

III. Statement of Course Need

- A. This is an introductory course in the principles of ecology for students with a foundation in general biology and is a core course in the Environmental Science and Environmental Studies degree programs.
- B. This course requires a lab component for students that is essential for students to gain hands-on experience using field research techniques and methodologies and to be able to take field trips to introduce them to different ecosystems and relevant ecological patterns and processes.
- C. This course generally transfers as a Free Elective or a program requirement in Ecology, Environmental Science, or related fields dependent on the transfer institution.

IV. Place of Course in College Curriculum

- A. This course is a Free Elective
- B. This serves as a General Education Science (Lab) course.
- C. The course is a requirement in the Environmental Science and Environmental Studies degree programs and a 200-level Biology option in the Biology track in the Biological Sciences degree
- D. 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
- G. 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. Sampling Methods (Quadrat, Transect, Line Intercept)
 - c. Field Equipment - dbh tape, densitometers, meter tape/sticks
 - 2. Environmental Sampling
 - a. Sensory observations
 - b. Stream habitat quality
 - 3. Population and Community Studies
 - a. Butterfly populations and species richness – binoculars, nets, field guides
 - b. Species diversity – identification applications and field guides
 - c. Macroinvertebrate community composition – nets, identification guides, dissection scopes
 - 4. Data Entry, Interpretation and Analysis
 - a. MS Excel, GoogleEarth
 - 5. Report Preparation and Poster Presentation
 - a. MS Word, MS Powerpoint
- 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
9. Appalachian Mountains and NJ Highlands

VI. A. Course Learning Outcomes:

At the completion of the course, students will be able to:

1. Communicate and collaborate with others in a clear, logical manner about ecological patterns and processes (GE-1)
2. Apply quantitative reasoning to analyze and interpret data to answer ecological questions (GE-3)
3. Use technological tools to access, process and present ecological data (GE- 4, IL)
4. Explain basic ecological concepts and principles
5. Identify and interpret ecological patterns and processes observed in New Jersey
6. Develop and test original hypotheses about the causes of environmental patterns and events

B. Assessment Instruments

Given the outcomes described above, LIST which of the following assessment methods may be used; please note any instruments that will be *required* to assess outcomes as listed above (e.g., research papers for information literacy):

- A. laboratory exercises
- B. research papers
- C. lecture quizzes

VII. Grade Determinants

What factors may enter into the determination of the final? LIST the grade determinants. Please note any grade determinants that will be *required* for the course. For example:

- A. mid-term and final exam
- B. field quizzes
- C. research project
- D. presentations
- E. service learning
- F. laboratory assignments

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. lecture/discussion
- B. small-group work

- C. computer-assisted instruction
- D. guest speakers
- E. laboratory exercises
- F. student oral presentations
- G. student collaboration
- H. field trips

VIII. Texts and Materials

The following types of course materials may be used:

- A. Suggested Texts:
 - o Sher, A and M. Molles. 2021. Ecology: Concepts and Applications. 9th Edition (looseleaf), McGraw Hill
 - o 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 passenger van
- 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. Tropical butterfly collection
- G. Field guides, literature, films and documentaries from RVCC Science Library

X. Check One: Honors Course N/A