RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE
BIOL-231: GENERAL ECOLOGY

I. Basic Course Information

A. Course Number and Title: BIOL-231 General Ecology

B. New or Modified Course: Modified Course

C. Date of Proposal: Semester: Fall Year: 2016

D. Effective Term: Fall 2017

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours: 4

G. Weekly Contact Hours: 6 Lecture: 3
Laboratory: 3
Out of class student work per week: 7.5

H. Prerequisites/Corequisites: BIOL 102- General Biology II

I. Laboratory Fees: Yes

J. Name and Telephone Number or E-Mail Address of Department Chair at time of approval: Sarah Imbriglio, Ext 8241, sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisites: BIOL 102 (General Biology II). Offered in the fall semester only.
This course explores the interactions between organisms and the environment. Students will investigate and develop an understanding of the effects of physical and biological factors on the distribution and abundance of species. Major areas of focus include biogeography, adaptations and evolution, population biology, community, ecosystem, and landscape ecology, and applications to modern environmental problems. Lab consists of hands-on field research in local natural areas and a survey of important New Jersey ecosystems, patterns and processes. Students will utilize the scientific method, including generating research questions and hypotheses, identifying and using appropriate lab and field methods to collect data, and performing data analysis to accept/reject hypotheses to investigate terrestrial and aquatic systems. Two weekend field trips are required.

III. Statement of Course Need

A. This is an introductory course in the principles of Ecology for students with a firm grounding in the Sciences—General Biology II is a prerequisite. This is currently the only 200-level course in the ecology/environmental science offerings that is not an independent study. The course is required for students of the Environmental Science and Environmental Studies options and a choice among 200 level majors courses for students of the Biology, General Science and other Science options.
B. Laboratory experience is essential for students in this class to gain hands-on experience using field research techniques and methodologies, apply course concepts, and to be able to take field trips to introduce them to different ecosystems and relevant ecological patterns and processes.
C. Transferability of course:
    a. This course may transfer as a General Education course in Science with Lab.
    b. This course generally transfers as an ecology or environmental science program requirement.
    c. This course generally transfers as a biology or environmental science program elective.

IV. Place of Course in College Curriculum

A. Free Elective
B. This course serves as a General Education course in Science with Lab.
C. This course is required for the Environmental Science A.S. and the science track in the Environmental Studies A.A. It also satisfies the 200-level Biology elective for Biology Majors.
D. Course transferability: This course is the equivalent of the General Ecology, Ecology, Field Biology, and Principles of Applied Ecology courses taught at other institutions. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

LECTURE:
A. Introduction to Ecology
    1. Definition and History of Ecology and its Relation to Evolution
    2. Relationship to Biological and Physical Sciences
    3. Types of Species Interactions – Predation, Mutualism, Competition, etc.
B. Biogeography
    1. Factors Affecting Global Species Distributions
        a. Terrestrial Biomes
        b. Marine and Freshwater Biomes
        c. Altitudinal and Latitudinal Gradients
    2. Local Biogeographic Patterns
        a. Physiographic Provinces and Ecosystems of NJ
C. Population Biology
    1. Population Growth and Dynamics

2. Predator-Prey and Other Interactions
3. Ecological Release – Invasive and Other Species
4. Coextinction
5. Metapopulations

D. Species Adaptations and Evolution
1. Definitions of Species
2. Phenotype vs. Genotype
3. Speciation and Adaptive Radiation
4. Natural vs. Sexual Selection
a. Galapagos Finches
5. Other Evolutionary Processes

E. Community Structure and Dynamics
1. Species Richness and Diversity
a. Effects of Disturbance
b. Effects of Environmental Heterogeneity
2. Food Webs
3. Trophic Cascades or Cascade Effects
4. Ecological Succession

F. Ecosystem Science
1. Primary Production
2. Energy Flow and Trophic Structure
3. Nutrient Cycling
4. Urban Ecology and Urban Wildlife
5. Restoration Ecology

G. Landscape Ecology
1. Metapopulations
2. Fragmentation
3. Hubs and Corridors

H. Applications

1. Endangered Species Conservation
2. Invasive Species Ecology
3. Disease Ecology and Public Health
4. Human Population Growth and Sustainability

LAB:

A. Field Research
1. Vegetation Sampling – Forest Structure and Composition
a. Cover, Density, Frequency
b. Quadrat Sampling, Line Intercept Methods
2. Animal Population Studies
a. Deer Spotlight Survey, Tick Drag Sampling, Small Mammal Trapping
3. Data Entry, Interpretation and Analysis
4. Report Preparation

B. Survey of NJ Ecosystems, Patterns and Processes
1. Floodplain Forest Ecology
2. Forest Fragmentation, Deer Herbivory, and Invasive Plant Species

3. Coastal Ecosystems and Shoreline Dynamics
4. Old Field Succession and Old Growth Forests
5. Campus Ecology
6. Historical Ecology in Post-Agricultural Landscapes
7. Fire Ecology in the Pine Barrens
8. Stream Monitoring, Aquatic Invertebrates and Water Pollution

C. Green Infrastructure Networks for Urban Conservation Biology
1. Network Design Principles
2. Analysis of Aerial Photos
3. Urban Restoration for Ecosystem Services and Conservation
4. Organismal Ecology of Threatened/Endangered Species
5. Management Techniques for Urban Conservation Biology
6. Analyzing and Addressing Stakeholder Concerns

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

1. Students will analyze an ecological problem and draw conclusions from data and evidence using the scientific method (GE-NJ3)
2. Students will construct graphs and charts, interpret them, and draw appropriate conclusions (GE-NJ2)

B. Course Learning Outcomes:

Students will be able to:

1. explain basic ecological concepts and principles
2. apply basic ecological concepts and principles to identify and interpret ecological patterns and processes observed in the region

C. Assessment Instruments:

Given the outcomes described above, the following assessment methods may be used:

A. laboratory products
B. research/technical papers using standard scientific format based on the scientific method
C. oral presentations
D. demonstrations
E. essays
F. journals

VII. Grade Determinants

The following may be used to determine the final grade:

A. mid-term and final exam
B. field quizzes
C. research/technical papers using standard scientific format based on the scientific method (required)
D. book report
E. presentations
F. service learning incorporating ethical standards (required)
G. laboratory assignments (required)

Given the goals and outcomes described above, the following may be used in the course:

A. lecture/discussion
B. small-group work
C. computer-assisted instruction
D. guest speakers
E. laboratory
F. student oral presentations
G. student collaboration
H. independent study

VIII. Texts and Materials

The following types of course materials may be used:

A. Suggested Texts:
- Molles, Manuel C. 2012. Ecology: *Concepts and Applications.* McGraw Hill Inc.
- Articles from scientific journals and periodicals

B. Field Journals
C. Literature Reviews
D. Student Writing
E. Films and Documentaries
F. Recordings from National Public Radio
G. Internet Databases and Information Sources
H. Library Article Databases

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

IX. Resources

A. RVCC van and/or bus rental;
B. Library databases and other library resources;
C. Natural areas on campus and elsewhere;
D. RVCC greenhouse and related supplies;
E. Environmental monitoring, GIS, and forest ecology field equipment;
F. Computers with Excel, ArcMAP (GIS), and SAS-JMP statistical software;
G. Field guides, literature, films and documentaries from RVCC Science Library.

X. Honors Option

Not applicable.