I. **OVERVIEW**

The following information will appear in the 2010 - 2011 catalog

**BIO 114**  
**General Ecology**  
4 Units

*Formerly listed as: BIO - 114: Introduction to Ecology*

*Recommended for Success: Before enrolling in this course, students are strongly advised to satisfactorily complete ENGL 50.*

Introduction to the biological sciences and the general concepts and principles of ecology. Topics include organization and energetics of nature, natural interactions and biological diversity. Includes global and local ecosystems, scientific methods of ecological research, nutrient cycles and conditions of existence, and ecological assessment.

Field trips might be required.  (A-F or P/NP - Student choice) Lecture /Lab  
**Transfer:** (CSU, UC) **General Education:** (MJC-GE: A ) (CSU-GE: B2, B3 ) (IGETC: 5B )

II. **LEARNING CONTEXT**

Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. **COURSE CONTENT**

1. **Required Content:**

   a. Introduction
      i. The ecological hierarchy
      ii. Ecosystem models
      iii. Applying hierarchy theories

   b. Biological molecules
      i. Carbohydrates
      ii. Lipids
      iii. Proteins
      iv. Nucleic acids

   c. Energetics
      i. Energy
      ii. Photosynthesis
      iii. Cellular respiration

   d. Cycles and conditions of life
i. Hydrologic cycle
ii. Salination
iii. Nitrogen and phosphorus cycle
iv. Fire ecology
v. Toxic wastes

e. Organization and diversity of nature
   i. Viruses
   ii. Bacteria
   iii. Protista
   iv. Fungi
   v. Animals
   vi. Plants

f. Population ecology
   i. Populations and population dynamics
   ii. Communities and community dynamics
   iii. Competition for resources
   iv. Human interactions with nature

g. Ecosystems
   i. Ecosystem models
   ii. Abiotic and biotic components
   iii. Gradients and ecotones
   iv. Biodiversity
   v. Gaia hypothesis

2. **Required Lab Content:**

   a. Scientific method
      i. Metric system
         a. Metric system measurement lab activity
      ii. Sampling techniques
         a. Sampling lab activity
iii. Basic statistics
   a. Data analysis lab activity

b. Matter and energy
   i. Ecosystem activity
      a. Build an ecosystem
   ii. Matter, energy, and biological molecules
      a. Photosynthesis lab activity I
      b. Mc Mush activity, biological molecules in fast food

c. Organization and diversity of nature
   i. Hierarchy of life
      a. Leaf litter and soil investigation lab activity
      b. Hierarchy of life on campus activity
   ii. Monera and Protista
      a. Pond water investigation lab activity
   iii. Fungi
      a. Fungi lab activity
   iv. Plants
      a. Plant kingdom lab activity
      b. Photosynthesis lab activity II
   v. Animals
      a. Animal kingdom lab activity
      b. Field trip to Great Valley Museum, Modesto Junior College East campus

d. Population ecology
   i. Find a species, population, or community interaction in nature activity
      a. Describe and evaluate interaction
   ii. Find a human interaction with nature activity
a. Describe and evaluate interaction

e. Ecosystems
   i. Biotic and abiotic components
      a. Examine biotic and abiotic components on campus activity
   
   ii. Ecological interactions
      a. Literature research on ecological interactions
      b. Ecosystems on campus activity
   
   iii. Biodiversity
      a. Biodiversity on campus activity
         a. Record diversity indices of organisms on campus
      b. Biodiversity off campus activity
         a. Record diversity indices of organisms off campus
   
   iv. Cycles and conditions for life
      a. Literature research on nutrient cycles
      b. Population growth lab activity
         a. Experimental design, controls, evaluation and interpretation

B. ENROLLMENT RESTRICTIONS

1. Advisories

   Before enrolling in this course, students are strongly advised to satisfactorily complete ENGL 50.

2. Requisite Skills

   Before entering the course, the student will be able to:
   a. Read and understand college-level text material.
   b. Write college-level laboratory reports, short essays, and assigned papers.

C. HOURS AND UNITS

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<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Lect</td>
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<td>3.00</td>
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4 Units
D. METHODS OF INSTRUCTION (TYPICAL)
Instructors of the course might conduct the course using the following method:

1. Lecture
2. Classroom discussion
3. Laboratory activities
4. Laboratory discussion
5. Field trips
6. Film and documentary viewing

E. ASSIGNMENTS (TYPICAL)

1. EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS
   Time spent on coursework in addition to hours of instruction (lecture hours)
   a. Reading assignments
      i. Daily textbook readings
      ii. Bi-weekly laboratory manual readings
      iii. Weekly ecological literature readings
   b. Written papers and reports
      i. Two papers per term for lecture content
      ii. Eight reports for laboratory content

2. EVIDENCE OF CRITICAL THINKING
   Assignments require the appropriate level of critical thinking
   a. Quizzes and exams
      i. Students will be able to interpret ecological concepts and theories.
         a. Why must ecosystems be considered systems?
         b. What is the definition of evolution?
         c. Define and contrast the biotic and abiotic components of nature.
      ii. Students will be able to analyze and evaluate data and interpret experimental results
         a. What biological molecules are found in a typical hamburger fast food diet? How does
            this diet differ from a vegetarian diet?
         b. Evaluate the growth of two populations of protists and determine if their population
            growth patterns are significantly different.
iii. Students will be able to evaluate the ecological impact of humans on the environment both at the local and global level.
   a. Describe the impact of humans on the Central Valley of California in terms of habitat loss and land degradation.
   b. Describe the impact humans have on the carbon cycle in nature.

b. Written papers and reports
   i. Students will analyze and evaluate ecological papers and reports.
      a. Evaluate the concept of animal corridors as viable land use practices to support biodiversity.
      b. Evaluate the scientific evidence supporting and contradicting human activity as the cause global warming.
      c. Describe how measurements of species abundance, diversity, and evenness are used to determine biodiversity.

ii. Students will analyze and evaluate laboratory and field trip based data.
    a. Describe the population changes observed in the two populations of protists in terms of resource competition and/or partitioning.
    b. Evaluate the biodiversity of plants at Modesto Junior College making sure to evaluate abundance and diversity.

F. TEXTS AND OTHER READINGS (TYPICAL)

III. DESIRED LEARNING

A. COURSE GOAL
   As a result of satisfactory completion of this course, the student should be prepared to:
   describe the hierarchical levels of organization ranging from atoms to the biosphere, describe ecosystem dynamics on a local and global scale, describe long-term solutions to environmental problems, and explain mathematical and energetic parameters of ecosystems.

B. STUDENT LEARNING GOALS
   Mastery of the following learning goals will enable the student to achieve the overall course goal.
   1. Required Learning Goals
      Upon satisfactory completion of this course, the student will be able to:
      a. Organize and interpret data from scientific experiments.
      b. Prepare an evaluative ecological paper.
      c. Apply the scientific method of investigation.
d. Describe hierarchical levels of organization ranging from atoms to the biosphere.

e. Describe mathematical and energetic parameters of ecosystems.

f. Describe long-term solutions to environmental problems.

g. Describe fundamental features of each living kingdom of organisms.

h. Explain the Gaia hypothesis and nutrient recycling.

i. Describe ecosystem dynamics on a local and global scale.

2. **Lab Learning Goals**

   *Upon satisfactory completion of the lab portion of this course, the student will be able to:*

   a. Properly use ecological lab and field equipment for data collection.

   b. Evaluate and interpret ecological data and results.

   c. Perform ecological experiments and collection of data in the laboratory and in the field.

   d. Evaluate and interpret experimental data and results.

   e. Write analytical papers and reports summarizing and evaluating experimental data.

IV. **METHODS OF ASSESSMENT (TYPICAL)**

   A. **FORMATIVE ASSESSMENT**

      1. Lecture quizzes and exams.

      2. Written papers.

      3. Lab activity quizzes and reports.

      4. Field trip reports.

   B. **SUMMATIVE ASSESSMENT**

      1. Final lecture exam.

      2. Field trip notebook.