## EARTH SCIENCE (ERSC)

**ERSC Courses**

**ERSC 144. Introduction to Earth Science. 4 units**  
Survey of fundamental processes of Earth science. Application of systems thinking to understanding the dynamic interactions among geological, geographic, soils and human factors in shaping the Earth. 3 lectures, 1 activity.

**ERSC 223. Rocks and Minerals. 4 units**  
Prerequisite: SS 120; and CHEM 124 or CHEM 127.  
Origin, composition, identification and weathering of rocks, minerals, and clays important in the development of soils. Parent materials as related to the nature and properties of soils. 3 lectures, 1 laboratory.

**ERSC 250. Physical Geography. 4 units**  
Addresses the origins and patterns of the earth’s diverse assemblage of climates, landforms, biota and soils. A major focus on relationship between human cultures and these earthly environments. 4 lectures. Crosslisted as ERSC/GEOG 250.

**ERSC 270. Selected Topics. 1-4 units**  
Prerequisite: Consent of instructor.  
Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Crosslisted as ERSC/SS 270.

**ERSC 303. Soil Erosion and Water Conservation. 4 units**  
Prerequisite: LA/NR 218 or GEOG 318; and SS 120.  
Evaluation of soil and water conservation with application toward agriculture, rangeland, and urban land uses. Study of process, regulation, and best management practices for soil erosion, water quality, and stormwater. Development of stormwater pollution prevention or farm water quality plans to meet regulatory requirements.  3 lectures, 1 activity.

**ERSC 325. Climate and Humanity. 4 units**  
Prerequisite: Junior standing.  
Geographic perspective on the interrelationships between climate and human cultures. Effects of people on climate and the influence of climate and weather upon human activities and behavior. Focus on global human conditions which are responsible for the alteration of climate and in turn are vulnerable to climate change.  4 lectures. Crosslisted as ERSC/GEOG 325.

**ERSC 333. Human Impact on the Earth. 4 units**  
Prerequisite: Junior standing.  
Global assessment of the impact of humans on the earth's vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of human attitudes, technologies, and population with natural resources. 4 lectures. Crosslisted as ERSC/GEOG 333.

**ERSC 335. Soil, Water, and Civilization. 4 units**  
2020-21 or later: Upper-Div GE Area B  
2019-20 or earlier catalog: GE Area B5, B6, or B7  
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).  
Explore past civilizations and how management of soil, water, and other natural resources allowed them to flourish, decline, or fail. Sustainability of natural resource use in modern/future societies. Issues include sustainability, agricultural practices, deforestation, water quality, and land management. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

**ERSC 399. Internship in Environmental Earth and Soil Sciences. 1-12 units**  
CR/NC  
Prerequisite: Consent of internship instructor.  
Selected students will spend up to 12 weeks with an approved firm or agency engaged in work and study related to their major. A detailed written proposal and written interim and final reports required. One unit of credit may be allowed for each full week of internship. Credit/No Credit grading. Crosslisted as ERSC/SS 399.

**ERSC 400. Special Problems for Advanced Undergraduates. 1-4 units**  
Prerequisite: Consent of instructor.  
Individual investigation, research, studies or surveys of selected problems. Total credit limited to 12 units. Crosslisted as ERSC/SS 400.

**ERSC 401. Field-Geology Methods. 4 units**  
Prerequisite: GEOL 102 or GEOL 201, GEOL 241, GEOL 415, ERSC 223, ERSC 323.  
Collecting and interpreting field-geologic data. Description of sedimentary rocks and construction of stratigraphic columns. Mapping geologic structures in the field. Surficial geologic stratigraphy and surficial geologic mapping. Understanding geologic processes through field study. Communicating results of field study. 1 lecture, 3 activities. Crosslisted as ERSC/GEOG 401.

**ERSC 402. Geologic Mapping. 4 units**  
Prerequisite: ERSC/GEOG 401.  
Bedrock geologic mapping on topographic maps and aerial photos. Surficial geologic mapping on topographic maps and aerial photos. Correlating and defining surficial geologic map units on the basis of soil development. Understanding landscape evolution using soil development 4 activities. Crosslisted as ERSC/GEOG 402.

**ERSC 414. Global and Regional Climatology. 4 units**  
Prerequisite: Junior standing.  
The earth’s pattern of climates and the physical processes that account for them. Focus on interrelationships between climate and the physical/biological and cultural environments. Special emphasis on modern climate changes and their consequences. 3 lectures, 1 laboratory. Crosslisted as ERSC/GEOG 414.
ERSC 415. Applied Meteorology and Climatology. 4 units
Prerequisite: ERSC/GEOG 250.

Physical processes in the atmosphere that determine regional weather, climate and climate variability. Surface and satellite systems for weather observation, and weather/climate modeling. Dynamics of weather systems, including thunderstorms and hurricanes. Emphases on weather/climate affecting agriculture and other human activities. 3 lectures, 1 activity. Crosslisted as ERSC/GEOG 415.

ERSC 423. Geomorphology. 4 units
Prerequisite: SS 120 or SS 121; and GEOL 201.


ERSC 442. Applied Environmental Groundwater Hydrology. 4 units
Prerequisite: ERSC 144 or GEOL 201; MATH 141 or MATH 161; and SS 120.

Applied field methods of vadose zone and groundwater flow modeling, resource evaluation, confined and unconfined aquifer characterization, well installation and groundwater monitoring. Introduction to groundwater modeling software including MODFLOW and AQTESOLV. 3 lectures, 1 laboratory. Formerly SS 442.

ERSC 443. Applied Environmental Contaminant Transport. 4 units
Prerequisite: CHEM 125 or CHEM 128; ERSC 144 or GEOL 201; MATH 141 or MATH 161; and SS 120.

Applied study of mechanisms of fate and transport of contaminants in soils and groundwater. Field methods and technologies of soil and groundwater sampling and site characterization. Representative conceptual and mathematical models, case studies, laboratory study of breakthrough behavior, and remediation technologies. Field trip required. 3 lectures, 1 laboratory.

ERSC 470. Selected Advanced Topics. 1-4 units
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Crosslisted as ERSC/SS 470.

ERSC 471. Selected Advanced Laboratory. 1-4 units
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Crosslisted as ERSC/SS 471.

ERSC 476. Senior Project - Advanced Internship Experience in Environmental Science/Management. 3 units
Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Independent internship experience conducted under faculty supervision focusing on a discipline area of environmental science/management. Completion of a project as a component of their internship. Satisfies the senior project requirement. Minimum 90 hours required. Crosslisted as ERSC/NR 476.

ERSC 477. Senior Project - Research Experience in Environmental Science. 3 units
Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Guided research experience in a specific area of environmental science. Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report. Satisfies senior project requirement. 1 lecture, 2 laboratories. Crosslisted as ERSC/NR 477.

ERSC 478. Senior Project - Current Topics in Environmental Science/Management. 3 units
Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Critical evaluation and formal presentation of current issues in environmental science/management. Evaluation of current topics, analysis of supporting evidence, and synthesis and presentation of resulting perspectives on different approaches to current challenges in environmental science/management. Satisfies the senior project requirement. 3 lectures. Crosslisted as ERSC/NR 478.

ERSC 479. Senior Project - Independent Study. 3 units
Prerequisite: Completion of GE Area A with grades of C- or better; ERSC 363 or NR 306 or NR 326; and consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time. Crosslisted as ERSC/NR 479.

ERSC 570. Selected Topics in Earth Science. 1-4 units
Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

ERSC 571. Selected Advanced Laboratory. 1-4 units
Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.