ENSC M01L: ENVIRONMENTAL SCIENCE LAB

Originator
bswartz

Co-Contributor(s)

Name(s)
Putnam, Roger (rputnam)

College
Moorpark College

Discipline (CB01A)
ENSC - Environmental Science

Course Number (CB01B)
M01L

Course Title (CB02)
Environmental Science Lab

Banner/Short Title
Environmental Science Lab

Credit Type
Credit

Start Term
Fall 2022

Catalog Course Description
Explores environmental processes associated with life, Earth, and human society, including weather and climate, soil health, decomposition and cellular respiration, photosynthesis, population growth, food webs, biodiversity, the energy that powers life, the water cycle, water quality, and ocean acidification. Emphasizes scientific methodology and sampling methods to explore and test hypotheses in weekly labs.

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
May be required

Faculty notes on field trips; include possible destinations or other pertinent information
With new tools, we can simulate and test processes that students would see at industrial facilities. Field trips may be optional to illustrate and expand upon laboratory concepts. Field trips may be needed to visit sites of study. This includes: Ventura county beaches, Simi Valley Landfill and Recycling Center, Wildwood Park (Thousand Oaks), Department of Public Works (Simi Valley), Hill Canyon Wastewater Treatment Plant (Santa Rosa Valley), among other local natural and industrial centers that extend from laboratory material and profile the human relationship to the natural world.

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
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
ENSC M01 or concurrent enrollment

Entrance Skills

Entrance Skills
ENSC M01

Prerequisite Course Objectives
ENSC M01- describe the formation, properties, conservation, and role of soil in agriculture.
ENSC M01- diagram the cycling of water and chemical elements (e.g., carbon or nitrogen) through the atmosphere, lithosphere, hydrosphere and biosphere.
ENSC M01-define the concept of sustainability and evaluate how sustainable various processes are based on that definition.
ENSC M01-reproduce the equations for photosynthesis and cellular respiration; explain how the laws of thermodynamics apply to the role of energy production.
ENSC M01-describe and diagram the processes of water consumption, sanitation, and pollution.
ENSC M01-analyze the impacts of the 20th century "green revolution" on biodiversity, air and water quality, and the health of human and non-human animals.

Requisite Justification

Requisite Type
Prerequisite

Requisite
ENSC M01

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Closely related lecture/laboratory course

Requisite Type
Concurrent

Requisite
ENSC M01

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	explore and test hypotheses while interpreting, measuring, and describing how energy flows through ecosystems, how energy powers life, how biodiversity is measured and managed, how the ocean and atmosphere interact, how industrial agriculture affects soil health and contaminates waterways, and how competition and ecology affect the planet on a global scale.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	explain the process of the scientific method and relate the concepts to natural laws and ideas.
2	demonstrate effective data collection techniques, graphing of gathered data, and the ability to interpret graphs. This includes the operation of various scientific instruments, chemical tests, and other sampling methods.
3	interpret segments of a natural ecosystem and identify components of the fauna and flora; demonstrate an understanding of the history and purpose of mitigation projects such as those that apply to local ecosystems.
4	identify soil types and evaluate their physical, chemical, and biological properties.
5	identify and describe processes that underpin eutrophication in coastal waters due to human impacts.
6	gather data from natural or simulated ecosystems, and integrate those data in order to demonstrate how the environmental sciences connect to overlapping disciplines.

Course Content

Lecture/Course Content
NA

Laboratory or Activity Content
- 6.66% Matter has relationships, too (physical chemistry)
- 6.66% Big molecules make up food (the chemistry of life)
- 6.66% Acids n’ bases on an exoplanet (acid/base concepts)
- 6.66% Your diet and your DNA (the chemistry and value of food)
- 6.66% How food powers your life (energy and cellular respiration)
- 6.66% Feeding levels and the metabolism of life (energy and ecosystems)
- 6.66% Life interacts within “feeding webs” (food webs)
- 6.66% Branches on a tree of life (biodiversity)
- 6.66% What is a biome (biodiversity in its environmental context)
- 6.66% Where does life survive and why (niches)
- 6.66% What affects population growth? (population/conservation biology)

- 6.66% Resource competition (farming)
- 6.66% Deoxygenation of waterways (water pollution)
- 6.67% Eutrophication and nutrient overload (agricultural wastes I)
- 6.66% Fertilizer n' food (agricultural wastes II)

Methods of Evaluation

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

Written expression
Problem solving exercises
Skills demonstrations

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):

Individual projects
Laboratory activities
Laboratory reports
Objective exams
Problem-solving exams
Quizzes
Simulations
Skills demonstrations
Skills tests or practical examinations
Written analyses
Written homework
Other (specify)
Classroom Discussion
Projects
Participation
Reports/Papers/Journals

Other

Read relevant environmental news articles, summarize and link to the course material through written or oral communication skills.

Instructional Methodology

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

Audio-visual presentations
Case studies
Class discussions
Computer-aided presentations
Demonstrations
Distance Education
Group discussions
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Internet research
Laboratory activities
Lecture
Observation
Problem-solving examples

Describe specific examples of the methods the instructor will use:

Visual, auditory, verbal, kinesthetic, logical, interpersonal, and intrapersonal methods are used. This may include:

1. Strong visuals that drive lab demos and discussions.
2. Linguistic and auditory approaches paired with rhetorical and logical constructs to drive discussions and reasoning.
3. Tactile pedagogical techniques that make students write and draw concepts discussed.
4. Original 'eco-pics' that students take and share to illustrate class concepts.
5. Observational and experimental labs that allow students to deconstruct science as a process, and iterate their own ideas as they explore their and test hypotheses.
6. Physical demonstrations that illustrate environmental concepts.
7. Lab group work where students showcase creative problem solving as teams.

8. Integration—take-home messages that students read intrapersonally, discuss interpersonally, and synergize for a synthetic comprehension of concepts and methods.

Representative Course Assignments

Writing Assignments

- Summarize and analyze experimental findings or environmental field observations.
- Respond to selected scientific readings in the environmental sciences.
- Interpret tabulated data and graphs about climate change.
- Answer analytical questions following each lab on an environmental topic.

Critical Thinking Assignments

- Participate in class discussions on environmental issues such as efficiency vs. decarbonization, environmental ethics, and the naturalistic fallacy.
- Analyze data acquired from each lab on an environmental topic.

Reading Assignments

- Read about the chemical basis of cellular energy and the role of food in public health.
- Study food webs and the bioamplification of persistent environmental contaminants.
- Study biodiversity impacts and the effects of the sixth mass extinction.
- Read about population biology, demography, population density, and infectious diseases.
- Research the industrialization of food and agriculture, soil health, and eutrophication.

Skills Demonstrations

- Monitor metrics of soil health on agriculture and water pollution, and evaluate the physical, chemical, and biological properties of soil.
- Interpret and measure biodiversity in natural ecosystems, and identify members of the fauna and flora.
- Examine and interpret charts and data to determine the impacts of humans on ecosystems.

Outside Assignments

Representative Outside Assignments

- Through pictures or video, find and document, real-world examples that illustrate lab concepts in the environmental sciences.
- Through personal discovery, complement media by a written syntheses that demonstrates the conceptual application of environmental knowledge.

Articulation

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
UC Santa Cruz	EART 20L	Environmental Geology Lab	1
CSU, Northridge	GEOG 101AL	The Physical Environmental Lab	1

Comparable Courses within the VCCCD

ESRM R100L - Introduction to Environmental Science Laboratory

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
De Anza College	ESCI 1L	Environmental Science Lab	1
Monterey Peninsula College	BIOL 32	Environmental Science Lab	1

District General Education

A. Natural Sciences

A2. Physical Science
Approved

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
Fall 1999

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B3 Laboratory Activity
Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

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

UC TCA

UC TCA
Approved

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 5C: Laboratory Science
Approved

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
Macfall, Janet, Catherine Deininger, and Patricia Thomas-Laemont. *Environmental Science Lab Manual.* 2nd ed., Kendall Hunt Publishing, 2017.

Resource Type
Textbook

Description
Wagner, Travis P., and Robert Sanford. *Environmental Science: Active Learning Laboratories and Applied Problem Sets.* 3rd ed., Wiley, 2018.

Library Resources

Assignments requiring library resources
A research-based paper and/or presentation using the Library's print and online resources.

Sufficient Library Resources exist
Yes

Example of Assignments Requiring Library Resources
Research using appropriate library databases such as Elsevier ScienceDirect on such topics as: The chemical basis of cellular energy and the role of food in public health; food webs and the bioamplification of persistent environmental contaminants; biodiversity impacts, and the effects of the sixth mass extinction; population biology, demography, population density, and infectious diseases; or the industrialization of food and agriculture, soil health, and eutrophication.

Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (1%–50% online)
Hybrid (51%–99% 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
Asynchronous Dialog (e.g., discussion board)	Regular asynchronous discussions that facilitate students to compare/contrast, discuss, identify, analyze, and synthesize course content across modules.
E-mail	The class calendar, email, class announcements, and tools such as “Message Students Who” and “Assignment Comments” in Canvas will be used to communicate with all students to clarify class content, remind of upcoming assignments, and provide immediate feedback to students on coursework to facilitate student learning outcomes. Students will be given multiple ways to email instructor through Canvas inbox and faculty provided email account through their own canvas email and school email.
Other DE (e.g., recorded lectures)	Faculty will use a variety of tools and media integrated within the LMS to help students reach SLO such as: • Recorded Lectures, Narrated Slides, Screencasts • Instructor created content • 3rd Party Lab Tools (e.g., Labster) • MC Online Library Resources • Canvas Peer Review Tool • Canvas Student Groups (Assignments, Discussions) • Websites and Blogs • Multimedia (e.g., YouTube, Films on Demand, 3CMedia, Google Earth, earth.nullschool.net, etc.)
Synchronous Dialog (e.g., online chat)	Scheduled synchronous sessions may be organized at the instructor’s discretion to demonstrate skills, address problems, and review asynchronous material. Synchronous sessions may also be used for students to unpack concepts and work on problem together. The platform for such sessions may include ConferZoom or any other approved medium for synchronous dialog.

Hybrid (51%—99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
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100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Regular asynchronous discussions that facilitate students to compare/contrast, discuss, identify, analyze, and synthesize course content across modules.
E-mail	The class calendar, email, class announcements, and tools such as "Message Students Who" and "Assignment Comments" in Canvas will be used to communicate with all students to clarify class content, remind of upcoming assignments, and provide immediate feedback to students on coursework to facilitate student learning outcomes. Students will be given multiple ways to email instructor through Canvas inbox and faculty provided email account through their own canvas email and school email.
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Examinations

Hybrid (1%–50% online) Modality

On campus
Online

Hybrid (51%–99% online) Modality

On campus
Online

Primary Minimum Qualification

EARTH SCIENCE

Review and Approval Dates

Department Chair

02/08/2022

Dean

02/08/2022

Technical Review
03/03/2022

Curriculum Committee
03/15/2022

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000434192

DOE/accreditation approval date
MM/DD/YYYY