

REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN GEOPHYSICS

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 **130***
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**

Geophysics— Exploration Option

1916F
Bachelor of Science
in Geophysics

OU encourages students to complete at least 33 hours of applicable coursework each year to have the opportunity to graduate in four years.

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	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)	3
	CHEM 1315, General Chemistry (Core II)	5		
	HIST 1483 or 1493, U.S. (Core IV)	3	MATH 2423, Calculus & Analytic Geometry II	3
	GEOL 1114, Physical Geology for Science and Engineering Majors	4	CHEM 1415, General Chemistry	5
			GEOL 1124, Earth History	4
	TOTAL CREDIT HOURS	18	TOTAL CREDIT HOURS	15
SOPHOMORE	MATH 2433, Calculus & Analytic Geometry III	3	MATH 2443, Calculus & Analytic Geometry IV	3
	PHYS 2514, General Physics for Engineering & Science Majors (Core II)	4	PHYS 2524, General Physics for Engineering & Science Majors	4
	⁴ C S 1313, Programming for Non-Majors	3	P SC 1113, American Federal Government (Core III)	3
	GEOL 2224, Introduction to Mineral Sciences	4	GEOL 3233, Sedimentary Petrology and Sedimentology	3
	¹ General Education Western Civilization & Culture (Core IV)	3	¹ General Education Understanding Artistic Forms (Core IV)	3
	TOTAL CREDIT HOURS	17	TOTAL CREDIT HOURS	16
JUNIOR	² MATH 3113, Introduction to Ordinary Differential Equations	3	² PHYS 3043, Physical Mechanics I	3
	GEOL 3114, Structural Geology	4		
	³ Free Elective	3	GEOL 3123, Introductory Field Geology	3
	Physics Elective (upper-division)	3	GPHY 3413, Principles of Geophysics	3
	¹ General Education Social Sciences (Core III)	3	Math Elective (upper-division)	3
			Geology Elective (upper-division)	3
	TOTAL CREDIT HOURS	16	TOTAL CREDIT HOURS	15
SENIOR	ENGL 3153, Technical Writing	3	GPHY 4953, Senior Thesis in Geophysics (Capstone)	3
	GPHY 4874, Seismic Exploration	4		
	GPHY 5864, Gravimetric & Magnetic Exploration	4	Geology Elective (upper-division)	3
	² Physics Elective (upper-division)	4	Geophysics Elective (upper-division)	3
	Geophysics Elective (upper-division)	3	Geophysics Elective (upper-division)	3
			¹ General Education Non-Western Culture (Core IV)	3
	TOTAL CREDIT HOURS	18	TOTAL CREDIT HOURS	15

* = Students who have not completed two years of the same foreign language 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.

¹ = To be chosen from the University-Wide General Education Approved Course List. Three hours of general education outside the major must be upper-division.

² = Fulfills the additional science requirement for graduation.

³ = Three hours of faculty-adviser approved elective.

⁴ = 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 Geophysics coursework may be taken to fulfill the 128 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.

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 P SC 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)	

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) [II-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)

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 2433 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)

4953 Senior Thesis in Geophysics. Prerequisite: senior standing with a major in geophysics and permission. May not be repeated. Individual research of a geophysical 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) [V]

G5864 Gravimetric and Magnetic Exploration. Prerequisite: Mathematics 2433, Physics 2524, or permission of instructor. Lectures and laboratory/problem sessions covering theory and applications of gravimetric and magnetic exploration. Includes potential theory, filtering, modeling and interpretation. Emphasis is on exploration for minerals, oil and gas. Concepts of geodesy and isostasy are briefly considered. **Laboratory** (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) [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)

†G3113 Introduction to Ordinary Differential Equations. Prerequisite: 2423. Duplicates two hours of 3413. First order ordinary differential equations, linear differential equations with constant coefficients, two-by-two linear systems, Laplace transformations, phase planes and stability. (F, Sp, Su)

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)

3043 Physical Mechanics I. Prerequisite: 1205 or 2514, and Mathematics 3113 or 3413 (or concurrent enrollment); or permission of instructor. Differential equations based continuum mechanics: Newtonian particle mechanics, driven and damped oscillations, vibrations and waves, and their application to other linear systems, non-linear oscillations, introduction to Lagrange's equations. (Sp)