Earth Sciences Courses

Courses

ERTH 101. Exploring Planet Earth. 4 Credits.
Plate tectonics, mantle flow, and magmatism. Volcanoes, earthquakes, mountain building, generation of Earth's crust; rocks and minerals; Earth's internal structure. Comparison with other planets. Laboratory, lecture.

ERTH 102. Exploring Earth's Environment. 4 Credits.
Landforms, surface processes, and interactions between humans and the environment. Weathering, erosion, sedimentation, ground water, streams, glaciers, deserts, oceans, and coastlines; geologic hazards. Laboratory, lecture. Roering.

ERTH 103. Exploring Earth History. 4 Credits.
History of the Earth. Geologic time, sedimentary environments; oceans, mountains, and climate through time; stratigraphic history of North America; evolution of plants and animals; interactions between humans, science, and the environment.

ERTH 110. People, Rocks, and Fire. 4 Credits.
Investigation of topics in geology, ecology, and anthropology relevant to contemporary global energy debates; current energy policy issues investigated through term projects.

ERTH 137. Mountains and Glaciers. 4 Credits.
Survey of the geological processes that both create and destroy mountain ranges around the world, and an introduction to geological science.

ERTH 156M. Scientific Revolutions. 4 Credits.
Surveys several major revolutions in our views of the natural and technological world, focusing on scientific concepts and methodological aspects. For nonscience majors. Multilisted with PHYS 156M.

ERTH 198. Laboratory Projects: [Topic]. 1-12 Credits.
Repeatable.

ERTH 199. Special Studies: [Topic]. 1-6 Credits.
Repeatable. Studies of geologic topics combine background lectures with guided field trips to areas of geologic interest.

ERTH 201. Dynamic Planet Earth. 4 Credits.
Processes that cause earthquakes, volcanism, mountain building, and plate tectonics. Includes Earth's origin and internal structure, rocks and minerals, gravity and magnetics. Weekly lectures, two-hour laboratory.

ERTH 202. Earth's Surface and Environment. 4 Credits.
Earth materials, the rock record, human interactions with surface environment. Sedimentary rocks and environments, chemical and physical weathering, hydrogeology, ground-water contamination, surface processes, human impacts. Weekly lectures, two-hour laboratory.

ERTH 203. History of Life. 4 Credits.
Origin, history, and physical evolution of the Earth; geologic time scales, development of the global stratigraphic section. Weekly lectures, two-hour laboratory.

ERTH 213. Geology of National Parks. 4 Credits.
Examines selected geologic features in United States national parks/monuments and the processes that form them within a historical approach to the development of the North American continent. Focuses on parks and monuments throughout the conterminous 48 states.

ERTH 304. The Fossil Record. 4 Credits.
This course will cover the history of life on Earth through time as found in the fossil record, as well as how scientists go about studying the fossil record. The curriculum also includes the processes of speciation and the disciplines of functional morphology and paleoecology.

ERTH 305. Dinosaurs. 4 Credits.
This course covers the evolution, occurrence, and variety of animals classified within the Dinosauria and the changing climate and vegetation during their time. Students will discuss dinosaur video depiction in popular culture and will assess the accuracy of those representations.

ERTH 306. Volcanoes and Earthquakes. 4 Credits.
Mechanisms that cause earthquakes and volcanoes, relation to plate tectonics, associated hazards, examples in Oregon and the western United States.

ERTH 307. Oceanography. 4 Credits.
Characteristics and physical, chemical, and biological processes of the world's oceans. Includes sections on origin of the oceans, plate tectonics, and human use and misuse of oceans. Students cannot receive credit for both BI 150 and ERTH 307.

ERTH 308. Geology of Oregon and the Pacific Northwest. 4 Credits.
The region's geologic and tectonic history and the plate tectonic processes responsible for its evolution.

ERTH 310. Earth Resources and the Environment. 4 Credits.
Geology of energy, mineral, and water resources and environmental issues related to their use. Topics include fossil fuels, metals, nuclear waste disposal, and water pollution.

ERTH 311. Earth Materials. 5 Credits.
Chemical and mineralogical composition of rocks, sediment, and soil. Properties of common minerals; origin of rocks; microscopic study of rock textures; environmental issues.
Prereq: ERTH 101, ERTH 102 or ERTH 201, ERTH 202; coreq CH 221 or CH 224.

ERTH 315. Earth Physics. 4 Credits.
Physics of basic Earth processes; application of physics to plate tectonics and lithospheric deformation. Topics include forces, deformation, gravity, and seismology. Taught once or more per academic year.
Prereq: MATH 252, PHYS 201.

ERTH 316. Introduction to Hydrogeology. 4 Credits.
Examines the role of water in geologic and environmental processes. Topics include the water cycle, groundwater flow, and contaminant transport.
Pre- or coreq: MATH 252, PHYS 201.

ERTH 318. Introduction to Field Methods. 3 Credits.
Introduction to geologic mapping and related field skills, rock descriptions, cross sections, and structures. Lectures, laboratories, mandatory field trips.
Prereq: ERTH 101–ERTH 103 or ERTH 201–ERTH 203.

ERTH 319. Cascade Volcanoes - Field Studies. 4 Credits.
Two-week summer course. Physical processes that cause volcanic activity, and an introduction to geological science. Examines recent volcanic activity in the Cascades, impacts of volcanism on people, infrastructure, and natural resources, and volcano monitoring and hazard assessment.

ERTH 331. Mineralogy. 5 Credits.
Crystal chemistry, systematic study of rock-forming silicate, and selected other minerals, mineral optics, and x-ray diffraction. Lab work with hand samples and petrographic microscopes.
Prereq: ERTH 201, ERTH 202 or ERTH 101, ERTH 102; coreq: CH 221 or CH 224.

ERTH 332. Introduction to Petrology. 5 Credits.
Origin and classification of igneous, metamorphic, and sedimentary rocks. Microscopic study of rocks in thin section.
Prereq: ERTH 331.

ERTH 334. Sedimentology and Stratigraphy. 4 Credits.
Sedimentary processes; characteristic properties of sedimentary rocks and their use in interpreting depositional environments; principles of lithostratigraphy and sequence stratigraphy.
Prereq: ERTH 101–ERTH 103 or ERTH 201–ERTH 203; pre- or coreq: ERTH 311 or ERTH 332.

ERTH 337. Introduction to Physical Oceanography. 4 Credits.
Introduction to the physical processes that occur in the ocean. These processes control the movement of sediment, pollution, nutrients, and biota, as well as heat and freshwater. Topics might include waves, global ocean circulation, sediment transport, estuarine circulation, and biological oceanography.
Prereq: ERTH 101 and ERTH 102 or ERTH 201 and ERTH 202; PHYS 101 and PHYS 102 or PHYS 201 and PHYS 202 or PHYS 251 and PHYS 252.

ERTH 350. Structural Geology. 3 Credits.
Description, analysis, and origin of geologic structures including faults, folds, and tectonites. Focus on kinematic and dynamic analysis of deformation of earth materials.
Prereq: ERTH 318; ERTH 311 or ERTH 332.

ERTH 351. Structural Geology Problems. 1 Credit.
Exercises in solving structural geology problems using orthographic and stereographic projection techniques. Problems emphasize calculating stress and strain from structural markers.
Coreq: ERTH 350.

ERTH 352. Structural Geology Laboratory and Field. 1 Credit.
Collection and interpretation of field and map data for structural analysis. Includes field trips, map and cross-section generation, and some computer-based exercises.
Coreq: ERTH 350.

ERTH 353. Geologic Hazards. 4 Credits.
A hands-on study of natural hazards, their physical processes and geography, and their impact on societies worldwide including recent occurrences of natural disasters . This course is accessible and to individuals interested in Geosciences, Geography, and Environmental Science.
Prereq: ERTH 101 or ERTH 201.

ERTH 363. Computational Tools for Earth Sciences. 4 Credits.
Introduction to computational tools vital to the work of Earth scientists, including data management and analysis, algorithms, basic programming, computational environments, and visualization.
Prereq: MATH 251.

ERTH 399. Special Studies: [Topic]. 1-5 Credits.
Repeatable.

ERTH 400M. Temporary Multilisted Course. 1-5 Credits.
Repeatable.

ERTH 401. Research: [Topic]. 1-21 Credits.
Repeatable.

ERTH 403. Thesis. 1-6 Credits.
Repeatable three times for a maximum of 6 credits.
Prereq: earth sciences honors or senior thesis students only.

ERTH 405. Reading and Conference: [Topic]. 1-21 Credits.
Repeatable.

ERTH 406. Field Studies: [Topic]. 1-6 Credits.
Repeatable.

ERTH 407. Seminar: [Topic]. 1-5 Credits.
Repeatable.

ERTH 408. Laboratory Projects: [Topic]. 1-12 Credits.
Repeatable.

ERTH 409. Terminal Project. 1-12 Credits.
Repeatable.

ERTH 410. Experimental Course: [Topic]. 1-5 Credits.
Repeatable.

ERTH 410L. Experimental Course: [Topic]. 1-5 Credits.
Repeatable.

ERTH 414. Igneous and Metamorphic Petrology. 4 Credits.
Advanced principles of igneous and metamorphic petrogenesis. Gibbs phase rule, phase diagrams, mineral thermodynamics; magma geochemistry and rheology; metamorphic facies, geothermometry and geobarometry. Johnston.
Prereq: ERTH 332; CH 223 or CH 226H.

ERTH 415. Field Geophysics. 4 Credits.
Introduction to geophysical methods for subsurface investigation, useful for exploration, geotechnical engineering, and characterization of subsurface groundwater and environmental conditions.
Prereq: MATH 112Z or PHYS 201.

ERTH 416. Geophysical and Environmental Sensors. 4 Credits.
This experiential course will provide students an introduction to sensors, microcontrollers, automation, data collection and programming from the perspective of sensing the Earth and the environment.
Prereq: MATH 252, ERTH 363 or CS 122.

ERTH 418. Earth and Environmental Data Analysis. 4 Credits.
Tools-based instruction in data analysis for earth and environmental scientists. Topics include descriptive statistics, visualization, uncertainty analysis, hypothesis testing, regression, time series, and directional data.
Prereq: MATH 246 or MATH 251.

ERTH 420. Geocommunication. 3 Credits.
Scientific writing and presentations for the geological sciences. Focus on writing scientific papers and proposals, preparing oral and visual presentations.

ERTH 423M. Introduction to Space Physics. 4 Credits.
Course explores the interaction of the solar wind with the Earth's magnetosphere using fundamental plasma physics supported and motivated by spacecraft observations. Students will gain an understanding of the physics governing the interaction building from single particle plasma motion to specific observation supported examples.
Prereq: PHYS 253, MATH 282.

ERTH 425. Geology of Ore Deposits. 5 Credits.
Porphyry copper-molybdenum, epithermal, massive sulfides in volcanic rocks, and base and precious metals in sedimentary rocks. Geologic setting, alteration and ore mineral assemblages, and geochemistry of ore formation.
Prereq: CH 223; ERTH 332.

ERTH 433. Paleobotany. 4 Credits.
Evolution and ecology of plants and microbes from the origin of life to global warming. Laboratory exercises and field trip to collect plant fossils.
Pre- or coreq: ERTH 103 or ERTH 203.

ERTH 434. Vertebrate Paleontology. 4 Credits.
Evolution of vertebrates, including ourselves, based on fossil evidence. Physical and other evolutionary constraints are addressed, and lab exercises provide practical experience.
Prereq: ERTH 103 or ERTH 203.

ERTH 435. Paleopedology. 4 Credits.
Soil formation; mapping and naming fossil soils; features of soils in hand specimens and petrographic thin sections; interpretations of ancient environments from features of fossil soils.
Prereq: ERTH 311 or ERTH 332.

ERTH 436. Paleoecology and Functional Morphology. 4 Credits.
Ecological methods for the study of fossil organisms, both terrestrial and marine. Covers a range of methods from those that reconstruct the ecology of individual species to those that deal with whole communities and ecosystems. Laboratory offers practical and analytical experience in the methods.
Prereq: ERTH 103, ERTH 203, or BI 213.

ERTH 438. Geobiology. 4 Credits.
Studies how microorganisms interact with geological environments at scales from enzymes to global element cycles.

ERTH 440. Sedimentary Basin Analysis. 4 Credits.
Evolution of sedimentary basins, emphasizing tectonic controls on basin formation and filling. Interpretation of subsidence mechanisms and sedimentary processes through analysis of the stratigraphic record.
Prereq: ERTH 334, ERTH 350.

ERTH 441. Hillslope Geomorphology. 4 Credits.
Hillslope processes and landforms; includes hillslope hydrology, overland flow erosion, weathering and soil formation, soil creep, landslides and related hazards, glacial and periglacial processes, effects of land-use practices and fire, and landscape evolution.

ERTH 451. Hydrogeology. 4 Credits.
Study of the origin, motion, and physical and chemical properties of ground water. Emphasizes quantitative analysis of flow and interaction with geologic materials.
Prereq: CH 222 or CH 225H; ERTH 316.

ERTH 452. Neotectonics and Quaternary Geology. 4 Credits.
Interpretation of active structures from deformed quaternary sediments and surfaces using case histories. Field project uses air photos and field techniques. Repeatable once for maximum of 8 credits.
Prereq: ERTH 334, ERTH 350.

ERTH 453. Tectonics. 3 Credits.
Tectonic processes and examples. Global kinematics of plates and the forces that drive them. Continental deformation in compressional, shear, and extensional settings.
Prereq: ERTH 350 and calculus.

ERTH 454. Fluid Dynamics. 4 Credits.
Introduction to the continuum theory of fluid dynamics, focusing on the Navier-Stokes equations of motion including common simplified limits and extensions. Applications are drawn from Earth and Planetary Science, Biology, and Physics.
Prereq: PHYS 252, MATH 252.

ERTH 455. Mechanical Earth. 4 Credits.
Introduction to continuum mechanics. Includes stress and strain, friction, elasticity, viscous fluids, constitutive laws, equations of motion, and deformation of the Earth.
Prereq: ERTH 315, PHYS 202, or equivalent; MATH 256.

ERTH 456. Signal Processing. 4 Credits.
A theoretical and hands-on introduction to signal processing techniques that are widely used in geophysical, geological, and related fields.
Prereq: MATH 252 or ERTH 363.

ERTH 458. Earth Monitoring. 4 Credits.
Learn hands-on applications of tools used to monitor the solid earth and its changes through time (deformation, gravity, etc.). Address problems related to natural hazards (earthquakes, landslides, volcanoes) and natural resources (climate change).
Prereq: ERTH 101 or ERTH 201, PHYS 201 or MATH 252.

ERTH 462. Environmental Geomechanics. 4 Credits.
Application of fluid and solid mechanics to understanding processes in the earth and environmental sciences. Offered alternate years.
Prereq: ERTH 455.

ERTH 463. Computational Earth Science. 4 Credits.
Practical techniques for scientific computing. Topics include root finding, curve fitting, interpolation, integration and differentiation, optimization, differential equations.
Prereq: MATH 253; ERTH 363 or equivalent.

ERTH 466. Geodynamics. 4 Credits.
Introduction to the process of the earth's physical workings. Includes rheology, bending of lithosphere, viscous flow, and heat transport.
Prereq: MATH 256 or equivalent; ERTH 455.

ERTH 467. Fault Mechanics. 4 Credits.
The physics of faulting throughout the earthquake cycle. Topics include fault friction, seismic rupture, earthquake triggering, and other fault zone processes. Offered alternate years.
Prereq: ERTH 315, MATH 253.

ERTH 468. Introduction to Seismology. 4 Credits.
Introduction to observational, theoretical, and computational seismology. Includes review of earth structure, source representation, ray theory, and seismic wave phenomena.
Prereq: MATH 256, ERTH 455.

ERTH 471. Thermodynamic Geochemistry. 4 Credits.
Introduction to geologic application of classical chemical thermodynamics. Gibbs free energy and its temperature, pressure, and composition derivatives; fugacity, activity, and chemical potential. Solutions, ideal and nonideal.
Prereq: ERTH 311 or ERTH 332, CH 223, MATH 253.

ERTH 472. Aqueous-Mineral-Gas Equilibria. 4 Credits.
Aqueous chemistry applied to natural waters (geothermal, diagenetic, continental brines). Equilibrium calculations applied to aqueous-mineral-gas systems.
Prereq: CH 223; MATH 252.

ERTH 473. Isotope Geochemistry. 4 Credits.
Introduction to nuclear physics and isotope systematics; techniques of isotope analysis; applications of stable and radioactive isotopes in geochronology and as tracers of geological processes.

ERTH 474. Soil and Environmental Chemistry. 4 Credits.
Understanding the flow and cycling of chemicals in soils is vital for addressing many pressing societal issues, including mitigating climate change, growing abundant and safe food, and protecting water quality. This class will describe fundamental soil chemical principles and consider their broader applications.
Prereq: ENVS 477, CH 222.

ERTH 480. Volcanology. 4 Credits.
Products and processes of volcanism, transport of magma in the conduit and into the atmosphere, eruptive mechanisms, volcanic hazards.
Prereq: ERTH 201, PHYS 201 or PHYS 251, and MATH 251 or MATH 246.

ERTH 500M. Temp Multilist Course. 1-5 Credits.
Repeatable.

ERTH 503. Thesis. 1-16 Credits.
Repeatable.

ERTH 507. Seminar: [Topic]. 1-5 Credits.
Repeatable.

ERTH 508. Laboratory Projects: [Topic]. 1-12 Credits.
Repeatable.

ERTH 510. Experimental Course: [Topic]. 1-5 Credits.
Repeatable.

ERTH 510L. Experimental Course: [Topic]. 1-5 Credits.
Repeatable.

ERTH 514. Igneous and Metamorphic Petrology. 4 Credits.
Advanced principles of igneous and metamorphic petrogenesis. Gibbs phase rule, phase diagrams, mineral thermodynamics; magma geochemistry and rheology; metamorphic facies, geothermometry and geobarometry. Johnston.

ERTH 515. Field Geophysics. 4 Credits.
Introduction to geophysical methods for subsurface investigation, useful for exploration, geotechnical engineering, and characterization of subsurface groundwater and environmental conditions.

ERTH 516. Geophysical and Environmental Sensors. 4 Credits.
This experiential course will provide students an introduction to sensors, microcontrollers, automation, data collection and programming from the perspective of sensing the Earth and the environment.

ERTH 518. Earth and Environmental Data Analysis. 4 Credits.
Tools-based instruction in data analysis for earth and environmental scientists. Topics include descriptive statistics, visualization, uncertainty analysis, hypothesis testing, regression, time series, and directional data.
Prereq: MATH 246 or MATH 251.

ERTH 520. Geocommunication. 3 Credits.
Scientific writing and presentations for the geological sciences. Focus on writing scientific papers and proposals, preparing oral and visual presentations.

ERTH 523M. Introduction to Space Physics. 4 Credits.
Course explores the interaction of the solar wind with the Earth's magnetosphere using fundamental plasma physics supported and motivated by spacecraft observations. Students will gain an understanding of the physics governing the interaction building from single particle plasma motion to specific observation supported examples.

ERTH 525. Geology of Ore Deposits. 5 Credits.
Porphyry copper-molybdenum, epithermal, massive sulfides in volcanic rocks, and base and precious metals in sedimentary rocks. Geologic setting, alteration and ore mineral assemblages, and geochemistry of ore formation.

ERTH 533. Paleobotany. 4 Credits.
Evolution and ecology of plants and microbes from the origin of life to global warming. Laboratory exercises and field trip to collect plant fossils.

ERTH 534. Vertebrate Paleontology. 4 Credits.
Evolution of vertebrates, including ourselves, based on fossil evidence. Physical and other evolutionary constraints are addressed, and lab exercises provide practical experience.

ERTH 535. Paleopedology. 4 Credits.
Soil formation; mapping and naming fossil soils; features of soils in hand specimens and petrographic thin sections; interpretations of ancient environments from features of fossil soils.

ERTH 536. Paleoecology and Functional Morphology. 4 Credits.
Ecological methods for the study of fossil organisms, both terrestrial and marine. Covers a range of methods from those that reconstruct the ecology of individual species to those that deal with whole communities and ecosystems. Laboratory offers practical and analytical experience in the methods.

ERTH 538. Geobiology. 4 Credits.
Studies how microorganisms interact with geological environments at scales from enzymes to global element cycles.

ERTH 540. Sedimentary Basin Analysis. 4 Credits.
Evolution of sedimentary basins, emphasizing tectonic controls on basin formation and filling. Interpretation of subsidence mechanisms and sedimentary processes through analysis of the stratigraphic record.

ERTH 541. Hillslope Geomorphology. 4 Credits.
Hillslope processes and landforms; includes hillslope hydrology, overland flow erosion, weathering and soil formation, soil creep, landslides and related hazards, glacial and periglacial processes, effects of land-use practices and fire, and landscape evolution.

ERTH 551. Hydrogeology. 4 Credits.
Study of the origin, motion, and physical and chemical properties of ground water. Emphasizes quantitative analysis of flow and interaction with geologic materials.

ERTH 552. Neotectonics and Quaternary Geology. 4 Credits.
Interpretation of active structures from deformed quaternary sediments and surfaces using case histories. Field project uses air photos and field techniques. Repeatable once for maximum of 8 credits.

ERTH 553. Tectonics. 3 Credits.
Tectonic processes and examples. Global kinematics of plates and the forces that drive them. Continental deformation in compressional, shear, and extensional settings.

ERTH 554. Fluid Dynamics. 4 Credits.
Introduction to the continuum theory of fluid dynamics, focusing on the Navier-Stokes equations of motion including common simplified limits and extensions. Applications are drawn from Earth and Planetary Science, Biology, and Physics.

ERTH 555. Mechanical Earth. 4 Credits.
Introduction to continuum mechanics. Includes stress and strain, friction, elasticity, viscous fluids, constitutive laws, equations of motion, and deformation of the earth.

ERTH 556. Signal Processing. 4 Credits.
A theoretical and hands-on introduction to signal processing techniques that are widely used in geophysical, geological, and related fields.

ERTH 558. Earth Monitoring. 4 Credits.
Learn hands-on applications of tools used to monitor the solid earth and its changes through time (deformation, gravity, etc.). Address problems related to natural hazards (earthquakes, landslides, volcanoes) and natural resources (climate change).

ERTH 562. Environmental Geomechanics. 4 Credits.
Application of fluid and solid mechanics to understanding processes in the earth and environmental sciences. Offered alternate years.

ERTH 563. Computational Earth Science. 4 Credits.
Practical techniques for scientific computing. Topics include root finding, curve fitting, interpolation, integration and differentiation, optimization, differential equations.

ERTH 566. Geodynamics. 4 Credits.
Introduction to the process of the earth's physical workings. Includes rheology, bending of lithosphere, viscous flow, and heat transport.

ERTH 567. Fault Mechanics. 4 Credits.
The physics of faulting throughout the earthquake cycle. Topics include fault friction, seismic rupture, earthquake triggering, and other fault zone processes. Offered alternate years.

ERTH 568. Introduction to Seismology. 4 Credits.
Introduction to observational, theoretical, and computational seismology. Includes review of earth structure, source representation, ray theory, and seismic wave phenomena.

ERTH 571. Thermodynamic Geochemistry. 4 Credits.
Introduction to geologic application of classical chemical thermodynamics. Gibbs free energy and its temperature, pressure, and composition derivatives; fugacity, activity, and chemical potential. Solutions, ideal and nonideal.

ERTH 572. Aqueous-Mineral-Gas Equilibria. 4 Credits.
Aqueous chemistry applied to natural waters (geothermal, diagenetic, continental brines). Equilibrium calculations applied to aqueous-mineral-gas systems.
Prereq: CH 223; MATH 252.

ERTH 573. Isotope Geochemistry. 4 Credits.
Introduction to nuclear physics and isotope systematics; techniques of isotope analysis; applications of stable and radioactive isotopes in geochronology and as tracers of geological processes.

ERTH 574. Soil and Environmental Chemistry. 4 Credits.
Understanding the flow and cycling of chemicals in soils is vital for addressing many pressing societal issues, including mitigating climate change, growing abundant and safe food, and protecting water quality. This class will describe fundamental soil chemical principles and consider their broader applications.

ERTH 580. Volcanology. 4 Credits.
Products and processes of volcanism, transport of magma in the conduit and into the atmosphere, eruptive mechanisms, volcanic hazards.

ERTH 601. Research: [Topic]. 1-16 Credits.
Repeatable.

ERTH 603. Dissertation. 1-16 Credits.
Repeatable.

ERTH 605. Reading and Conference: [Topic]. 1-16 Credits.
Repeatable.

ERTH 606. Field Studies: [Topic]. 1-16 Credits.
Repeatable.

ERTH 607. Seminar: [Topic]. 1-5 Credits.
Repeatable.

ERTH 608. Laboratory Projects: [Topic]. 1-16 Credits.
Repeatable.

ERTH 609. Terminal Project. 1-12 Credits.
Repeatable.

ERTH 610. Experimental Course: [Topic]. 1-5 Credits.
Repeatable.

ERTH 620. Advanced Igneous Petrology. 3 Credits.
Ingeous rocks of the ocean basins, continental margins, and stable continental interior including basalts, calcalkaline series, and granites. Content varies according to research interests.
Prereq: ERTH 514, 571, or equivalent.

ERTH 692. Advanced Volcanology. 4 Credits.
This course introduces students to concepts of heat and mass transfer to understand the transport of magma in the subsurface and the physical processes involved in volcanic eruptions.
Prereq: ERTH 480, ERTH 580.