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**BIO 234 ECOLOGY LECTURE**  
**FALL 2007**  
**MWF 11:00-11:50 AM, SC 139**

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<b>Instructors:</b>	Dr. John A. Cigliano	Dr. Rich Kliman
<b>Office:</b>	SC 112	Miller 24
<b>Office Hours:</b>	T 11:00-12:00; W 1:00-2:00	T 4-5; W 10-11
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**Prerequisites:** BIO 121 & 122

**Credits:** 3.0

**LA Course:** Writing II (Laboratory)

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**Course Description:** Ecology is the study of the interactions between an organism and the environment and how these interactions influence the abundance and distribution of the organisms. Lecture will emphasize the underlying theories of ecology in an evolutionary context. Students will be challenged to understand and apply these theories in analyzing the interactions that determine the distribution and abundance of organisms. Lecture and integration of the laboratory is aimed at a collective understanding and practical application of these fundamental principles of ecology.

Ecology is a science; therefore, ecologists use the scientific method to understand the factors that affect the distribution and abundance of species. The science of ecology encompasses several subdisciplines that are organized within a hierarchy of organization: individuals (behavioral), populations, communities, ecosystems, and landscapes. While the subdisciplines/hierarchical levels of ecology endeavor to answer questions at different spatial and temporal scales using different experimental approaches and methodologies, they are all interrelated and each level informs on the level above and below it.

Theodosius Dobzhansky, a very wise geneticist, stated “*nothing in biology makes sense except in the light of evolution*” (The American Biology Teacher 35, March 1973: 125–129). This is especially so for ecology because of the very close relationship between ecology and evolution; intraspecific competition (part of theme #2) is the primary mechanism of evolution by natural selection.

Thus, this course has been organized around six themes:

1. THE SCIENCE OF ECOLOGY: Application of the scientific method to the study of ecology,
2. THE ECOLOGY OF EVOLUTION: Natural selection, micro- and macro evolution,
3. THE ECOLOGICAL NICHE & BIOMES: What affects the distribution and abundance of species (population and ecosystem ecology),
4. POPULATION DYNAMICS: Demography, Population Abundance, and Metapopulations (population and community ecology),
5. INTERSPECIFIC INTERACTIONS: The Structure and Organization of Communities (behavioral and community ecology),
6. AN ECOLOGIST’S MANTRA: “Energy flows, nutrients cycle” (ecosystem ecology).

**Course Objectives:** By the end of the course, you will be competent to:

- identify & understand the major principles of ecology
- identify & understand the interconnections between the major principals
- apply the major principles of ecology to field & laboratory research & problem solving

**Learning Outcomes/Assessment:** The following is a list of the learning outcomes for this course and how each will be assessed:

- **Outcome:** Students will develop critical thinking, scientific reasoning, and quantitative reasoning skills through (i) developing and testing ecological hypotheses using data from assigned readings and (ii) developing answers to questions about ecological concepts and principles. **Assessment:** Exams.
- **Outcome:** Students will develop the ability to communicate clearly and effectively through the written word by reporting the results of their research in scientific papers and a poster and through exams. **Assessment:** Scientific papers, poster and exam essays.
- **Outcome:** Students will develop the ability to understand and respond to issues of local, national, and global significance through class discussions of conservation-related issues. **Assessment:** Clarity and effectiveness of discussion of each student will be noted.

**Required Texts:** Townsend, C.R., M. Begon & J.L Harper. 2003. Essentials of Ecology, 2<sup>nd</sup> edition. Blackwell Publishing, Malden, MA

**Class Attendance:** Regular attendance is **expected**, as well as arriving to class on time. Late arrivals are disruptive and will not be tolerated. You are responsible for all material covered and assignments due during missed classes.

**Late Assignments:** All assignments are due on or before their due dates. The grades for an assignment turned in late will be lowered by **10 pts of the original value** for each day the assignment is late. No assignment will be accepted once it has been returned to the rest of the class.

**Make-up Exam Policy:** If you miss a scheduled exam you do not automatically qualify for a make-up exam. A missed exam can only be made up if a valid reason is documented. ***You must contact the Dean of Students for documentation.*** Otherwise, you will receive a "0". In cases of excused absences, you must take the make-up exam within 1 week of the scheduled exam.

**The following are official College policies and statements.**

**Classroom Behavior:** Disruptive behavior will not be tolerated. Any incidences will be noted and you will be penalized 1/3 of your final letter grade for each incidence (e.g., B to a B-). *Generally, disruptive behavior in the classroom is any behavior that interferes with the process of learning.* At Cedar Crest College, it is the right of every student and faculty member to engage in a classroom experience free from disruptive behavior. What is disruptive to one person might not be disruptive to another, so the final authority on disruptive behavior is the faculty member.

Faculty members have the authority to address disruptive behavior in the manner they see fit under the guidelines set forth in the College Catalog (please see the section on “Classroom Protocol”).

Disruptive behavior may be viewed on a continuum ranging from the isolated incidents of mildly annoying or irritating behavior to more clearly disruptive, dangerous, and/or violent behavior.

Examples of disruptive behavior may include the following:

- Persistent speaking without permission
- Use of electronic devices, cell phones, or pagers during class
- Threats or harassment of any kind
- Poor personal hygiene
- Revealing dress
- Working on homework for other classes
- Inappropriate personal disclosures during class (sharing too much information)
- Sleeping in class
- Entering class late or leaving early (without permission)
- Eating/drinking in class without permission
- Disputing authority and arguing with faculty and other students
- Physical disruptions or physical altercations

**Verbal & Written Communication:** FACULTY MEMBERS ARE NOT PART OF YOUR SOCIAL CIRCLE OR PEER GROUP AND SHOULD NOT BE ADDRESSED AS SUCH. On the first day of class, faculty members will introduce themselves and express how you should address them. Addressing a faculty member by his or her first name is not acceptable unless the faculty member invites you to do so.

When addressing a faculty member in person, use a positive, respectful approach. Ideally, you should meet with faculty members during their scheduled office hours and not at the beginning or end of class unless the interaction will be brief.

When using the telephone, be sure to identify yourself at the beginning of the conversation. Be brief and concise, particularly when leaving a voice mail message. REMEMBER THAT IT IS YOUR RESPONSIBILITY TO MAKE SURE THAT YOU COMMUNICATE WITH YOUR PROFESSOR. When leaving a message, leave a time when you will call back. DO NOT EXPECT YOUR PROFESSOR TO RETURN PHONE CALLS OR TO BE THE ONE TO ENSURE CONTACT. It is always better to visit or call your professor during office hours.

When sending email, remember that your writing conveys an image of you and demonstrates respect for the recipient. Treat email as you would any other **FORMAL** written correspondence: Begin with the appropriate greeting (“Dear Dr. Smith”), use complete sentences (it is not an online chat) with good grammar and spelling, use a friendly and polite tone, and expect that faculty members will return your correspondence when they are able. Expecting an “instant response” is not realistic.

**Honor Code:** We fully support the Cedar Crest College Honor Code and the Classroom Protocol code as stated in the Student’s Guide Book (Section A.I). All assignments, including exams are

governed by the honor code.

**Plagiarism:** Plagiarism is a serious offense. In academia, few, if any, offenses are considered more serious. As such, we fully support the College's policy on plagiarism. Please see the Student's Guide (Section A.I) for a definition of plagiarism and the College's policy on plagiarism. Students who are found to have committed plagiarism will either be required to redo the assignment, receive an F for that assignment, or fail the course, depending on the severity of the offense. Under certain situations, those who have committed plagiarism may be suspended or expelled from the College. All cases will be reported to the Provost. **PLEASE BE AWARE THAT ACCIDENTAL PLAGIARISM CARRIES THE SAME WEIGHT AND PENALTY AS DELIBERATE PLAGIARISM.**

**College Accommodations Policy:** Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.

### Assignments & Grading

- CLASS PARTICIPATION IN DISCUSSIONS AND ACTIVITIES. This course will be concept based. To support the learning of these concepts, you will engage in group discussions and activities. Many of the discussion will be selected from the review questions at the end of each chapter. However, when appropriate, I will assign my own questions. Activities will consist of in-class, group mini-projects and discussions. *PARTICIPATION BY EACH CLASS MEMBER IS EXPECTED.* Some of these review questions and activities will be used as exam questions. No grade will be given for participation but students who are actively engaged in classroom discussions will have their final grade rounded up if their grade is near or at the upper range of a grade (E.G., 89/B+ CHANGED TO A-). Students who are not actively engaged will not have their grades rounded up.
- THERE WILL BE THREE (3) LECTURE EXAMS. Exams will consist of multiple choice/matching and short essays. The 3<sup>rd</sup> exam will be given during Finals Week but will not be cumulative. **(350 pts.)**

<b>Exam 1: 28 September (100pts)</b>	<b>Exam 2: 2 November (100 pts)</b>	<b>Exam 3: Finals Week (150 pts.)</b>
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- PLAGIARISM TUTORIAL AND TEST. All students are required to take the plagiarism tutorial and test developed by Indiana University and submit the signed confirmation certificate to me by 22 September 2006. In the box, cross out "my academic advisor" and replace it with the name of your lab instructor where it states, "If I had questions after finishing the tutorial, this document confirms that I have sought help from my academic advisor..." The tutorial home page is <http://www.indiana.edu/~istd/> **(50 pts.)**

**Extra-credit Policy:** No extra credit assignments will be given. *If you are having difficulty with the course, please see us for extra help.*

**Final Grade:** Final grades will be calculated as follows:

Grade	Points
A	372
A-	360
B+	348
B	332
B-	320
C+	308
C	292
C-	280
D+	268
D	252
F	<252

The above are minimum points needed for each grade. Grades are calculated as a range (e.g., a B=332-347.9). *Grades will not be curved or rounded up except as noted above.*

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## Lecture Topics

Below is a list of the topics we will cover and the corresponding chapters. We will also supplement lectures with material from other sources. We have chosen not to write out a schedule with dates because we would rather that we follow a pace that is comfortable for the class and not one that is predetermined. All you need to do is read the textbook in the following order and stay at least one chapter ahead. **You will be responsible for all material from the assigned readings even if we do not discuss it in class.**

Theme	Chapter (pages)
<b>THE SCIENCE OF ECOLOGY</b> <i>The Scientific Method</i> <i>Statistics and Scientific Rigor</i> <i>Doing Ecology</i> CASE STUDY: THE BROWN TROUT IN NEW ZEALAND	N/A 1 (11-17) 1 (10-11) 1 (18-24)
<b>THE ECOLOGY OF EVOLUTION</b> <i>Evolution by Natural Selection</i> <i>Microevolution</i> <i>Macroevolution</i>	2 (39-43) 2 (43-55) 2 (55-69)
<b>THE ECOLOGICAL NICHE &amp; BIOMES: WHAT AFFECTS THE DISTRIBUTION &amp; ABUNDANCE OF SPECIES?</b> <i>Conditions</i> LAW OF TOLERANCE HOW ORGANISMS RESPOND TO THERMAL STRESS <i>Resources</i> RESOURCE DEFENSE INTRASPECIFIC COMPETITION <i>Tolerance, Resource Utilization &amp; the Ecological Niche</i> <i>So what does all this Mean? One word, Biomes</i>	3 (76-77) 3 (77-80) 3 (84-88) 3 (88-100) 3 (100-103) 3 (103-106) 3 (106-108) 4
<b>POPULATION DYNAMICS: DEMOGRAPHY, POPULATION ABUNDANCE, AND METAPOPOPULATIONS</b> <i>Population Demography: Abundance, dispersion, sex ratio, &amp; age structure</i> <i>Life Tables, Fecundity Schedules, &amp; Survivorship Curves</i> <i>Patterns of Population Growth</i> <i>What Determines Population Abundance?</i> <i>Life History Patterns</i> <i>Temporal Patterns of Community Change</i> PATCH DYNAMICS ECOLOGICAL SUCCESSION	5 (152-157, 170-176) 5 (163-170) 5 (176-180) 9 (294-306) 5 (157-163, 181-185) 9 (309-312) 9 (312-317)

<p><b>INTERSPECIFIC INTERACTIONS: THE STRUCTURE AND ORGANIZATION OF COMMUNITIES</b></p> <p><i>What exactly is INTERSPECIFIC COMPETITION &amp; when does it occur?</i></p> <p><i>ECOLOGICAL EFFECTS of Interspecific Competition: Exclusion or Coexistence?</i></p> <p>CASE STUDY: DIATOMS &amp; SILICA (EXCLUSION)</p> <p>CASE STUDY: BUMBLE BEES (COEXISTENCE)</p> <p>CASE STUDY: RODENTS VS. ANTS (COEXISTENCE)</p> <p><i>EVOLUTIONARY EFFECTS of Interspecific Competition: Niche Differentiation, Resource Partitioning &amp; Character Displacement</i></p> <p>Case Study: Darwin’s Finches</p> <p>Case Study: Indian Mongoose</p> <p>Case Study: Canadian Sticklebacks</p> <p><i>Affect of Interspecific Competition on Community Structure</i></p> <p>CASE STUDY: BUMBLE BEES, AGAIN</p> <p>CASE STUDY: HAWAIIAN OCTOPUSES</p> <p><i>So, how significant is interspecific competition in practice &amp; what about the GHOST OF COMPETITION PAST?</i></p> <p><i>Predation: Not Just for Grizzly Bears</i></p> <p>Effects of Predation on Community Structure</p> <p><i>Food Webs</i></p> <p>INDIRECT &amp; DIRECT EFFECTS OF PREDATION</p> <p>KEYSTONE SPECIES</p> <p>TOP-DOWN VS. BOTTOM UP</p> <p>IS IT BETTER TO BE COMPLEX? THE STABILITY OF FOOD WEBS</p>	<p>6 (189), 3 (103-106)</p> <p>6 (189-203)</p> <p>6 (189-190)</p> <p>6 (194)</p> <p>6 (195-197)</p> <p>6 (203-207)</p> <p>2 (57-59)</p> <p>6 (204-206)</p> <p>6 (206-207)</p> <p>6 (207-213)</p> <p>6 (208-210)</p> <p>OM</p> <p>6 (204; 213-221)</p> <p>8 (257-262)</p> <p>8 (273-291)</p> <p>9 (317-327)</p> <p>9 (318)</p> <p>9 (318-320)</p> <p>9 (320-323)</p> <p>9 (323-328)</p>
<p><b>AN ECOLOGIST’S MANTRA: “ENERGY FLOWS, NUTRIENTS CYCLE”</b></p> <p><i>“Energy flows”</i></p> <p><i>“Nutrients cycle”</i></p>	<p>11 (367-383)</p> <p>11 (384-392)</p>