GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 05/18/2021

GCCCD Governing Board Approval: 06/15/2021

BIOLOGY 110 - ENVIRONMENTAL BIOLOGY

1. Course Number Course Title Semester Units

 BIO 110 Environmental Biology 4

Semester Hours

 3 hours lecture: 48-54 hours 96-108 outside-of-class hours 3 hours lab: 48-54 hours

 192-216 total hours

2. Course Prerequisites

 None

 Corequisite

 None

 Recommended Preparation

 A "Pass" grade in Math 090 and a “C” grade or higher or Pass in English 120 or equivalent.

3. Catalog Description

 A basic college-level ecology course designed to acquaint the student with living systems, their environment and evolution. Local plants and animals and their habitats will be used to investigate fundamental ecological principles. Almost half of the laboratory periods will be devoted to field studies. Due to the time involved, some of these field studies will take place on Saturdays or Sundays.

4. Course Objectives

 The student will:

 a. List and describe the steps comprising the scientific method and apply the scientific method to understanding experimental design and the analysis of experimental data.

 b. Evaluate the use of scientific methods and processes to select the most plausible of several alternative explanations for a set of observations. Ability to distinguish between scientific and non-scientific methods of evaluating questions.

 c. Define the basic mechanisms of reproduction and genetic inheritance, the process of organic evolution, list and describe the major steps involved in natural selection, and provide at least one example of how natural selection accounts for the observed diversity of life on earth.

 d. List the general criteria which define the major domains and kingdoms of life on earth.

 e. Differentiate the structural differences between typical prokaryotic and eukaryotic cells and between typical plant and animal cells.

 f. Describe the concept of homeostasis and the self-regulation necessary to maintain optimal conditions for survival in changing environmental conditions.

 g. Apply a systems-oriented approach to explaining the interrelationships within living systems, as well as between living systems and their physical, chemical, and energy environments. Describe how humans are altering these natural systems.

 h. Explain the basic concepts of organic chemistry and the relationship of these molecules to our food and as the building blocks for life.

 i. Explain the basis of evolution-based classification of life on earth (systematics).

 j. Read and analyze college-level materials that elaborate and expand on the understanding of biological topics.

 g. Exhibit basic Climate Change literacy. Explain and understand the Carbon Cycle and the anthropogenic mechanisms in which the Carbon Cycle is being modified.

5. Instructional Facilities

 a. Standard Classroom

 b. Biological teaching lab equipped with all necessary equipment and utilities. This includes:

 1) Compound and dissecting microscopes

 2) Charts and models

 3) Preserved and living specimens for dissection and observation

 4) Prepared microscopic slides

 5) Salt and fresh water aquaria

 6) Computers

6. Special Materials Required of Student

1. Clipboard
2. Hand-lens

7. Course Content

LECTURE

1. Basic inorganic and organic chemistry.
2. Historical perspectives of humans in the ecosystem.
3. Water. Basic properties.
4. Anthropogenic modification of primary production and the food web.

 Climate Change Literacy and the Anthropogenic modifications of the atmosphere.

 e. Biochemical cycles.

 (1) Nitrogen.

 (2) Carbon.

 (3) Phosphorus.

 f. Shrubland, Montane and Marine ecology.

 g. Mendelian Genetics and reproduction.

 i. Natural Selection and Organic Evolution

LAB

1. Water.

 (1) Basic properties.

 (2) Freshwater ecosystems.

 (a) Lake types and their productivity.

 (b) Thermal stratification and overturn.

 b. Energy and homeostasis in plants

 (1) Transpiration and evaporation

 (2) Photosynthesis

 c. Energy and homeostasis in animals

 (1) Metabolic rates

d. Survey of local ecosystems

 (1) Coastal sage scrub

 (2) Montane

 (3) Tidal

 (4) Desert

 (5) Freshwater

 (6) Oak woodland

 e. Computer modeling of natural selection and evolution

LECTURE AND LAB

 a. Introduction to the Scientific method. Distinguish between ‘Science’ and ‘non-Science’ as the ‘ways of knowing things.’

 b. Energy.

 1). Laws of thermodynamics.

 2) Energy flow in organisms.

 3) Energy flow in ecosystems.

 a) Trophic levels, food chains, and food webs.

 b) Biological accumulation of substances.

 c. Climate and Climate Change and its effect on the distribution of primary production. How climate and weather vary historically, globally and locally as well as anthropogenic alterations and effects today and in the future.

 d. Evolution.

 1) Natural selection as a mechanism.

 2) Adaptation.

 a) Convergent evolution.

 b) Coevolution.

 c) Symbiosis and mimicry.

 3) Diversity of life.

 a) Speciation.

 b) Adaptations in plants and animals.

 c) Taxonomy.

 4) Extinction and endangered species.

8. Method of Instruction

 a. Lecture and discussion.

 b. Films and slides.

 c. Use of library resources.

 d. Laboratory studies.

 e. Field studies.

 f. Special guest lectures.

 g. Group work in lecture.

h. Volunteering in habitat clean-ups.

9. Methods of Evaluating Student Performance

 a. Written exams, including final, using proper English grammar.

 b. Assignments based on collection of data in field and lab settings, requiring data analysis, tables and graphs, and mathematical calculations.

 c. Research Term Report: Utilizing resources from libraries, the Internet, and/or local museums, students will choose from a list of topics of current interest including exposure to climate Change, endocrine disruptors, GMO’s, and the effects of loss of the ozone layer on human health and the environment. Students may select alternate topics with the approval of the instructor.

80. Outside Class Assignments

 a. Field work including collection and analysis of data.

 b. Internet research project to use literature-searching resources to find at least two peer-reviewed publications that support or refute a controversial scientific topic, such as the association between vaccination and autism, and analyze and write a one-page summary of their findings for a class discussion.

 c. Textbook reading assignments.

 d. Writing up lab exercises.

 e. Reading assigned journal articles.

 f. Written special reports of 2-4 pages, summarizing both sides of a controversial environmental topic (such as climate change) using at least one primary literature citation for each, and evaluate both positions according to characteristics of scientific reasoning (repeatability, testability, and peer reviewed publications).

 g. Field trips to local museums.

91 Representative Texts

1. Representative Text(s):
2. Dudley, Gordon, Virginia Dudley, Michael Golden, et al*. Biology 110 Laboratory Manual*. El Cajon: Grossmont College Press, 2019.
3. Campbell, Neil. *Biology:* *Concepts and Connections Abridged*. Custom edition. 2018

 Donald J. Borror. [*Dictionary of Word Roots and Combining Forms*](http://www.amazon.com/exec/obidos/tg/detail/-/0874840538/qid%3D1073933076/sr%3D1-1/ref%3Dsr_1_1/002-9487337-2736026?v=glance&s=books), McGraw-Hill, 1985.

 b. Supplementary texts and workbooks:

 1) *California’s Changing Landscape*. Michael Barbour, ed. California Native Plant Society, 1991.

 *2) Coast to Cactus*. Diana Lindsey, ed. Sunbelt Publications, 2016.

 *3) San Diego Native Plants*. Lightner, James. San Diego Flora, 2011.

 *4) Conifers of the Pacific*. Kauffmann, Michael Edward. Backcountry Press, 2013.

 *5) Flora of the Santa Ana River and Environ*. Clarke, Oscar F. Heyday Books, 2007.

Addendum: Student Learning Outcomes

 Upon completion of this course, our students will be able to do the following:

1. Explain how latitude and elevation affect average temperature, average precipitation and primary production
2. State the mechanism for Evolution
3. Demonstrate Climate Change Literacy by explaining Anthropogenic modifications of
the climate