

OHLONE COLLEGE
Ohlone Community College District
OFFICIAL COURSE OUTLINE

I. Description of Course:

1. **Department/Course:** BIOL - 142

2. **Title:** Environmental Biology

3. **Cross Reference:**

4. **Units:** 4

Lec Hrs: 3

Lab Hrs: 3

5. **Repeatability:** No

6. **Grade Options:** Letter Grade, May
Petition Credit/No Credit (GC)

7. **Degree/Applicability:**

Credit, Degree Applicable, Transferable -
CSU (T)

8. **General Education:**

9. **Field Trips:** Required

10. **Requisites:**

Advisory

Eligible for ENGL-151B and ENGL-163

None

12. Catalog Description:

This lecture and lab course is an introduction to the biological sciences focusing on organismal interactions with their environment and with other organisms (ecology), the effects humans have had on biological diversity and ecosystems, and efforts to protect species and their habitats (conservation). Enrollment is open to all students. No previous biology experience required.

13. Class Schedule Description:

Biology of organismal interactions and distribution, human environmental impact, and conservation of natural resources.

14. Counselor Information:

This course provides a biology lecture and lab course alternative to BIOL 130. It is recommended for students interested in understanding the macroscopic features of the living world as well as our impact on biodiversity and the environment.

II. Student Learning Outcomes

The student will:

1. Describe the scientific method and recognize how science contributes to knowledge of the natural world.
2. Examine the basic physical principles of matter and energy, and describe how they relate to living organisms and ecosystems.
3. Identify important ecosystem components and describe their function
4. Recognize the different terrestrial and aquatic biomes existing on the planet
5. Explore the origins of life and describe how life has evolved through a process of natural selection
6. Explain patterns of global biodiversity
7. Assess major causes and consequences of species extinction
8. Recognize different types of species interactions and explain how organisms interact with each other and their environment
9. Recognize patterns of population growth and factors that affect populations

10. Assess and apply ecological concepts to modern life and understand society's impact on the world's natural resources
11. Interpret the causes and consequences of many of the world's environmental problems
12. Compare and contrast possible solutions to current environmental problems

III. **Course Outline:**

- A. Science a. Scientific method b. Value of science c. Theories
- B. Ecosystems a. Physics of matter and energy b. Ecosystem components c. Energy flow d. Primary productivity and matter cycling
- C. Evolution & biodiversity a. Origins of life b. Evolutionary theory and natural selection c. Ecological niches and adaptation d. Speciation, extinction & biodiversity
- D. Climate and biomes a. Weather and climate b. Terrestrial biomes c. Aquatic biomes
- E. Community Ecology a. Community structure and species diversity b. Species interactions c. Ecological succession d. Ecological stability
- F. Population Ecology a. Population dynamics and carrying capacity b. Reproductive patterns and survival c. Effect of genetic variation on populations
- G. Human populations a. Factors affecting human population dynamics b. Population age structure c. Cutting global population growth
- H. Sustaining biodiversity a. Extinction b. Importance of diversity c. Causes of extinction
- I. Natural resources a. Food resources b. Water resources c. Energy resources
- J. Sustaining environmental quality a. Toxicology, human health b. Air pollution c. Climate change and ozone d. Water pollution e. Pest management f. Solid waste
- K. Sustaining societies and the environment a. Economics and the environment b. Politics c. Ethics

LABORATORY ACTIVITIES:

1. Science:
 - a. Value of scientific method
 - b. Measurement
 - c. Sampling techniques, replication, controls
 - d. Basic statistics
 - e. Skills: Field techniques (quadrats, random sampling, teamwork, communication)
2. Matter and energy in an ecosystem
 - a. Build a biosphere (aquarium, raise a plant, etc.)
 - b. What are the components?
 - c. Input? Output?
 - d. How can it be self sustaining?
 - e. Skills: Critical thought, understanding connections, design
3. Diversity of life I:
 - a. Monera, Protista,
 - b. Reproduction and ecological role
 - c. Find kingdoms on campus

- d. Skills: Identification, characteristics of different groups, microscopy
- 4. Diversity of life II:
 - a. Fungae
 - b. Plantae
 - c. Skills: Identification, characteristics of different groups, microscopy
- 5. Diversity of life III:
 - a. Animalia
 - b. Skills: Identification, characteristics of different groups, microscopy, dissection, functional morphology, evolution/ancestry (squid & snail comparisons)
- 6. Biodiversity
 - a. Compare biodiversity in habitats on campus (natural vs. disturbed/ controlled)
 - b. Field collection and measurement of species # and abundance
 - c. Diversity indices comparing species #
 - d. Discussion: why is biodiversity important? Why does it change?
 - e. Skills: Use of diversity indices, practical use of statistics in science, scientific method, critical thought, ecological principles of diversity patterns
- 7. California plant communities:
 - a. Field trip to park/ arboretum with different plant communities
 - b. Record observations in field notebooks and hypothesize why differences exist
 - c. Examine patterns in community dispersion
 - d. Library research to determine physical/environmental requirements for each community
 - e. Skills: Scientific method, keeping a scientific notebook, library research, plant taxonomy and identification
- 8. Estuarine communities
 - a. Field trip to local marsh/ mud flat and adjacent salt pond/ developed area
 - b. Characterization of plants and animals at different habitats
 - c. Measurement of environmental conditions
 - d. Identification of organisms in lab
 - e. Comparisons of diversity
 - f. Skills: Fieldwork, practical application of diversity indices in environmental monitoring, science notebook, environmental conditions (temp, salinity, tides, weather), plant identification & taxonomy
- 9. Population ecology lab:
 - a. Students design experiments that use bacterial colonies in predicting population growth
 - b. Students design experiments to use bacterial colonies for competition, predation, etc.
 - c. Skills: Scientific method, microbiology lab techniques, statistics, experimental design, practical application of ecological rules in a microcosm of environment
- 11. Ecological Interactions:
 - a. Find an ecological interaction (predation, symbiosis, parasitism, decomposition, herbivory) and describe
 - b. Identify the organisms, type of interaction, and roles
 - c. What is happening? Transfer of energy & matter, shelter, etc.
 - d. Skills: Observational skills, application of ecological principles, hypothesis generation
- 12. Renewable energy:
 - a. Field trip to renewable energy plant
 - b. Solar energy/ wind energy businesses
 - c. Skills: Practical application of technology for environmental health, link between business and environment

13. Sustainability:

- a. Hypothesize and innovate ways to live more environmentally friendly
- b. Field trip to green building and sustainable business
- c. Skills: Learning to do things sustainably. Raising awareness of alternatives. Inspiration of the next generation of responsible citizens.

14. Conservation biology:

- a. Field trip to restored/ restoring marsh or wetland
- b. Skills: Compare and contrast disturbed/ undisturbed habitats, observe methods of reverting back to healthy ecosystem, learn techniques necessary to repair damage, using ecological principles to fix problems

15. Behavioral ecology:

- a. Determine environmental factors affecting the behavior of brine shrimp
- b. Observe a brine shrimp under the microscope and describe its anatomy.
- c. Design experiments and test ways to determine if brine shrimp are phototactic or geotactic.
- d. Skills: Observation, functional morphology, experimental design,

IV. Course Assignments:

A. Reading Assignments

1. Weekly reading of textbook chapters, newspaper articles, and Field Guide to California
2. Research issues from the internet and other sources for group projects

B. Projects, Activities, and other Assignments

1. Group project: Sustainability at Ohlone- Students will choose a way to increase sustainability on campus, research the topic, assess costs & benefits, produce a plan of implementation, and then present their suggestions for improvement (possibly to sustainability committee).
2. Personal Sustainability Goals: Students will calculate their ecological footprint at the start of the semester, compile personal sustainability goals, implement those goals, and re-measure their footprint at the end of the semester.
3. Field trips: students will participate in field trips where they will learn about an environmental issues or sustainable solutions.

C. Writing Assignments

1. Group project report - Critically analyze and synthesize information about a campus environmental issue and its solutions
2. Laboratory notes - Document observations, questions and compile data from field/lab work
3. Report on personal sustainability goals & outcomes - Documentation, analysis, and assessment of personal environmental impact with solutions on how to live more sustainably
4. Summaries of newspaper articles - Increase awareness of contemporary environmental issues and critically analyze public information

V. Methods of Evaluation/Assessment:

- A. Exams: Multi-choice, True/False, Short answer, medium answer
- B. Critical Thinking paper:
- C. Lab skills demonstration/ practical
- D. Group research project report
- E. Individual project report: Living more sustainably

- F. Field notebooks
- G. Group oral presentations
- H. In class discussion

VI. Methods of Instruction:

- A. Laboratory
- B. Discussion
- C. Demonstration
- D. Audiovisual
- E. Other
 - 1. Field trips
- F. Lecture

VII. Textbooks:

Required

1. Alden P *National Audubon Society Regional Guide to California* 1 Edition, Knopf, 1998
ISBN: 0679446788
2. For use in lab/ field
3. Miller, GT *Living in the Environment* 14 Edition, Brooks Cole, 2004 ISBN: 0534997295

Optional

VIII. Supplies:

- A. Lab Notebook
- Textbooks

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