FORM VERSION: 5/95
DATE REVISED: November 6, 1996

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

_X_ Transfer course _X_ A.A. degree applicable course
(check all that apply)

COURSE NUMBER AND TITLE: Biology 118L - GENERAL ECOLOGY (Laboratory)

UNIT VALUE: 1 **MINIMUM NUMBER OF SEMESTER HOURS:** 48

BASIC SKILLS REQUIREMENTS: Appropriate language and computational skills.

ENTRANCE REQUIREMENTS:

PREREQUISITE: Completion of, or concurrent enrollment in, BIOL 118.

COREQUISITE: Completion of, or concurrent enrollment in, BIOL 118.

RECOMMENDED PREPARATION:

SCOPE OF COURSE:

Provides hands-on experiences with ecological concepts, methods, and problem-solving techniques by using the plants and animals of local communities in their natural settings. The majority of laboratory session will be devoted to off-campus field studies.

SPECIFIC COURSE OBJECTIVES:

The successful student will:

1. apply the process of scientific inquiry and have the ability to think critically and creatively when employing the scientific method or when analyzing scientific information;
2. apply the basic quantitative methodologies and the statistical techniques used to test ecological hypotheses;
3. evaluate the difference between scientific and nonscientific claims;
4. analyze the basic characteristics of life and the organizational levels of life;
5. analyze the basic methods used to measure and describe the physical and chemical aspects of an environment and the quantitative and qualitative methods used to describe individuals, populations, communities and ecosystems;
6. apply ecological concepts and ecological methods to investigate ecological processes and to solve ecological problems;
7. use library resources and the Internet to locate ecological information;
8. apply a systems-oriented approach to explaining the interrelationships between living organisms and between living organisms and their physical, chemical and energy environments;

9. apply a wide variety of biological principles to natural ecosystems;
10. describe the characteristics of climate, moisture, temperature, light, nutrients and soils as they relate to the distribution, density and adaptations of living organisms in natural settings;
11. compare the major types of aquatic and terrestrial ecosystems and relate the distribution of ecosystems to their unique biological, physical, chemical and energy environments;
12. analyze the importance of self-regulating mechanisms (homeostatic controls) in determining the distribution of organisms;
13. analyze the characteristics of populations, especially population growth and regulation, intraspecific competition, life history patterns, and population genetics;
14. evaluate the characteristics of communities, especially interactions between populations, community structure, disturbance and ecological succession;
15. describe and compare the biotic and abiotic characteristics of local biological communities and be able to recognize the common plants and animals within these local communities;
16. analyze the relationships between evolution and the unity and diversity of life;
17. analyze human ecosystems and the impact of humans on natural ecosystems, on both local and global levels.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

Laboratory Component:

I. Laboratory Procedures
   - A. Laboratory Safety Procedures
   - B. Proper Care and Use of Laboratory and Field Equipment
   - C. Metric Measurements and Conversions

II. Library Research
   - A. Literature Research in Ecology
   - B. Review Selected Papers From the Ecological Literature

III. The Design and Analysis of Ecological Studies
   - A. Experimental Design in Ecological Studies - The Planning of Lab and Field Investigations
   - B. Data Analysis
     1. Quantitative Descriptions of Ecological Samples and Testing Ecological Hypotheses
     2. Graphing
     3. Introduction to Computers, Spreadsheets and Ecological Software Programs

IV. The Natural History of Southern California
   - A. Geology and Climates of Southern California
   - B. Biological Communities of Sourthern California
     1. Relationships Between Microclimates and Community Distributions
     2. History of Biological Communities in Southern California

V. Measurement of Environmental Parameters
   - A. Abiotic Measurements
     1. Solar Radiation, Relative Humidity, Temperature, and Wind Velocities
     2. Soil Analysis (soil moisture, soil texture, soil temperature profiles, soil organic matter, soil density, and soil percolation rates)
     3. Physical Measurements in Selected Microclimates

B. Biotic Measurements (Equipment Permitting)
   1. Photosynthesis
   2. Respiration
   3. Transpiration

VI. Analysis of Populations
   A. Life Tables and Survivorship Curves
   B. Population Genetics and Natural Selection
   C. Biological Variation and Adaptations
      1. Ecotype Variation in Plants in Response to Environmental Gradients
      2. Ecological Adaptations in Plants
         a. Anatomical Adaptations (e.g. hydrophytes, mesophytes, xerophytes)
         b. Physiological Adaptations (e.g. C_3, C_4 and CAM; Metabolic Rates versus Body Size; Enzyme Responses to Temperature and pH)
   D. Population Growth
      1. Laboratory Investigations of Population Growth
      2. Population Growth Models
   E. Population Estimates
      1. Plants: Plot Sampling and Transect Sampling
      2. Animals: Mark and Recapture
   F. Vegetation Analysis: Population Density, Percent Cover, Frequency, Dispersion.

VII. Field Investigations of Local Communities
   A. The Local Communities Studied
      1. Intertidal Zones (coastal salt marsh, sandy beach, rocky shore communities)
      2. Lake/Pond Ecosystem
      3. Southern Coastal Scrub
      4. Chaparral
      5. Southern Oak (Foothill) Woodland
      6. Montane Coniferous Forest
      7. Mountain Meadow
      8. Riparian Woodlands (Desert, Mountain and Coastal Mesas)
      9. Pinyon-Juniper Woodland
      10. Desert (Low Desert Scrub, Desert Wash and/or Alkali Sink)
   B. Biotic Measurements and Observations
      1. Identification of Dominant Plant and Animal Species
      2. Identification of Common Adaptations in Plants and Animals
      3. Vegetation Analysis
         a. Density
         b. Population Dispersion
            1) Spatial Distribution Patterns (Random, Uniform, Aggregate)
            2) Distance to Nearest Neighbor (Positive and Negative Associations)
         c. Percent Cover
         d. Frequency
         e. Dominance
         f. Importance Value
         g. Biomass
      4. Spatial Relations in Plants and Plant Competition (Plant Size and Interplant Distance)

5. Species Diversity
6. Community Similarity
7. Horizontal and Vertical Zonation
8. Field Measurements of Photosynthesis, Transpiration and Water Potentials (Equipment Permitting)
    a. Intraspecies Comparisons Along Environmental Gradients
    b. Interspecies Comparisons (e.g. C_3, C_4, and CAM Plants; Evergreen and Deciduous Plants)
9. Ecological Succession (e.g. Burned Sites, Vacant Lots)
10. Aquatic Ecosystems
    a. Benthos Sampling
    b. Nekton and Plankton Sampling
    c. Littoral Zone Sampling

C. Abiotic Measurements and Observations
    1. Light Intensity, Solar Radiation, Relative Humidity, Temperature, and Wind Velocity
    2. Soil Analysis (soil moisture, soil texture, soil temperature profiles, soil organic matter, soil density, soil percolation rates and surface litter)
    3. Selected Microclimates
    4. Aquatic Ecosystems - Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Light Penetration
D. Community Comparisons - Biotic and Abiotic Relationships

VIII. Convergent Evolution (e.g. Mediterranean-Type Shrublands)

IX. Endangered Species

X. Symbiotic Relationships (e.g. Allelopathy)

XI. Decomposition

REQUIRED READING:

Laboratory:

Gilardi, J. General Ecology Laboratory Manual. San Marcos: Self Published 1995
OR
Cox, G.W., Laboratory Manual of General Ecology. 7th edition. Wm. C. Brown Publishers, 1996.
OR
Ancinec, G.D., Radford, K. and Schwenkmeyer, R., Natural History of Southern California: A Laboratory Guide. Peek Publications, 1985.
OR
Similar Text.

SUGGESTED READING:

Selected journal articles as identified by the instructor.
Selected books as identified by the instructor.

REQUIRED WRITING:

Each laboratory exam includes several essay questions with each answer requiring one-half to one full page of writing. Other writing assignments may include short essays on specific topics, journal article reviews, and research papers. These assignments will total a minimum of 5 pages of writing.

OUTSIDE ASSIGNMENTS:

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short term classes.

In the laboratory portion of the course outside assignments will include the analysis of data collected during laboratory sessions, preparation for oral presentations and writing summaries of laboratory and field investigations.

INSTRUCTIONAL METHODOLOGY:

Laboratories are supplemented with computerized simulations and data analysis, laboratory and field investigations, use of field equipment, handouts, visits to an ecological research site, the San Diego Zoo, the Natural History museum, ecological reserves and botanical gardens.

Check all that apply:

___ lecture
_X_ laboratory
___ lecture-laboratory combination
___ directed study

This course may be offered as a distance education course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380. Yes ___ No _X_

If yes, check all that apply. (See guidelines for preparation for definitions.)

____ telecourse
____ mediated instruction
____ computer assisted instruction

GRADING POLICY AND STANDARDS (include methods for determining whether the stated objectives have been met by students):

Evaluation of students may include quizzes, lecture exams and other assignments. In a typical course, at least 70% of the final grade is determined by quizzes and lecture exams, and up to 30% of the final grade is determined by other assignments.

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?
YES_____NO__X__Number of times course may be taken for credit __1__

If yes, identify specific provision of Title 5 Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable:

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