

# Earth Science Courses (EARTHSCI)

## Courses

### **EARTHSCI 1100 (870:010). Astronomy — 3-4 hrs.**

Introduction to the Universe, solar system, stars, and galaxies, including apparent motions of bodies in the sky; development of astronomy and its impact on humankind. Discussion, 3 periods; lab, 2 periods. Also offered as a 3-hour course without lab. Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. (Fall, Spring, Summer)

### **EARTHSCI 1110 (870:011). Astronomy Laboratory — 1 hr.**

Exploration of astronomical phenomena through the use of telescopes, charts, almanacs, computer simulations, and other laboratory equipment. Students will gain experience in methods of observing the night sky and become familiar with celestial objects. Lab, 2 periods. Prerequisite(s): consent of instructor. Prerequisite(s) or corequisite(s): EARTHSCI 1100 (870:010). (Fall, Spring, Summer)

### **EARTHSCI 1200 (870:021). Elements of Weather — 3 hrs.**

Meteorological elements and their applications to environment; interpretation of weather maps and weather data; forecasting and briefing on daily weather. Discussion, 3 periods. No credit for those who have completed EARTHSCI 3210/5210 (870:121g). Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. (Fall, Spring, Summer)

### **EARTHSCI 1210 (870:022). Elements of Weather Laboratory — 1 hr.**

Fundamentals of meteorological observation, use of basic meteorological instruments, and applications of maps and charts to understanding forecasts. Intended for science teaching majors and minors. Lab, 2 periods. Prerequisite(s) or corequisite(s): EARTHSCI 1200 (870:021). (Fall and Spring)

### **EARTHSCI 1300 (870:031). Introduction to Geology — 4 hrs.**

Introduction to the physical environment, emphasizing materials of the Earth and processes that lead to changes within and on the Earth. Lab emphasis includes rocks and minerals, geologic processes, and landscape development. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. (Fall and Spring)

### **EARTHSCI 1320 (870:035). Earth History — 4 hrs.**

Methods and principles used in deciphering the 4.6 billion-year history of our planet; discussion of history and evolution of life on Earth and examination of major physical and plate-tectonic events through geologic time. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): EARTHSCI 1300 (870:031) or equivalent. (Fall and Spring)

### **EARTHSCI 1400. Introduction to Environmental Earth Science — 3 hrs.**

Introduction to the physical, biological, and cultural components of the natural world around us. The primary focus is on global-scale understanding of environmental issues using a scientific approach. Discussion, 3 periods. Prerequisite(s): Students must have satisfied university entrance requirements in English and Mathematics. (Fall)

### **EARTHSCI 1410 (870:037). Field Studies in \_\_\_\_\_ — 1-4 hrs.**

Field studies in various areas of Earth Science: geology, oceanography, paleontology, meteorology, and astronomy. To be preceded by seminars on proposed study area. Student collection of

data in the field and reports on their findings. May be repeated in different study area. Only 4 hours may be applied to the Earth Science minor. Prerequisite(s): consent of instructor. (Variable)

### **EARTHSCI 3100/5100 (870:109g). Fundamentals of Astronomy — 4 hrs.**

Basic principles of astronomy intended primarily for in-service teachers. No credit for students with credit in EARTHSCI 1100 (870:010) or its equivalent. Prerequisite(s): junior standing; consent of department head. (Fall, Spring, Summer)

### **EARTHSCI 3110/5110 (870:154g). Observational Astronomy — 2 hrs.**

Use of astronomical instruments (telescopes, cameras, and digital cameras), along with observing aids (charts, catalogs, and ephemerides), for collection, analysis, and interpretation of astronomical data. Discussion, 1 period; lab, 2 periods. Prerequisite(s): EARTHSCI 1100 (870:010) (4 semester hours) or equivalent; junior standing. (Fall)

### **EARTHSCI 3120 (870:151). Planets — 2 hrs.**

Examination of the Sun's family of planets, satellites, asteroids, and comets, including formation and evolution; processes currently at work in the Solar System; search for exoplanets. Discussion, 2 periods. Prerequisite(s): EARTHSCI 1100 (870:010) or equivalent. (Variable)

### **EARTHSCI 3130 (870:152). Stars — 2 hrs.**

Study of structure and the evolution of stars; the Sun, protostars, red giants, white dwarfs, variable stars, supernovae, pulsars, and black holes. Discussion, 2 periods. Prerequisite(s): EARTHSCI 1100 (870:010) or equivalent. (Variable)

### **EARTHSCI 3140 (870:153). Galaxies and Cosmology — 2 hrs.**

Study of the Milky Way Galaxy and other galaxies. Examination of active galaxies and radio galaxies, galaxy clusters, quasars, and galactic black holes. Discussion of the structure, origin, evolution, and fate of the Universe. Discussion, 2 periods. Prerequisite(s): EARTHSCI 1100 (870:010) or equivalent. (Variable)

### **EARTHSCI 3150. Naked-eye Astronomy — 2 hrs.**

Exploration of the changing sky with examples of how different cultures have reacted to and used these changes for time keeping and navigation. (Spring)

### **EARTHSCI 3200/5200 (870:111g). Fundamentals of Weather — 3 hrs.**

Basic principles of meteorology intended primarily for in-service teachers. Prerequisite(s): junior standing; consent of department head. (Fall and Spring)

### **EARTHSCI 3210/5210 (870:121g). Meteorology — 4 hrs.**

Weather observations; the atmospheric boundary layer; heating and cooling of the atmosphere; instability and thunderstorm formation; winds and weather systems; air pollution and weather. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): EARTHSCI 1200 (870:021); junior standing. (Spring)

### **EARTHSCI 3220/5220 (870:122g). Weather Analysis and Forecasting — 3 hrs.**

Fundamentals of weather forecasting; practical application of numerical prediction; analysis of surface and upper air weather observations; the polar front cyclone; conceptual models of atmospheric ascent; thunderstorms; ensemble forecasting; daily

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weather forecasting exercise. Discussion, 3 periods. Prerequisite(s): EARTHSCI 3210/5210 (870:121g); junior standing. (Variable)

### **EARTHSCI 3230/5230 (870:123g). Air Quality — 4 hrs.**

Atmospheric pollution and pollutants; effect of air pollution on the atmosphere, health and welfare; regulation and public policy; atmospheric dispersion of air pollution; air pollution control; indoor air quality. Discussion, 4 periods. Prerequisite(s): EARTHSCI 1200 (870:021); junior standing. (Fall)

### **EARTHSCI 3240/5240 (870:124g). Air Quality Modeling — 4 hrs.**

Theory and application of air quality modeling; simulation of ambient concentrations of air pollution; dispersion modeling; photochemical modeling. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): EARTHSCI 1200 (870:021); junior standing. (Spring)

### **EARTHSCI 3250/5250 (870:177g). Measurement and Analysis of Air Quality — 4 hrs.**

Atmospheric chemistry; techniques commonly used in air quality measurement; collection and analysis of gases and particulates; remote sensing of air pollution; indoor air quality; determining compliance with air quality regulations. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): EARTHSCI 1200 (870:021); junior standing. Prerequisite(s) or corequisite(s): EARTHSCI 3230/5230 (870:123g). (Fall)

### **EARTHSCI 3300/5300 (870:128g). Fundamentals of Geology — 4 hrs.**

Basic principles of physical geology intended primarily for inservice teachers. Prerequisite(s): junior standing; consent of department head. (Fall and Spring)

### **EARTHSCI 3310/5310 (870:129g). Structural Geology — 4 hrs.**

Origins and mechanics of rock deformation. Plate tectonics and the deformation of Earth's crust. Field trip. Discussion, 2 periods; lab, 4 periods. Prerequisite(s): EARTHSCI 1300 (870:031); EARTHSCI 1320 (870:035); junior standing. (Even Springs)

### **EARTHSCI 3315 (870:117). Earthquakes and Tsunamis — 2 hrs.**

Study of the causes, measurements, prediction, and preparation for earthquakes and tsunamis and the effects of earthquakes and tsunamis on civilization. Discussion, 1 period; lab, 2 periods. Prerequisite(s): Student must have satisfied university entrance requirements in English and Mathematics. (Variable)

### **EARTHSCI 3322. Earth Materials — 4 hrs.**

Investigations of the composition, properties, classification, identification, and origin of common Earth materials including the major rock-forming minerals as well as igneous, sedimentary, and metamorphic rocks. Discussion 3 periods, lab 2 periods. Prerequisite(s): EARTHSCI 1300 (870:031). (Spring)

### **EARTHSCI 3325/5325 (870:136g). Sedimentary Geology — 4 hrs.**

Investigation of layered rocks, sedimentary processes, sedimentation, environments of deposition, correlation procedures, and classification and description of common sedimentary rocks. Field trips. Discussion, 2 periods; lab, 4 periods. Prerequisite(s): junior standing. Prerequisite(s) or corequisite(s): EARTHSCI 1320 (870:035). (Fall)

### **EARTHSCI 3327/5327. Paleoclimatology — 3 hrs.**

Introduction to paleoclimatology emphasizing methods and principles used to decipher paleoclimate events in the geologic past. This course focuses on climate forcing, the response time of Earth's climate system, feedbacks within the climate system, and the role of carbon in this system over million-year time scales. In particular, the role of stable and radiogenic isotope proxies in determining paleoclimate events is emphasized. Discussion, 3

periods. Prerequisite(s): EARTHSCI 1300 (870:031) or GEOG 1210 (970:026); EARTHSCI 1320 (870:035) or permission of the instructor; junior standing. (Variable)

### **EARTHSCI 3328 (870:125). Fossils and Evolution — 4 hrs.**

Topics in paleontology, including fossil preservation, systematics, functional morphology, paleoecology, paleobiogeography, and biostratigraphy, with special emphasis on mass extinctions and the role of paleontology in reconstructing evolutionary history. Laboratory studies of major groups of fossil invertebrates. Discussion, 3 periods; lab, 3 periods. (Variable)

### **EARTHSCI 3330/5330 (870:141g). Geomorphology — 4 hrs.**

Classification, description, origin, and development of landforms and their relationship to underlying structure and lithology; emphasis on geomorphic processes. Includes fluvial, glacial, periglacial, eolian, karstic, weathering, and mass-movement processes and features. Discussion, 3 periods; labs and field trips, 2 periods. Prerequisite(s): EARTHSCI 1300 (870:031) or GEOG 1210 (970:026); junior standing. (Fall)

### **EARTHSCI 3340/5340 (870:165g). Oceanography — 3 hrs.**

Basic principles of geological, biological, chemical, and physical oceanography; emphasis on marine geology. Physiographic features of ocean basins, coastal features and processes, oceanic sediments, biological and geological resources, and ocean management. Discussion, 3 periods. Prerequisite(s): EARTHSCI 1300 (870:031) or equivalent; junior standing. (Variable)

### **EARTHSCI 3345/5345 (870:171g). Environmental Geology — 3 hrs.**

Recognition and remediation of natural and human induced geologic hazards. Analysis of issues or problems of local concern where possible. Discussion, 2 periods; lab and field trips, 2 periods. Prerequisite(s): EARTHSCI 1300 (870:031) or equivalent; junior standing. (Odd Falls)

### **EARTHSCI 3350/5350 (870:173g). Environmental Hydrology — 3 hrs.**

Introduction to environmental aspects of watershed hydrology. Surface water hydrologic processes, pollution of surface water resources, surface water - ground water interactions, unsaturated zone hydrologic processes, movement of chemicals in soils, site characterization, and soil remediation techniques. Discussion, 3 periods. Prerequisite(s): EARTHSCI 1300 (870:031); junior standing. (Even Springs)

### **EARTHSCI 3355/5355 (870:175g). Hydrogeology — 3 hrs.**

Principles and applications of hydrogeology including study of runoff, stream flow, soil moisture, and ground water flow. Examination and analysis of ground water flow to wells, regional ground water flow, geology of ground water occurrence, water chemistry of ground water, water quality and ground water contamination, ground water development and management, field methods, and ground water models. Discussion, 3 periods. Prerequisite(s): EARTHSCI 1300 (870:031); junior standing. (Odd Springs)

### **EARTHSCI 3360/5360. Field and Laboratory Methods in Hydrology — 3 hrs.**

Methods of data collection, laboratory procedures and error analysis associated with water in the geo-hydrologic systems. Develop skills in using hydrologic equipment, including ion chromatograph, spectrophotometers, water monitoring sondes, and well purging systems. Field trips; Discussion/lab, 4 periods. Prerequisite(s): junior standing. (Odd Falls)

**EARTHSCI 3400/5400 (870:113g). Topics in Earth Science — 1-3 hrs.**

Offered both on- and off-campus in flexible format. May include plate tectonics, geomagnetism, naked-eye astronomy, telescope usage, weather forecasting, or other topics of current interest. Topics listed in Schedule of Classes. May be repeated on different topic. Application to major requires consent of department head. Prerequisite(s): junior standing. (Fall, Spring, Summer)

**EARTHSCI 3410/5410 (870:137g). Field Studies in \_\_\_\_\_ — 1-4 hrs.**

Field studies in various areas of Earth Science including geology, oceanography, paleontology, meteorology, and astronomy. To be preceded by seminars on the proposed study area. Student collection of data in the field and reports on their findings. May be repeated in different study area. Only 4 hours may be applied to the Earth Science minor. Prerequisite(s) or corequisite(s): an EARTHSCI 3000/4000-level (870:1xx) course appropriate to the specific field studies and approved by department head; junior standing; consent of instructor. (Variable)

**EARTHSCI 3420/5420 (870:189g). Readings in Earth Science — 1-3 hrs.**

Maximum of 3 hours may be applied to earth science or geology majors or minors. Prerequisite(s): junior standing; consent of instructor and department head. (Variable)

**EARTHSCI 3430 (870:195). Internship — 1-6 hrs.**

Supervised work experience in approved work situation. Offered on credit/no credit basis only. Prerequisite(s): consent of department head. (Fall, Spring, Summer)

**EARTHSCI 3500 (870:181). Investigations in Earth and Space Sciences — 4 hrs.**

Introduction to significant concepts and theories of earth science and a model of effective teaching strategies related to elementary school level. Topics include geologic materials and processes acting on them and fundamentals of earth history, weather, and astronomy. Discussion and/or lab, 5 periods plus arranged. Prerequisite(s): SCI ED 1100 (820:033). (Odd Springs)

**EARTHSCI 4150/5150. Astrophysics — 3 hrs.**

Examination of astrophysical concepts and principles for a range of topics, including processes that influence stars, galaxies and the universe. Prerequisite(s): PHYSICS 1701 (880:130), PHYSICS 1702 (880:131), MATH 1420 (800:060), MATH 1421 (800:061), Junior Standing. (Even Springs)

**EARTHSCI 4400 (870:180). Undergraduate Research in Earth Science — 1-3 hrs.**

Research activities under direct supervision of Earth Science faculty member. Credit to be determined at registration. May be repeated for maximum of 6 hours. Prerequisite(s): consent of instructor and department head. (Fall, Spring, Summer)

**EARTHSCI 6297 (870:297). Practicum.**  
(Variable)

**EARTHSCI 6299 (870:299). Research.**

Prerequisite(s): consent of department. (Variable)