

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

BIOLOGY 133 – ETHNOECOLOGY

3 hours lecture, 3 units

Catalog Description

Ethnoecology is the study of the dynamic relationship between people, biota and their environment. Through the scientific study of the principles of ecology, students use their knowledge and scientific reasoning to assess the impacts of humans on Earth's natural systems. This course will focus on the ecological and cultural basis of indigenous land management; particular attention will be paid to the environmental stewardship of the Kumeyaay/Diegueño people of Southern California and Northern Baja California. Local field trips and restoration projects in Cuyamaca College's nature preserve will provide opportunities for working directly with natural habitats.

Prerequisite

None

Course Content

- 1) Introduction to the Kumeyaay/Diegueño People of Southern California and Northern Baja California
 - a. Sustainability
 - b. Environmental history
 - c. Introduction to the tools of scientific inquiry and its applications to ecology and land management strategies
- 2) Basic principles of ecology and resource management
 - a. What is ecology? What is environmental science? What is indigenous science?
 - b. Ecosystem function
 1. Abiotic and biotic components of ecosystems
 2. Energy flow in the ecosystem: food webs
 3. Biodiversity and stability of the ecosystem
 4. Succession in ecosystems
 5. Ecological services
 - c. Biogeochemical cycles:
 1. Carbon, nitrogen, phosphorous, sulfur and hydrologic cycles
 2. Human impact on these cycles
 - d. Evolution and biodiversity
 1. Natural selection
 2. Ecological niches
 3. Intermediate disturbance
- 3) Sustaining and restoring habitats
 - a. Drivers of ecological change
 - b. Developing a conceptual ecological model of a disturbed habitat
- 4) Community Ecology
 - a. Community structure
 - b. Symbiotic interactions among species
- 5) Population Ecology
 - a. Population dynamics
 1. Exponential versus linear growth
 2. Carrying capacity
 3. Endangered species management

- 6) Hydrology
 - a. Water movement through landscapes
 - b. Human alterations to surface runoff
 - c. Restoration approaches to reduce runoff and soil erosion
 - d. Wetland restoration
 - e. Eutrophication
 - f. Issues related to groundwater, streams, lakes and oceans
- 7) Climate Change
 - a. Natural greenhouse effect
 - b. Factors affecting changes in the Earth's average temperature
 - c. Effects of a changing climate (ocean acidification/warmer temperatures/changes in weather patterns)
- 8) Survey of the plant communities and associated habitats within the Kumeyaay ethnobotanical region of Southern California and Northern Baja California
- 9) Comparison of indigenous and modern land management techniques
- 10) Assessment of fire, non-native plants and cultural interactions on native Southern California ecosystems

Course Objectives

Students will be able to:

- 1) Use the tools of scientific inquiry to analyze and resolve ecological issues.
- 2) Demonstrate an understanding of the ecological and evolutionary effects of indigenous land management.
- 3) Diagram the pathways of energy, organic and inorganic chemicals in the environment, and discuss ways in which humans have impacted those pathways and the consequences of those actions.
- 4) Compare and contrast indigenous land management techniques with those used by modern land managers, and discuss how changing land management priorities have affected California's ecosystems.
- 5) Evaluate the relationships between humans and their environment and assess the impact of humans on Earth's natural systems.
- 6) List the major components of an ecosystem, define ecosystem services and describe how they affect the sustainability of the Earth's life support services.
- 7) Diagram a sample food web and describe its relationship to energy flow in an ecosystem.
- 8) Develop a conceptual ecological model of a degraded ecological system and predict the effects of changes in interspecific interactions, disturbance, and loss of habitat area.
- 9) Apply ethnoecological solutions to modern social and environmental issues such as ecological degradation, climate change, loss of biological and cultural diversity, water scarcity, and economic inequalities.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay, exams, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes and exams that measure the student's ability to demonstrate an understanding of Kumeyaay land management techniques and their basis in ecological principles.
- 2) Written student analysis of ecosystem and land use changes within the Kumeyaay ethnobotanical region.

Special Materials Required of Student

Botanical keys/field guides

Minimum Instructional Facilities

- 1) Smart classroom with writing board, overhead projector

2) Individual computers with Microsoft Excel

Method of Instruction

- 1) Integrated classroom lecture, discussion and demonstration
- 2) Small and large group discussion
- 3) In-class activities and independent homework/research projects
- 4) Field trips designed to link course materials to real world phenomena
- 5) Instructional slides and audio/video presentations
- 6) Auxiliary use of study groups, peer tutoring and/or instructional office hours

Out-of-Class Assignments

- 1) Ecology project in which students use traditional and scientific methods to assess the biodiversity and health of native southern California ecosystems.
- 2) Ecology research paper in which students are required to analyze, interpret and draw conclusions from scientific and traditional ethnoecological resources.

Texts and References

- 1) Required (representative examples):
 - a. Anderson, Kat M. *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources*. University of California Press, 2006. (current edition)
 - b. Galatowitsch, Susan. *Ecological Restoration*. Sinauer Associates, 2012.
- 2) Supplemental: As assigned by instructor

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Knowledge of the environmental history of the Kumeyaay/Diegueño People of Southern California and Northern Baja California
- 2) Understand and utilize the tools of scientific inquiry
- 3) Demonstrate an understanding of biodiversity and stability of an ecosystem
- 4) Compare and contrast the differences between modern and traditional land management techniques

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Use the tools of scientific inquiry to analyze and resolve ecological issues.
- 2) Demonstrate an understanding of the ecological and evolutionary effects of indigenous land management.
- 3) Diagram the pathways of energy, organic and inorganic chemicals in the environment, and discuss ways in which humans have impacted those pathways and the consequences of those actions.
- 4) Compare and contrast indigenous land management techniques with those used by modern land managers, and discuss how changing land management priorities have affected California's ecosystems.
- 5) Evaluate the relationships between humans and their environment and assess the impact of humans on Earth's natural systems.
- 6) List the major components of an ecosystem, define ecosystem services and describe how they affect the sustainability of the Earth's life support services.
- 7) Diagram a sample food web and describe its relationship to energy flow in an ecosystem.
- 8) Develop a conceptual ecological model of a degraded ecological system and predict the effects of changes in interspecific interactions, disturbance, and loss of habitat area.
- 9) Apply ethnoecological solutions to modern social and environmental issues such as ecological degradation, climate change, loss of biological and cultural diversity, water scarcity, and economic inequalities.