

**REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN GEOLOGY**  
**COLLEGE OF EARTH AND ENERGY**  
**THE UNIVERSITY OF OKLAHOMA**

For Students Entering the Oklahoma State System for Higher Education  
**Summer 2008 through Spring 2009**

GENERAL REQUIREMENTS	
Total Credit Hours . . . . .	126•
Total Upper-Division Credit Hours . . . . .	48
<b>Minimum Retention/Graduation Grade Point Averages:</b>	
Minimum in OU Coursework . . . . .	2.00
Minimum in Major Coursework- Combined and OU . . . . .	2.00
Overall - Combined and OU . . . . .	2.00

**Petroleum Geology**  
**1914H**  
 Bachelor of Science  
 in Geology

**OU encourages students to complete at least 32 hours of applicable coursework each year to have the opportunity to graduate in four years.**

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
<b>FRESHMAN</b>	ENGL 1113, Principles of English Composition (Core I)	3	ENGL 1213, Principles of English Composition (Core I), or	3
	MATH 1823, Calculus & Analytic Geometry I (Core I)	3	EXPO 1213, Expository Writing (Core I)	
	CHEM 1315, General Chemistry (Core II)	5		
	GEOL 1114, Physical Geology for Science and Engineering Majors	4	MATH 2423, Calculus & Analytic Geometry II	3
			CHEM 1415, General Chemistry (Continued)	5
			GEOL 1124, Earth History	4
	<b>TOTAL CREDIT HOURS</b>	<b>15</b>	<b>TOTAL CREDIT HOURS</b>	<b>15</b>
<b>SOPHOMORE</b>	MATH 2433, Calculus & Analytic Geometry III	3	MATH 2443, Calculus & Analytic Geometry IV	3
	HIST 1483 or 1493, U.S. (Core IV)	3	PHYS 2514, General Physics for Engineering and Science Majors (Core II)	4
	GEOL 2224, Introduction to Mineral Sciences	4	<sup>4</sup> C S 1313, Programming for Non-Majors	3
	<sup>2</sup> General Education Understanding Artistic Forms (Core IV)	3	GEOL 3223, Igneous and Metamorphic Petrology	3
			GEOL 3233, Sedimentary Petrology and Sedimentology	3
	<b>TOTAL CREDIT HOURS</b>	<b>13</b>	<b>TOTAL CREDIT HOURS</b>	<b>16</b>
<b>JUNIOR</b>	PHYS 2524, General Physics for Engineering and Science Majors	4	P SC 1113, American Federal Government (Core III)	3
	GEOL 3114, Structural Geology	4	<sup>1</sup> Free Elective	3
	GEOL 3513, Fundamentals of Invertebrate Paleontology	3	GPHY 3413, Principles of Geophysics	3
	<sup>2</sup> General Education Western Civilization & Culture (Core IV)	3	<sup>2</sup> General Education Social Sciences (Core III)	3
			P E 3213, Reservoir Rock Properties	3
			P E 3221, Rock Properties Lab	1
	<b>TOTAL CREDIT HOURS</b>	<b>14</b>	<b>TOTAL CREDIT HOURS</b>	<b>16</b>
<b>SENIOR</b>	ENGL 3153, Technical Writing	3	GEOL 3123, Introductory Field Geology	3
	GEOL 4113, Depositional Systems & Stratigraphy	3	GEOL 4233, Subsurface Methods	3
	GEOL 4133, Fundamentals of Petroleum Geology	3	P E 3813, Formation Evaluation with Well Logs	3
	GPHY 4874, Seismic Exploration	4	<sup>3</sup> Science Elective	3
	<sup>1</sup> Free Elective	3	<sup>2</sup> General Education Non-Western Culture (Core IV)	3
	<b>TOTAL CREDIT HOURS</b>	<b>16</b>	<b>TOTAL CREDIT HOURS</b>	<b>15</b>

**SUMMER**

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

- = Students who have not completed two years of the same foreign language courses in high school are required to take two college courses in the same foreign language. This additional coursework may add 6-10 hours to the minimum hours required for graduation.
  - ‡ = In order to progress in your curriculum, and as a specific graduation requirement, a grade of C or better is required in each major course. The requirement includes both Geology (GEOL) and Geophysics (GPHY) courses. Students must also successfully complete **major** prerequisite courses with a grade of C or better before proceeding to the next course.
  - <sup>1</sup> = Six hours of faculty-adviser-approved electives. Foreign language courses taken to satisfy University-Wide General Education Requirements may be counted as lower-division free electives.
  - <sup>2</sup> = To be chosen from the University-Wide General Education Approved Course List. Three hours of general education must be upper-division outside the major.
  - <sup>3</sup> = A minimum of 9 hours of faculty-adviser-approved courses. Three hours must be chosen from biological sciences, chemistry, computer science, mathematics, physics, and/or engineering. The remaining six hours (upper-division, 3000-4000-level) are fulfilled by P E 3213 and 3813.
  - <sup>4</sup> = This course fulfills the Computer Literacy Requirement for graduation as required by the Oklahoma State Regents for Higher Education.
- NOTE:** No more than 52 hours of Geology coursework may be taken to fulfill the 126 minimum total credit hours required. Students must complete 36 of the last 60 credit hours in residence.

**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.

<b>Core I</b>	<b>Symbolic and Oral Communication (9–19 hours, 3–5 courses)</b> • 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)
<b>Core II</b>	<b>Natural Science (7 hours, 2 courses)</b> • Courses must be taken from different disciplines in the biological and/or physical sciences; one of which must include a laboratory.
<b>Core III</b>	<b>Social Science (6 hours, 2 courses)</b> • One course must be P.SC 1113, "American Federal Government"
<b>Core IV</b>	<b>Humanities (12 hours, 4 courses)</b> • 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
<b>Senior Capstone Experience (3 hours, 1 course)</b>	

## COURSES IN COMPUTER SCIENCE (C S)

**1313 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 (GEOL)

**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, magnetism, gravity, rock deformation, earthquakes and the earth's interior. Surface processes including weathering, erosion, transport and deposition. Landforms, rivers, groundwater, glaciers, ocean processes, and volcanoes. Minerals and rocks. Application of geology to land-use, groundwater, mineral and fossil fuel exploration. **Laboratory** (F, Sp) [I-LAB]

**1124 Earth History.** Prerequisite: none; 1114 helpful but not required. Laboratory included; field trip. Physical history 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 motions. Plate tectonics, particularly as it relates to continent 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 Introduction to Mineral Sciences.** 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. An 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** (Sp)

**3223 Igneous and Metamorphic Petrology.** Prerequisite: 2224 or permission. Laboratory included. Field trip; students will be charged transportation costs. Generation, emplacement and crystallization of magma; phase chemistry; principles of igneous rock classification; the relationship of magma types to geologic setting. Principles of metamorphic petrology; phase chemistry and metamorphic reactions; concepts of metamorphic grade, P-T regimes and relationships to geologic environments; concepts of protoliths and provenance. Laboratory study of the textures, structures and mineral assemblages of igneous and metamorphic rocks utilizing hand specimens and thin sections. **Laboratory** (Sp)

**3233 Sedimentary Petrology and Sedimentology.** Prerequisite: 2224 or permission. Laboratory included. Field trip; 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 trip; students will be charged transportation costs. A systematic approach to the animal invertebrate phyla, emphasizing fossil forms as they occur in the geologic record. Paleontologic principles and methods with emphasis on evolutionary paleontology, paleoecology and stratigraphic paleontology. Brief treatments of biogeochemistry and paleobiogeography. **Laboratory** (F)

**4113 Depositional Systems and Stratigraphy (Slashlisted 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, magneto stratigraphy, and seismic stratigraphy. Field trip; students will be charged transportation costs. **Laboratory** (F)

**G4133 Petroleum Geology for Geoscientists.** Prerequisite: 1104 or 1114; or senior standing. Lectures will integrate at a quantitative level several fields of geology with geophysics, geochemistry and engineering that comprise the science of petroleum geology. The history of the petroleum industry, the location and amount of major reserves of oil and gas, and the potential for development of unconventional hydrocarbon resources will be covered. Labs will cover the types of data acquired during the drilling and testing of wells and the interpretation of these data, the analysis of well logs, use of logs and other subsurface data for correlation and mapping manually and using computer software. Recent tools and technological developments will be covered. **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 methods, to the recognition and interpretation of geologic phenomena. (Su) [V]

## 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)

**G4874 Seismic Exploration.** Prerequisite: Physics 2524; Mathematics 2434 or concurrent enrollment. Lectures and laboratory/problem sessions covering theory and applications of reflection and refraction seismic exploration methods. Emphasis is on the common-depth-point reflection method. (F)

## 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) [I-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 PETROLEUM ENGINEERING (P E)

**3213 Reservoir Rock Properties.** Prerequisite: Geology 1114; corequisite: 3221. Fundamental course establishing primary petrophysical concepts, properties and their measurement. Covers rock types, distribution, composition and structure, porosity, permeability, resistivity, wettability, water saturation, elastic moduli and includes effects of pressure and temperature on rock properties. (Sp)

**3221 Rock Properties Laboratory.** Prerequisite: Geology 1114; corequisite: 3213. Laboratory course aimed at exposing the student to the measurement and analysis of reservoir properties such as porosity, permeability, fluid saturation, grain size, elastic moduli and pore throat sizes. The course will stress safety concerns appropriate for all laboratory procedures, error analyses and report writing. (Sp)

**3813 Formation Evaluation with Well Logs.** Prerequisite: 3213, 3221, Geology 1114, Geology 3003 or concurrent enrollment in Geology 3003. Basic formation evaluation concepts, borehole environment, principles of resistivity, radiation, thermal and elastic wave measurements and measuring tools, applications to formation evaluation using commercial software package. (Sp)

## COURSES IN PHYSICS (PHYS)

**2514 General Physics for Engineering and Science Majors.** Prerequisite: Mathematics 1823. 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)