Las Positas College
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Course Outline for BIO 70

FIELD BIOLOGY

Effective: Fall 2019

I. CATALOG DESCRIPTION:
BIO 70 — FIELD BIOLOGY — 3.00 units

A hands-on course in field biology. Students will learn basic concepts about ecology and environmental science through outdoor activities and exploration of a variety of ecosystems. The goals are to gain experience and develop skills in the following areas: identification of plants and animals, first-hand knowledge of a wide array of organism life histories, quantitative field research techniques and procedures applicable to plants and animals, and methods of recording data and observations. Field trips to local and regional habitats focus on seasonally relevant events, processes, and appropriate methodologies to study these communities.

2.00 Units Lecture 1.00 Units Lab

Grading Methods:
Letter Grade

Discipline:
- Biological Sciences

	MIN
Lecture Hours:	36.00
Expected Outside of Class Hours:	72.00
Lab Hours:	54.00
Total Hours:	162.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Describe the scientific process, scientific method, and scope of field biology
B. Apply principles of field biology to ecological problems
C. Distinguish among members of Bacteria, Protists, Fungi, Plants, and Animals
D. Compare abiotic and biotic ecological factors
E. Identify and label biogeochemical cycles
F. Describe succession, speciation, territoriality, and symbiosis
G. Compare Northern California ecosystems
H. Identify indicator species of plants and animals found within Northern California ecosystems: (a) herbs, shrubs, trees; (b) invertebrates, e.g. mollusks, arthropods, (c) vertebrates, e.g. birds, amphibians, mammals
I. Complete biological field work, using appropriate techniques

V. CONTENT:
A. Defining a naturalist, Examples of scientific field studies vs. natural history
    1. Field methods and case studies
B. Geology, Soils and Climate
    1. Geological past, rock cycle, soil formation and function, and climate
    2. Comparison of bacteria, protists, and fungi
    3. Role of microbes, lichens, and fungi in soil formation and function
C. Biogeochemical cycles, water and nutrients
    1. Role of microbes, fungi, and protists in biogeochemistry
    2. Water cycle
D. Stewardship and citizen science
    1. Energy and global challenges
    2. Conservation
    3. Interpretation, Communication
    4. Citizen science projects
E. Plants
    1. California Floristic Province and biomes

2. Forests and woodland resources
3. Survey and identification of common mosses, ferns, conifers, shrubs, and trees

F. Animals
1. Identification of common amphibians, reptiles, birds, and mammals in California
2. Identification of common invertebrates found in rocky, sandy and muddy shores
3. Identification of common fishes
4. Animal behavior

G. Evolution and Ecology
1. Evolutionary processes: natural selection, speciation, plasticity
2. Populations and communities: trophic webs, succession, population dynamics, diversity
3. Interactions: mutualism, competition, territoriality, predation, etc.

VI. LAB CONTENT:

A. Scientific methods in field studies
1. Questions and hypotheses
2. Sampling design and techniques
3. Data analysis
4. Assembling and writing a field notebook

B. Geology, Soils and Climate
1. Identification of rocks and geologic features
2. Analysis of soil types and structure
3. Documenting slope aspect effect on plant communities

C. Biogeochemical cycles, water and nutrients
1. Water testing
2. Water quality, nutrients, aquatic ecology

D. Stewardship and citizen science
1. Local environmental and conservation challenges
2. Local conservation groups and missions: getting involved
3. Survey of citizen science opportunities

E. Plants
1. Using a key to identify common plants
2. Survey of major plant groups
3. Analysis of forest structure and plant community diversity

F. Animals
1. Survey of animal diversity
2. Using keys and field guides to identify common animals
3. Conduct an animal behavior study
4. Quantifying animal diversity

G. Evolution and Ecology
1. Conduct analysis and comparison of community diversity
2. Document a trophic web based upon field study
3. Analyze adaptations of organisms to different environments

VII. METHODS OF INSTRUCTION:

A. **Discussion** -
B. **Lecture** -
C. **Lab** -
D. **Field Trips** -

VIII. TYPICAL ASSIGNMENTS:

A. Field Reports
B. Population study of small mammals
C. Conduct a comparison of at least 5 local communities surveying the plant and animal diversity and basic physical characteristics to determine what conditions might influence species diversity.
1. This project incorporates species identification, diversity quanitification and physical environmental sampling.
2. The project culminates in a formal scientific paper, poster presentation, or oral presentation.

D. Post 20 species to iNaturalist (or equivalent citizen science project) that are accurate both taxonomically and geographically, add notes and respond to comments to learn how to participate in a citizen science project in a responsible and productive way.

IX. EVALUATION:

Methods/Frequency

A. Exams/Tests
3 per semester and a final exam

B. Quizzes
weekly

C. Research Projects
2 per semester

D. Oral Presentation
1 per semester

E. Field Trips
2 per semester

F. Lab Activities
2 per semester

G. Other
1. Field notebook
a. 2 per semester

X. TYPICAL TEXTS:

1. de Nevers, Greg, Deborah Edelman, and Adina Merenlender. *The California Naturalist Handbook.* 1st ed., University of California Press, 2013.
2. Schoenherr, Allan. *A Natural History of California.* 2nd ed., University of California Press, 2017.
3. Kaufmann, William. *The California Field Atlas.* 1st ed., Heyday, 2017.
4. Crowley, P., Kaysalya, S. . Ecology Lab and Field. Kendall Hunt , 2017.
5. Vodopich, D. . Ecology Lab Manual. Mc Graw Hill Education , 2009.

XI. OTHER MATERIALS REQUIRED OF STUDENTS: