ESRM R100L: INTRODUCTION TO ENVIRONMENTAL SCIENCE LABORATORY

Originator
jdanza

College
Oxnard College

Discipline (CB01A)
ESRM - Environmtl Sci & Resource Mgt

Course Number (CB01B)
R100L

Course Title (CB02)
Introduction to Environmental Science Laboratory

Banner/Short Title
Intro to Environmental Sci Lab

Credit Type
Credit

Start Term
Fall 2021

Catalog Course Description
Explores environmental processes associated with society including energy production, waste management, and soil and water quality. The laboratory class is focused on using environmental sampling, monitoring and assessment devices, and equipment and analytical tools to detect and quantify environmental contaminants in air, water and soil, as well as to assess the overall quality of those basic environmental resources. This course emphasizes the scientific method, data collection, and the completion of a research-based oral presentation.

Taxonomy of Programs (TOP) Code (CB03)
0301.00 - Environmental Science

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will be required

Grading method
Letter Graded

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture

Activity

Laboratory
Minimum Contact/In-Class Laboratory Hours
52.5
Maximum Contact/In-Class Laboratory Hours
52.5

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5
Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
52.5
Total Maximum Student Learning Hours
52.5

Minimum Units (CB07)
1
Maximum Units (CB06)
1

Prerequisites
ESRM R100 or concurrent enrollment

Entrance Skills

Entrance Skills
Ability to apply environmental concepts such the photosynthesis and the carbon cycle.

Prerequisite Course Objectives
ESRM R100-Recognize different types of species interactions and biogeochemical cycles and explain how they are interconnected

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Entrance Skills
Describe and analyze global and regional environmental issues and their impact.

Prerequisite Course Objectives
ESRM R100-Identify and describe major global, regional, and local environmental issues and their interdisciplinary nature
ESRM R100-Analyze the scientific basis of major environmental issues and identify and evaluate potential solutions within the context of current environmental laws and policy and an awareness of environmental ethics
ESRM R100-Apply ecological concepts to show relationships between human actions and environmental issues and examine the impacts of environmental issues on human populations and the sustainability of current utilization practices
ESRM R100-Analyze and discuss the scientific, social, economic, historical, and political factors that drive natural resource issues and environmental decision-making

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Entrance Skills
Apply the scientific method in evaluating observed environmental phenomena and affect due to human activity.

Prerequisite Course Objectives
ESRM R100-Use scientific methodologies and explain how the scientific method is used to better understand the natural world and environmental issues
ESRM R100-Apply ecological concepts to show relationships between human actions and environmental issues and examine the impacts of environmental issues on human populations and the sustainability of current utilization practices
ESRM R100-Analyze and discuss the scientific, social, economic, historical, and political factors that drive natural resource issues and environmental decision-making

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Requisite Justification

Requisite Type
Corequisite

Requisite
ESRM R100

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Closely related lecture/laboratory course

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	Describe the steps and the importance of the scientific method.
2	Identify the function of power generators, renewable energy equipment, and other devices.
3	Name the parts and function of natural ecosystems, including the plants and animals that occupy them.
4	Identify the steps of waste management, including solid waste, composting, biological and chemical wastewater treatment and recycling.
5	Describe the carbon cycle, biotic/abiotic components and climate change processes, including anthropogenic causes.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Explain the steps of the scientific method and relate the concepts to natural laws and ideas discussed in lecture.
2	Demonstrate correct data collection techniques, graphing of collected data, and ability to interpret graphs.
3	Demonstrate use of various scientific instruments, perform simple chemical tests, ecosystem population counts, and use other field sampling methods for water, air and soils.
4	Create presentations based on their collected data that explain principles of environmental science.
5	Identify soil types and evaluate their physical, chemical, and biological properties.
6	Prepare a description of the steps in solid waste management utilized in a municipal waste and recycling center.
7	Describe the principals and process of environmental policy such as for NEPA and CEQA, and related surveys
8	Explain sewer and stormwater generation and management and pollution control including use of bio-swales
9	Identify components of ecosystems including producers, consumers, and decomposers.
10	Explain climate change, the carbon cycle, biotic/abiotic changes, and the human role and related impacts such as sea level rise and species distribution.
11	Identify components of renewable electrical power generation and energy conservation measures
12	Explain principles of land use planning, forestry and range management
13	Identify ecosystems and their function for wetlands/uplands and coastal/marine; and the names of common plants and animals for each.

Course Content

Lecture/Course Content

1. Laboratory and Field Safety
   a. Appropriate clothing such as close-toe shoes
   b. Safety practices such as hearing protection
2. Introduction to the Science
   a. Scientific inquiry and hypothesis development
   b. Data collection and techniques
   c. Operate environmental sampling, monitoring and assessment devices and equipment and analytical tools for air, water, soil
   d. Data analysis using graphs of collected data
   e. Data interpretation using graphs

   f. Conclusion and recommendations including presentations based on collected data that explains principles of environmental science
   g. Abstract writing
3. Environmental Policy
   a. Application of principals and process of environmental policy such as for NEPA and CEQA, and related environmental site inspection for current local or regional projects.
   b. Review of land use planning, forestry and range management
4. Water Resources
   a. Hydrologic measurement and watershed management
   b. Water quality and pollution control assessment and measurement including water components such as temperature, pH, total dissolved solids, dissolved oxygen
   c. Explain sewer and stormwater generation and management and pollution control
   d. Calculate using maps, groundwater and pollutant movement
   e. Wastewater treatment processes, including biological and chemical, and primary, secondary and tertiary treatment
   f. Actual/Virtual Field Trip: Municipal wastewater treatment plant
   g. Actual/Virtual Field Trip: Water treatment plant
   h. Actual/Virtual Field Trip: Urban runoff and rivers and coasts
5. Solid Waste
   a. Processing
   b. Compositing
   c. Landfill site restoration
   d. Actual/Virtual Field Trip: Sanitary landfill and recycling facility
6. Ecosystems
   a. Identify components and processes of ecosystems
   b. Function and importance of wetlands
   c. Soil characterization including soil types and evaluate their physical, chemical, and biological properties
   d. Coastal Environmental Impacts
   e. Nutrient loading and eutrophication of aquatic systems
   f. Actual/Virtual Field Trip: Wetlands and their ecosystem functions
7. Energy
   a. Biotic and abiotic components of renewable electrical power generation and energy conservation measures
   b. Components of renewable electrical power generation
   c. Components of greenbuildings
8. Solid Waste
   a. Source reduction
   b. Identify the steps ofprocessing, composting, and recycling
   c. Actual/virtual field trip: sanitary landfill and recycling facility
9. Climate Change Causes and Impacts
   a. Carbon cycle
   b. Causes and projections
   c. Predict future sea level rise
   d. Impacts of western wildfires and ecosystem modification
   e. Environmental risk factors and perceptions

Laboratory or Activity Content

1. Laboratory and Field Safety
   a. Appropriate clothing such as close-toe shoes
   b. Safety practices such as hearing protection
2. Introduction to the Science
   a. Scientific inquiry and hypothesis development
   b. Data collection and techniques
   c. Operate environmental sampling, monitoring and assessment devices and equipment and analytical tools for air, water, soil
   d. Data analysis using graphs of collected data
   e. Data interpretation using graphs
   f. Conclusion and recommendations including presentations based on collected data that explains principles of environmental science
   g. Abstract writing
3. Environmental Policy

   a. Application of principals and process of environmental policy such as for NEPA and CEQA, and related environmental site inspection for current local or regional projects.
   b. Review of land use planning, forestry and range management
4. Water Resources
   a. Hydrologic measurement and watershed management
   b. Water quality and pollution control assessment and measurement including water components such as temperature, pH, total dissolved solids, dissolved oxygen
   c. Explain sewer and stormwater generation and management and pollution control
   d. Calculate using maps, groundwater and pollutant movement
   e. Wastewater treatment processes, including biological and chemical, and primary, secondary and tertiary treatment
   f. Actual/Virtual Field Trip: Municipal wastewater treatment plant
   g. Actual/Virtual Field Trip: Water treatment plant
   h. Actual/Virtual Field Trip: Urban runoff and rivers and coasts
5. Solid Waste
   a. Processing
   b. Compositing
   c. Landfill site restoration
   d. Actual/Virtual Field Trip: Sanitary landfill and recycling facility
6. Ecosystems
   a. Identifycomponents and processes of ecosystems
   b. Function and importance of wetlands
   c. Soil characterization including soil types and evaluate their physical, chemical, and biological properties
   d. Coastal Environmental Impacts
   e. Nutrient loading and eutrophication of aquatic systems
   f. Actual/Virtual Field Trip: Wetlands and their ecosystem functions
7. Energy
   a. Biotic and abiotic components of renewable electrical power generation and energy conservation measures
   b. Components of renewable electrical power generation
   c. Components of greenbuildings
8. Solid Waste
   a. Source reduction
   b. Identify the steps of processing, composting, and recycling
   c. Actual/virtual field trip: sanitary landfill and recycling facility
9. Climate Change Causes and Impacts
   a. Carbon cycle
   b. Causes and projections
   c. Predict future sea level rise
   d. Impacts of western wildfires and ecosystem modification
   e. Environmental risk factors and perceptions

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Essay exams
Essays
Group projects
Individual projects
Journals
Laboratory activities
Laboratory reports
Oral analysis/critiques
Objective exams
Oral presentations
Projects
Problem-Solving Assignments

Quizzes
Reports/papers
Research papers
Skills demonstrations
Skill tests
Simulations

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Computer-aided presentations
Collaborative group work
Class activities
Class discussions
Case studies
Distance Education
Demonstrations
Field trips
Group discussions
Guest speakers
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Internet research
Laboratory activities
Lecture
Practica
Small group activities

Describe specific examples of the methods the instructor will use:

1. Students will complete lab exercises during lab session, such as: the rate of photosynthesis and carbon cycling during an experiment.
2. Instructor will guide students to draw relationships between the observed biological environment and theory in a laboratory setting.
3. Small groups of students, using lab equipment and materials, will learn to interpret natural processes being observed and report on the results, such as the addition of fertilizers to aquatic environments.
4. Field trip reports will be used following the scientific method to examine environmental issues, such as the distribution of plants in an ecosystem.
5. Written and interpretive exercises will draw from laboratory activities involving soils and water resources.

Representative Course Assignments

Writing Assignments

1. Recording and making observations as part of the application of the scientific method. Summarizing results of data and observations.
2. Summarizing and analyzing experimental findings and field observations
3. Answering laboratory questions at the end of each laboratory.
4. Interpreting tabulated data and graphs.
5. Summarizing objectives of all field trips.
6. Summarizing selected scientific readings.

Critical Thinking Assignments

1. Instructor lead group discussion on lab results with critical thinking of how and why the scientific process yielded experimental results.
2. Analyzing acquired data and relating to environmental and biological processes.
3. Participating in in-class discussions of key issues of the course such as efficiency, environmental rights, and ethics.
4. Students will be evaluated for problem solving in lab activities.

Reading Assignments

1. Selective readings from lab manual.
2. Academic journals and respected news websites.
3. Agency publications and websites.

Skills Demonstrations

1. Students will interpret environmental data to define potential issues.
2. Students will demonstrate competence in laboratory equipment operation and measurement of water and air quality.
3. Students will demonstrate how to read results from various instruments, record data, and provide a visual analysis or graphic display of data.
4. Students will use factual information to make a coherent argument to persuade other to protect the environment.

Other assignments (if applicable)

1. Preparing for research-based paper and/or oral presentation.

Outside Assignments

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Manual

Description
Smith, Bradley, & Enger, Eldon (2013-01-01). *Field and Laboratory Activities for Environmental Science*. McGraw-Hill Education, New York.

Resource Type
Manual

Description
Travis, Wagner P., Sanford, Robert (2018-01-01). *Environmental Science: Active Learning Laboratories and Applied Problem Set*. John Wiley & Sons, Inc., New Jersey.

Resource Type
Manual

Description
Danza, James (2020) Environmental Science Oxnard College Edition XanEdu, Oxnard, CA

Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.
Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.
Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Synchronous Dialog (e.g., online chat)	Students post their results on a discussion board regarding their activity in the workbook for comparison and further discussion with other students.
Asynchronous Dialog (e.g., discussion board)	Students will watch a video recorded by the instructor showing the lab experiment and students complete the lab written report.
Other DE (e.g., recorded lectures)	Students post their results on a discussion board regarding their activity in the workbook for comparison and further discussion with other students.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Synchronous Dialog (e.g., online chat)	Students post their results on a discussion board regarding their activity in the workbook for comparison and further discussion with other students.
Asynchronous Dialog (e.g., discussion board)	Students will watch a video recorded by the instructor showing the lab experiment and students complete the lab written report.
Other DE (e.g., recorded lectures)	Students post their results on a discussion board regarding their activity in the workbook for comparison and further discussion with other students.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Synchronous Dialog (e.g., online chat)	Students post their results on a discussion board regarding their activity in the workbook for comparison and further discussion with other students.

Asynchronous Dialog (e.g., discussion board)	Students will watch a video recorded by the instructor showing the lab experiment and students complete the lab written report.
Other DE (e.g., recorded lectures)	Students post their results on a discussion board regarding their activity in the workbook for comparison and further discussion with other students.

Examinations

Hybrid (1%–50% online) Modality
Online
On campus

Hybrid (51%–99% online) Modality
Online
On campus

Primary Minimum Qualification
ECOLOGY

Review and Approval Dates

Department Chair
09/02/2020

Dean
09/02/2020

Technical Review
09/09/2020

Curriculum Committee
09/09/2020

Curriculum Committee
12/09/2020

CCCCO
MM/DD/YYYY

Control Number
CCC000599720

DOE/accreditation approval date
MM/DD/YYYY