Adopted from UCR 2018-2019 Catalog

Lower-Division Courses

ENSC 001 Introduction to Environmental Science Natural Resources (4) Lecture, 3 hours; discussion, 1 hour. An introduction to environmental science, focusing on natural resource description, management, and conservation. Topics covered include ecosystem characteristics and function; material and energy flows; population dynamics and influence of population on the environment; energy resources and conservation; and mineral and soil resources and their management. Credit is awarded for only one of ENSC 001 or ENSC 001H.

ENSC 002 Introduction to Environmental Science Environmental Quality (4) Lecture, 3 hours; discussion, 1 hour. An introduction to environmental science, focusing on the impact of human development and technology on the quality of natural resources and living organisms. Topics covered include soil, water, and air pollution; water, land, and food resources; wildlife management and species endangerment; toxicology and risk management; and solid and hazardous waste management. Credit is awarded for only one of ENSC 002 or ENSC 002H.

ENSC 003 Contemporary Issues in the Environmental Sciences (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): none. An issue-oriented approach to understanding the scientific principles behind environmental issues. Case studies of environmental issues appearing in the mass media provide the context for assessing the status of scientific knowledge and its role in human decision making. Credit awarded for only one of ENSC 003 or ENSC 003H.

Upper-Division Courses

ENSC 100 Introduction to Soil Science (4) Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): both CHEM 001C and CHEM 01LC or both CHEM 01HC and CHEM 1HLC; ENSC 002 (or ENSC 002H) or CEE 010; or consent of instructor. Explores the fundamental principles of soil science and soils as a natural resource. Introduces the morphology, physics, chemistry, microbiology, fertility, classification, development, and management of soils in relation to the environment.

ENSC 101 Water Resources (4) Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): Both CHEM 001C and CHEM 01LC (or both CHEM 01HC and CHEM 1HLC); ENSC 002 (or ENSC 002H); or consent of instructor. An introduction to the hydrologic cycle; water sources, distribution, and conveyance; physical, chemical, and biological properties of water; water treatment and reuse; and regulatory framework.

ENSC 102 Introductory Atmospheric Science (4) Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): CHEM 001C and CHEM 01LC or both CHEM 01HC and CHEM 1HLC; ENSC 002 (or ENSC 002H); or consent of instructor. Covers the structure of the atmosphere and man's impact

upon it. The causes and consequences of air pollution. Addresses air quality standards and the stratospheric and tropospheric ozone. Also introduces the chemistry of air pollution and air pollution control strategies.

ENSC 103 Environmental Pollution and Health (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ENSC 001, ENSC 002. Focuses on the history, theory, and practice of assessing, understanding, and mitigating impacts of the natural and built environment on human health. Reviews core disciplines that underpin the field of environmental health as well as case studies from industrialized, emerging, and developing countries around the world. Cross-listed with ENTX 103.

ENSC 104 Environmental Soil Chemistry (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): CHEM 005 or ENSC 100 or consent of instructor. Quantitative study of the chemistry of the solid, liquid, and gas phases in soils and sediments. Topics include solid and solution speciation, mineral solubility, ion exchange and adsorption reactions, oxidation-reduction, and the chemistry of organic contaminants and toxic trace elements in soils.

ENSC 105 Ecohydrology (4) Lecture, 3 hours; discussion, 1 hour; field trip, 4 hours per quarter. Prerequisite(s): ENSC 002 or ENSC 002H. Introduction to the role of water in ecosystems. Explores the movement of water through ecosystems and interactions with biota across a range of climatic and ecological zones. Examines the major human impacts on hydrology and their ecological and environmental implications. Field trips to representative hydrological systems.

ENSC 107 Soil Physics (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MATH 007B or MATH 009B or MATH 09HB; PHYS 002A; ENSC 100; or consent of instructor. Topics include physical properties of soils and methods of evaluation. Emphasizes movement of water, heat, gases, and chemicals through soil.

ENSC 110 Environmental Statistics (4) Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): MATH 007B or MATH 009B or MATH 09HB; STAT 048 or STAT 100A. Introduces the use of computers to solve mathematical problems arising in environmental sciences. Applies various computational methods (which include linear regression, optimization, Monte Carlo simulation, and data assimilation) to real climate/environmental examples using MATLAB.

ENSC 120 Soil Ecology (3) Lecture, 3 hours. Prerequisite(s): BIOL 002; or both BIOL 005A and BIOL 05LA; both CHEM 001C and CHEM 01LC (or both CHEM 01HC and CHEM 1HLC); ENSC 100; or consent of instructor. Examination of soil biota and their relationships with plants and the soil environment. Emphasizes soil biotic interactions that influence soil fertility, plant disease, and plant growth. Examines the importance of the different microbial and faunal groups from the rhizosphere to the ecosystem level. Cross-listed with NEM 120.

ENSC 127 Fate and Transport of Contaminants in the Environment (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ENSC 100; MATH 007B or MATH 009B or MATH 09HB; or consent of instructor. Topics include interactions of environmental conditions with abiotic and biotic transformation and transport of major organic and inorganic contaminants in the environment

ENSC 130 Weather and Climate (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ENSC 001 or ENSC 001H; or consent of instructor. Introduces basic principles of atmospheric dynamics on both short and long-term time scales with a focus on current examples and in-class demonstrations. Basic concepts related to atmospheric dynamics such as wind, the radiation budget, precipitation, and natural disasters will be covered, along with core principles of long-term changes.

ENSC 133 Environmental Microbiology (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): BIOL 005A, BIOL 05LA or BIOL 020, BIOL 005B, BIOL 005C; or consent of instructor. Introduction to nonpathogenic microorganisms in the environment. Topics include an introduction to microbial biology and microbial and metabolic genetic diversity; methods; symbiotic interactions; biofilms; and geomicrobiology and biogeochemistry. Explores life in extreme environments and the effects of the physical and chemical environment on microbes. Cross-listed with MCBL 133.

ENSC 134 Soil Conditions and Plant Growth (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): BIOL 104/BPSC 104 or ENSC 100; or consent of instructor. A study of the chemical, physical, and biological properties of soils and their influence on plant growth and development. Topics include soil-plant water relations; fundamentals of plant mineral nutrition; soil nutrient pools and cycles; soil acidity, alkalinity, salinity, and sodicity; root symbioses; and rhizosphere processes. Cross-listed with BPSC 134.

ENSC 135 Atmospheric Chemistry (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): CHEM 008A and CHEM 08LA or CHEM 08HA and CHEM 08HLA, CHEM 008B and CHEM 08LB or CHEM 08HB and CHEM 08HLB, or consent of instructor; ENSC 102 recommended. Structure of the troposphere and stratosphere; formation of atmospheric ozone; tropospheric NOx chemistry; methane oxidation cycle; phase distributions of chemicals; wet and dry deposition; chemistry of volatile organic compounds; formation of photochemical air pollution; modeling of air pollution and control strategies; stratospheric ozone depletion and global warming. Cross-listed with CHEM 135 and ENTX 135.

ENSC 136 Chemistry of Natural Waters (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): CHEM 005 with a grade of “C-” or better or ENSC 101 with a grade of “C-” or better or consent of instructor. Introduction to processes controlling the chemical composition of natural waters.

Topics include chemical equilibria, acid-base and coordination chemistry, oxidation-reduction reactions, precipitation-dissolution, air-water exchange, and use of equilibrium and kinetic models for describing marine nutrient, trace metal, and sediment chemistry. Cross-listed with CHEM 136.

ENSC 138 Soils of Natural Ecosystems and Landforms (4) Lecture, 3 hours; laboratory, 4 hours per quarter; one half to day field trip and three 1 to day field trips. Prerequisite(s): ENSC 100, GEO 001; or consent of instructor. The study of soils in diverse natural environments. Examines how soils form and their roles in ecosystem function and landscape processes. Includes causes of soil variability, fundamentals of soil classification, and indicators of current and past environmental conditions. Field trips emphasize the description and interpretation of soils. Cross-listed with GEO 138.

ENSC 140 Limnology (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ENSC 101; or consent of instructor. A study of surface waters. Considers in detail the physical and chemical processes in surface waters, aquatic biology, ecosystem dynamics, and aspects of surface water quality and modeling.

ENSC 141 Public Health Microbiology (4) Lecture, 4 hours. Prerequisite(s): BIOL 002 or BIOL 005A; BIOL 05LA or BIOL 020; BIOL 003 or BIOL 005B; upper-division standing; or consent of instructor. Introduction to transmission of human pathogenic microorganisms through environmental media, including drinking water, wastewater, food, and air. Topics include characterization of environmentally transmitted pathogens, microbial risk assessment, sampling and detection methods for microorganisms in environmental samples, food and waterborne disease outbreaks, wastewater reuse, and microbial regulations and standards. Cross-listed with MCBL 141.

ENSC 144 Solid Waste Management (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): BIOL 002 or both BIOL 005A and BIOL 05LA; both CHEM 001C and CHEM 01LC or both CHEM 01HC and CHEM 1HLC; either both ENSC 001 (or ENSC 001H) and ENSC 002 (or ENSC 002H) or ENVE 171; MATH 009B (or MATH 09HB); or consent of instructor. A study of the characterization, collection, transportation, processing, disposal, recycling, and composting of municipal solid waste. Emphasizes accepted management strategies and design procedures for recovering or disposing solid wastes while protecting public and environmental well-being. Cross-listed with ENVE 144.

ENSC 153 Ecological Economics and Environmental Valuation (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ENSC 006/ECON 006 or consent of instructor. Survey of environmental valuation and economy-wide, long time-scale issues. Valuation methods covered include hedonic pricing, weak complements, contingent valuation, and ecosystem services.

Environmental macroeconomic topics include population growth, biophysical constraints to economic growth, intertemporal welfare and sustainability, and sustainable development.

ENSC 163 Hydrology (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ENSC 100; ENSC 101; MATH 007B or MATH 009B or MATH 09HB; STAT 100B; or consent of instructor. Introduction to the scientific study of the hydrologic cycle. Covers the measurement and evaluation of hydrologic phenomena including the use of statistical methods. Explores computer techniques in hydrology with applications to water resource development and water quality problems, particularly those in California.

ENSC 165 Principles of Groundwater Science (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): CHEM 001B; ENSC 101; MATH 007B or MATH 009B or MATH 09HB. Covers the fundamental understanding of groundwater resources and aquifer properties. Explores physical principles of fluid flow in sediments and rocks, surface water-groundwater interactions, and contaminant transport. Discusses current issues in groundwater management and sustainability with an emphasis on California water resources. Students present topics related to groundwater science and management.

ENSC 172 Principles of Environmental Impact Analysis (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ECON 006/ENSC 006; two of the following ENSC courses: ENSC 100, ENSC 101, ENSC 102; or consent of instructor. Explores the principles and theories of analyzing environmental interactions. Provides a critical analysis of methodologies for assessing the physical, biological, and social impacts on the environment by human activities. Synthesizes the subject matter through preparation of an environmental impact report.

ENSC 174 Law, Institutions, and the Environment (4) Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): ECON 006/ENSC 006; one of the following ENSC courses ENSC 100, ENSC 101, ENSC 102; or consent of instructor. Introduction to natural resource ownership, protection, and regulation in the institutional environment of local, state, and federal laws, implementing agencies, and competing interests. Examines decision making in the context of the rights and limits of both private parties and the broad public interest in the use and protection of resources.

ENSC 175 Spatial Analysis and Remote Sensing for Environmental Sciences (4) Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): STAT 100B or consent of instructor. Explores the principles of spatial data analysis in environmental sciences. Provides comprehensive and systematic understanding of spatial analysis methods; Covers theory of remotely sensed data acquisition from satellites and UAVs, and discusses image analysis techniques. Students will utilize Geographic Information Systems (GIS), statistical and image classification software.

ENSC 177 Environmental Sampling and Analysis (4) Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): two of the following courses; ENSC 100, ENSC 101, ENSC 102; or consent of instructor. Introduces sampling, preparation and quantitative analysis of environmental samples. Topics include environmental sampling design; sampling techniques; quality assurance/quality control (QA/QC); data collection and reporting; sample preparations; extraction and cleanup; chemical separations (chromatography); and instrumental detection methods relevant to quantitative environmental analysis.

ENSC 190 Special Studies (1 to 5) variable hours. Prerequisite(s): upper-division standing and consent of instructor. Special studies as a means of meeting special curricular problems. Graded Satisfactory (S) or No Credit (NC); however, students may petition the instructor for a letter grade. Course is repeatable.

ENSC 191 Seminar in Professional Development in Environmental Sciences (2) Seminar, 2 hours. Prerequisite(s): upper-division standing in Environmental Sciences or consent of instructor. Lectures and discussions on scientific writing, critical analysis in reading, public speaking, job interview and resume preparation, and professional conduct. Students make both written and oral presentations on topics in Environmental Sciences.

ENSC 197 Research for Undergraduates (1 to 4) variable hours. Prerequisite(s): upper-division standing and consent of instructor. Individual research on a problem relating to environmental science to be conducted under the guidance of an instructor. Graded Satisfactory (S) or No Credit (NC); however, students may petition the instructor for a letter grade. Course is repeatable.

ENSC 198I Internship in Environmental Sciences (1 to 12) Field, 3 to 36 hours. Prerequisite(s): upper-division standing and consent of instructor. An academic internship involving participation in a functional capacity in the enhancement or maintenance of environmental quality. Conducted under the joint supervision of an off-campus sponsor and a faculty member in Environmental Sciences. One unit of credit for every three hours per week spent in internship. Graded Satisfactory (S) or No Credit (NC), but in exceptional cases student may petition for a letter grade. Course is repeatable to a maximum of 16 units.