of environments and biological communities; the processes maintaining these patterns. Laboratory (F, Sp)

G5204 Vertebrate Paleobiology (Crosslisted with Geology 5204; Slashed with 4204). Prerequisite: Zoology 1114, 1121, 2204; or permission. Systematics, relationships, zoogeography and evolutionary morphology of the major groups of vertebrates. Field trips. No student may earn credit for both 4204 and 5204. Laboratory (Sp)