

# Environmental Science (ENVR)

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## COURSES

### **ENVR 1101. SUCCESS IN EARTH AND ENVIRONMENTAL SCIENCES. 1 Hour.**

A first-year experience course for new students and new transfer students interested in a career in Earth and Environmental Sciences. Provides the necessary foundation for success in a college environment while balancing personal and work obligations. Orients students to life on campus, demonstrates how to leverage campus resources to achieve career and academic goals, and emphasizes engagement outside the classroom through collaborative and co-curricular opportunities. This course is reserved exclusively for students planning to major in Earth and Environmental Sciences who are in their first semester at UTA. Fulfills the University requirement for either UNIV 1101 or UNIV 1131. Offered as GEOL 1101 and ENVR 1101. Credit will not be given for both.

### **ENVR 1301. INTRODUCTION TO ENVIRONMENTAL SCIENCE. 3 Hours.**

This course provides an introduction to the basic principles of environmental science. Environmental science, as a discipline, along with key chemical, physical, geological, and biological aspects and relevant societal issues will be examined.

### **ENVR 1330. GLOBAL WARMING. 3 Hours.**

Global environmental challenges confronting humanity such as pollution, depletion of natural resources, ecosystem deterioration, food production, and population growth. Offered as ENVR 1330 and GEOL 1330. Credit will not be given for both.

### **ENVR 2301. INTRODUCTION TO ENVIRONMENTAL SCIENCE. 3 Hours.**

This course provides an introduction to the basic principles of environmental science. Environmental science, as a discipline, along with key chemical, physical, geological and biological science aspects and relevant societal issues will be examined.

### **ENVR 2314. THE GLOBAL ENVIRONMENT AND HUMAN HEALTH. 3 Hours.**

This course will assess the impact on human health of: 1) population growth and available resources; 2) exposure to man-made harmful substances; and 3) environmental degradation.

### **ENVR 2316. CONSERVATION OF NATURAL RESOURCES. 3 Hours.**

During this course the students will explore natural resources, with special emphasis on new solutions to problems of resource scarcity and conservation. During this course the students will learn about energy, water, air, and food resources conservation. Students will work on developing proposals for addressing water conservation issues. Prerequisite: ENVR 1301, or consult instructor.

### **ENVR 2318. CLIMATE CHANGE RISK AND RESILIENCE. 3 Hours.**

Climate risk is emerging as a key risk driver for systems as diverse as critical infrastructure (e.g. water, energy, transport, communications, buildings, transportation) and the natural environment. The course covers the topics of long-term climate trends, identification and management of climate risks, climate change's impact on extreme weather events and public health. Students will gain an understanding of climate equity, environmental justice, mitigation and adaptation strategies, and emerging concepts of climate resilience. The course also emphasizes the ethical responsibilities of scientists, engineers, and risk professionals, equipping students with the necessary theories, methods, and tools to conduct climate risk assessments.

### **ENVR 2414. THE GLOBAL ENVIRONMENT AND HUMAN HEALTH. 4 Hours.**

This course will assess the impact on human health of: 1) population growth and available resources; 2) exposure to man-made harmful substances; and 3) environmental degradation.

### **ENVR 3100. ENVIRONMENTAL SCIENCE PROFESSIONAL ORIENTATION. 1 Hour.**

Review of various careers in environmental science, and how to prepare a resume, network, and interview. Principles to follow for on-the-job success. Class will involve field trips and work force guest lectures. Prerequisite: ENVR 1301 or cons. inst.

### **ENVR 3187. ENVIRONMENTAL SCIENCE FIELD METHODS. 1 Hour.**

Measurement and analysis of environmental data collected in the field. Special fee covers cost of transportation and equipment. Prerequisite: CHEM 1442.

### **ENVR 3317. ENVIRONMENTAL HYDROLOGY. 3 Hours.**

An introduction to environmental hydrology topics including basic principles of the processes and measurements of precipitation, interception, infiltration, evaporation, evapotranspiration, interflow, overland flow, stream flow, and groundwater flow. Introduction to quantification of watershed metrics such as water budgets, hydrographs, discharge-concentration relationships, and flood routing. Examples and case studies will cover a broad spectrum of modern environmental scenarios (in a changing climate) across urban, agricultural, mining, and natural landscapes and biomes. Prerequisite: MATH 1426, or consent of instructor.

### **ENVR 3387. ENVIRONMENTAL SCIENCE FIELD METHODS. 3 Hours.**

Measurement and analysis of environmental data collected in the field. Special fee covers cost of transportation and equipment. Prerequisite: CHEM 1442.

### **ENVR 3454. STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS. 4 Hours.**

This course provides students with basic principles of statistics and helps students apply statistics to analyze data and interpret results from the perspective of Earth and environmental scientists. The course will first introduce basic concepts and then focus on applications to various examples in Earth and environmental sciences. Offered as ENVR 3454 and GEOL 3454, credit will not be given for both. Prerequisite: MATH 1426 or HONR-SC 1426.

**ENVR 3457. ENVIRONMENTAL ANALYTICAL CHEMISTRY. 4 Hours.**

This course offers an introduction to chemical and biochemical phenomena that occur in water, air, terrestrial and living environments, and the effects of human activity on them. Environmental chemistry can broaden as much as atmospheric chemistry, aquatic chemistry, chemistry of soil/geosphere, toxicological chemistry and industrial ecology. In this course, mainly chemical substances in diverse environmental compartments and interactions and exposure impact to human and wildlife receptors will be focus based on analytical chemistry principles and perspective. Prerequisite: CHEM 1442.

**ENVR 3487. ENVIRONMENTAL SCIENCE FIELD METHODS. 4 Hours.**

Measurement and analysis of environmental data collected in the field. Special fee covers cost of transportation and equipment. Prerequisite: CHEM 1442.

**ENVR 4189. RESEARCH IN ENVIRONMENTAL SCIENCE. 1 Hour.**

Supervised undergraduate research in some aspect of environmental science. Prerequisite: Permission from Instructor.

**ENVR 4190. ENVIRONMENTAL SCIENCE INTERNSHIP. 1 Hour.**

Work in environmental sciences for a commercial concern at least 20 hours per week for three months. Requirements include: writing a resume, learning how to interview and function on the job, and a report describing the work.

**ENVR 4199. TECHNICAL SESSIONS. 1 Hour.**

Forum for presentation of results of undergraduate and graduate students and faculty research. Offered as ENVR 4199 and GEOL 4199. Credit will not be given for both. Prerequisite: For ENVR: ENVR 1301 or equivalent. For GEOL: GEOL 1301 or equivalent.

**ENVR 4289. RESEARCH IN ENVIRONMENTAL SCIENCES. 2 Hours.**

Supervised undergraduate research in any one of the various fields of environmental sciences. May be repeated but will not meet Environmental Science degree requirements. Prerequisite: permission from instructor.

**ENVR 4303. TOPICS IN SUSTAINABILITY. 3 Hours.**

Governmental and regulatory issues as they relate to sustainability. Course offered as SUST 5303 and EVSE 5303. Credit will be granted only once.

**ENVR 4305. SELECTED TOPICS IN ENVIRONMENTAL SCIENCES. 3 Hours.**

Environmental science topics not treated in the regular curriculum. Topic, format, and prerequisites to be determined by the instructor. May be repeated for Environmental Science elective credit as different topics are offered. Prerequisite: Determined by instructor.

**ENVR 4306. SYNOPTIC METEOROLOGY. 3 Hours.**

This course discuss the core principles of synoptic meteorology including the following topics: Earth observations (radar, satellite, ground-based), cloud classification, analysis and forecasting of major weather systems and extreme weather events (fronts, hurricanes, tornadoes, flood, heatwaves, wildfires, and dust storms), weather forecasts, numerical forecasting models, and data assimilation techniques. Prerequisite: MATH 1426 and PHYS 1441 or PHYS 1443.

**ENVR 4308. ENVIRONMENTAL GEOCHEMISTRY. 3 Hours.**

The geochemistry of natural waters with emphasis on processes that control solute concentrations including complexation reactions, oxidation and reduction reactions, biogeochemistry, and chemical weathering reactions. Offered as ENVR 4308 and GEOL 4308. Credit will not be given for both. Prerequisite: CHEM 1442 or GEOL 2445.

**ENVR 4312. ENVIRONMENTAL RISK BASED ACTION. 3 Hours.**

This course offers an introduction to environmental risk-based actions including environmental laws and regulations, hazard identification, toxicology, common contaminants, chemical intake models, chemical fate and transport models, and vapor intrusions. Prerequisite: ENVR 1301 or GEOL 1301 or equivalent.

**ENVR 4313. ENVIRONMENTAL REGULATION OF CHEMICAL HAZARDS. 3 Hours.**

This course offers an introductory knowledge about regulations and management of environmental and life quality in relation to chemical pollution, waste disposal, energy/resources sustainability, public health threats, and food/consumer product safety. Prerequisite: CHEM 1441 or equivalent.

**ENVR 4314. TOXICOLOGY FOR ENVIRONMENTAL SCIENTISTS. 3 Hours.**

This course offers an introduction to environmental toxicology and methods of measuring and using data on the adverse effects of chemical substances in line with understanding chemical and biochemical phenomena that occur in water, air, terrestrial and living environments, and the impact to human population. Prerequisite: CHEM 1441 or equivalent.

**ENVR 4315. INTRODUCTION TO ENVIRONMENTAL STUDIES. 3 Hours.**

This course serves as an introduction to and covers broad aspects of environmental studies. It is designed to foster an increased understanding of physical, chemical and biological systems of terrestrial and aquatic environments, their complex connections and patterns, and human interactions. In this course emphasis is placed on a holistic approach to environmental studies using case studies, learning activities, and discussions to reinforce scientific principles. Students will examine the relationship between humankind and nature in order to gain a broad understanding of issues, causes, and possible solutions to the array of environmental challenges faced in today's world. Prerequisite: Junior standing, core complete.

**ENVR 4323. ISSUES IN ENVIRONMENTAL HEALTH. 3 Hours.**

An introduction to health issues of current concern resulting from environmental exposures. Topics include: environmental asthma, endocrine disruptors, climate change and health, emerging contaminants, nanotechnology and health, airborne particles and pediatric health. Offered as ENVR 4323 and GEOL 4323. Credit will not be given for both.

**ENVR 4325. TRACER HYDROLOGY. 3 Hours.**

This course is primarily focused on the applications of chemical tracers to study the interaction between precipitation, surface water, and groundwater. The first part covers the basics of water fluxes and naturally occurring and artificial tracers such as stable and radioactive isotopes, noble gases, fluorescent nanoparticles, ions, and DNA. The second part is oriented towards the assimilation of chemical tracer information to enhance hydrological metrics, conceptual model development, and numerical modeling. Prerequisite: ENVR 1301, or GEOL 1301, or cons. inst.

**ENVR 4330. UNDERSTANDING GEOGRAPHIC INFORMATION SYSTEMS. 3 Hours.**

A practical introduction to GIS and methods of creating, maintaining and displaying spatial data using the ArcGIS software. Prerequisite: Junior Standing.

**ENVR 4353. DATA ANALYSIS FOR EARTH AND ENVIRONMENTAL SCIENTISTS. 3 Hours.**

This course is an introduction to data analysis and data science by means of mathematics and statistics. We analyze real-world data to find patterns, detect trends and better forecast complex systems in nature. This course provides quantitative methods and deep understanding of applications of data analysis in earth and environmental sciences. It covers analyzing a broad type of data related to geology, earth sciences and environmental engineering. Offered as ENVR 4353 and GEOL 4353; credit will not be given for both. Prerequisite: ENVR 3454, or GEOL 3454, or STATS 1301.

**ENVR 4389. RESEARCH IN ENVIRONMENTAL SCIENCES. 3 Hours.**

Supervised undergraduate research in any one of the various fields of environmental sciences. May be repeated but will not meet Environmental Science degree requirements.

**ENVR 4455. ENVIRONMENTAL DATA SCIENCE. 4 Hours.**

This course focuses on acquisition, analysis, interpretation, and presentation of environmental data. Available datasets will be utilized to explore different models and case studies of the fate and transport of contaminants in multimedia environments, climate and health, toxicology prediction, water quality, environmental epidemiology, etc. The course includes practical exercises with Python and R. Offered as ENVR 4455 and GEOL 4455. Credit will not be given for both.

**ENVR 4456. ENVIRONMENTAL RISK ASSESSMENT. 4 Hours.**

This course introduces the basic scientific components of environmental and occupational health risk assessment and describes the policy context in which decisions to manage environmental health risks are made. The course presents the quantitative methods used to assess the human health risks associated with exposure to toxic chemicals, focusing on the four major components of risk assessment-hazard identification, dose-response assessment, exposure assessment, and risk characterization. Offered as ENVR 4456 and GEOL 4456. Credit will not be given for both.

**ENVR 4458. MACHINE LEARNING FOR EARTH AND ENVIRONMENTAL SCIENTISTS. 4 Hours.**

This course provides students with basic principles of machine learning and helps students apply machine learning to analyze data, predict outcomes and interpret results from the perspective of earth and environmental scientists. The course will first introduce basic concepts and then focus on applications to various examples in earth and environmental sciences. Offered as GEOL 4458 and ENVR 4458. Credit will be not given for both. Prerequisite: GEOL 3454 or ENVR 3454 or equivalent.