

ECOL/BIOL 3500 - ECOLOGY

Spring Semester 2011

Professor: **Gary W. Barrett**
Eugene P. Odum Chair in Ecology

gbarrett@uga.edu

706.542.6065

Office: 194A Ecology Building

Office hours: By appointment

Teaching Assistants:

William McDowell
Head Teaching Assistant
wgmcowell@gmail.com

James Moree
moree.james@gmail.com

Shafkat Khan
shafkat1@uga.edu

Text: *Fundamentals of Ecology, Fifth Edition*, Eugene P. Odum and Gary W. Barrett

Exercise book: *Ecology Exercise Book: An Ecosystem Approach*, Gary W. Barrett, Terry L. Barrett, Scott J. Connelly, Andrew S. Mehring, and James O. Moree

Information:

In addition to assignments from the text, you are responsible for information encompassing lecture notes, handouts, DVDs, additional reading assignments, and class discussions. Therefore, attendance is mandatory if you are to maximize your understanding of principles, concepts, mechanisms, and natural laws that are presented in this course. All academic work must meet the standards contained in “a culture of honesty.” Students are responsible for informing themselves about those standards before performing any academic work (f.i., Academic Honesty Statement <http://www.uga.edu/~vpaa>).

It is important to understand that a possible grade for withdrawal both before and after the midpoint of the semester is a *WF*, which carries the same numerical grade as an *F* (0 points). A *WF* will be given 2 school days following the midpoint withdrawal deadline (24 March 2011) to those students who have stopped attending class, failed to take test #2, and consequently are failing the course at that time.

It is your responsibility to make certain that all laboratory assignments are turned in on time, and that you know your grade regarding these assignments. Once the final laboratory grade is turned in to Dr. Barrett, there will be no consideration regarding changing this grade.

SYLLABUS

ECOL/BIOL 3500 - ECOLOGY - Spring Semester 2011 – G. W. Barrett

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

THE SCIENCE OF ECOLOGY

DATE	TOPIC	CONCEPTS	ASSIGNMENT
JANUARY 19 (W)	Introduction: Course objectives; Grading The Scope of Ecology: History; Ecology versus Economics Teaching philosophy	<i>Learning Pyramid</i> <i>Emergent property principle</i>	Foreword, Preface, and Handout materials Chapter 1
JANUARY 21 (F)	Hierarchy Theory: Holism versus Reductionism	<i>Levels of organization concept; Transcending processes</i>	Chapter 1
JANUARY 24 (M)	DVD: Eugene P. Odum: An Ecologist's Life: History of ecosystem ecology	<i>Study of "oikos"</i>	Chapter 1

ECOSYSTEM ECOLOGY

DATE	TOPIC	CONCEPTS	ASSIGNMENT
JANUARY 26 (W)	Ecosystem Structure: Trophic structure; Temporal/spatial scale	<i>Ecosystem concept; Biotic diversity</i>	Chapter 2
JANUARY 28 (F) *	Ecosystem Regulation: Models; Cybernetics; P/R ratios Ecosystem Types and Scales: Micro-, Meso-, and Macrocosms	<i>Homeostasis versus Homeorhesis</i> <i>Concept of sustainability; Concept of carrying capacity</i>	Chapter 2 Chapter 2
JANUARY 29 (S) **	Ecosystem Function: Energetics; Definitions and Language; Trophic levels	<i>Laws of thermodynamics; Subsidy-stress gradient</i>	Chapter 3
JANUARY 31 (M)	The Science of Limnology: Formation of lakes; Lotic versus Lentic systems	<i>Thermal and oxygen stratification; Lake zonation; Life forms</i>	Chapter 3
FEBRUARY 2 (W)	Energy Flow Models: Grazing versus Detritus Food Chains; Net Primary Production	<i>Concept of net energy; Concept of (eMergy)</i>	Chapter 3
FEBRUARY 4 (F)	TEST 1		
FEBRUARY 7 (M)	Biogeochemical Cycles: Types of cycles; Open versus Closed	<i>Nitrogen cycling; Watershed concept</i>	Chapter 4

	cycles		
FEBRUARY 9 (W) Alan P. Covich	Nitrogen, Phosphorus and Carbon Cycles: Gaseous versus Sedimentary cycles	<i>Greenhouse effect; Global climate change</i>	Chapter 4
FEBRUARY 11 (F)	DVD: <i>Chemistry of a Forest</i> ; Hydrologic cycle; Nutrient budgets	<i>Watershed concept; Buried seed strategy</i>	Chapter 4
FEBRUARY 14 (M)	Limiting and Regulatory Factors: Factor compensation and Ecotypes	<i>Liebig law of the minimum; Shelford law of tolerance</i>	Chapter 5
FEBRUARY 16 (W) Alan P. Covich	Soil: Organizing component for terrestrial ecosystems	<i>Concept of biological magnification</i>	Chapter 5
FEBRUARY 18 (F)	Fire Ecology: Wildfires versus Surface fires	<i>Fire-adapted systems; Concept of prescribed burning</i>	Chapter 5

* Please note that the Friday, 28 January lecture is scheduled to take place at a site to be announced.

** Please note that Saturday, 29 January lecture is scheduled to take place at a site to be announced.

POPULATION ECOLOGY

DATE	TOPIC	CONCEPTS	ASSIGNMENT
FEBRUARY 21 (M)	Properties of Populations: Natality versus Mortality	<i>Population survivorship; Age pyramids</i>	Chapter 6
FEBRUARY 23 (W)	Exponential versus Sigmoid growth curves: Rates of natural increase	<i>Concept of carrying capacity (K)</i>	Chapter 6
FEBRUARY 25 (F)	Population Regulation: Intrinsic versus Extrinsic theories	<i>Density-dependent versus Density independent population regulation</i>	Chapter 6
FEBRUARY 28 (M)	Patterns of Dispersal: Home range versus Territory	<i>The Allee principle of aggregation</i>	Chapter 6
MARCH 2 (W)	TEST 2		

COMMUNITY ECOLOGY

DATE	TOPIC	CONCEPTS	ASSIGNMENT
MARCH 4 (F)	Community Ecology: Types of interaction	<i>Concept of Coevolution</i>	Chapter 7
MARCH 7 (M)	Positive/negative Interactions: Predation, Herbivory, and Parasitism	<i>Role of Secondary chemistry</i>	Chapter 7
MARCH 9 (W)	Positive Interactions: Commensalism and Mutualism	<i>Bottom up versus Top down processes</i>	Chapter 7
MARCH 11 (F)	Habitat, Niche, and Guild: Types of Niches; Niche breadth versus Niche overlap	<i>Diversity-stability hypothesis; Role of biotic diversity</i>	Chapter 7
MARCH 14-18 (M-F)	SPRINGBREAK		

ECOSYSTEM DEVELOPMENT

DATE	TOPIC	CONCEPTS	ASSIGNMENT
MARCH 21 (M)	Strategy of Ecosystem Development: Autogenic versus Allogenic succession	<i>Primary versus Secondary succession</i>	Chapter 8
MARCH 23 (W)	Trends in Ecological Development: Youth to maturity	<i>Concept of climax community; Perturbation-dependent systems</i>	Chapter 8
MARCH 25 (F)	Relevance of Ecosystem Development to Society: Micro-versus Macroevolution	<i>Concept of heterotrophic succession; Integrating natural and economic capital</i>	Chapter 8

LANDSCAPE ECOLOGY

DATE	TOPIC	CONCEPTS	ASSIGNMENT
MARCH 28 (M)	Landscape Ecology: Landscape elements	<i>Source/sink dynamics; Connectivity</i>	Chapter 9
MARCH 30 (W)	Island Biogeography: DVD: <i>Landscape Linkages</i>	<i>Role of landscape corridors</i>	Chapter 9
APRIL 1 (F)	Temporal/Spatial Scale: Alpha, Beta, and Gamma diversity	<i>Concept of scale; Landscape geometry</i>	Chapter 9
APRIL 4 (M)	Agroecosystem Ecology: Domesticated landscapes	<i>Concepts of LISA and IPM</i>	Chapter 9
APRIL 6 (W)	TEST 3		

REGIONAL AND GLOBAL ECOLOGY

DATE	TOPIC	CONCEPTS	ASSIGNMENT
APRIL 8 (F) Terry L. Barrett	Technoecosystem: Virtual and Real system	<i>Noösphere concept; Ecological footprint</i>	Chapter 9
APRIL 11 (M)	DVD: Rachel Carson: <i>Silent Spring</i>	<i>Concept of biological magnification</i>	Chapter 10
APRIL 13 (W)	Regional Ecology: Biome types	<i>Biome concept; Life zone concept</i>	Chapter 10
APRIL 15 (F)	Terrestrial Biomes: Types of Classification	<i>Relationship of precipitation to temperature</i>	Chapter 10
APRIL 18 (M) Alan P. Covich	Marine Systems: Oceans and Estuaries	<i>Upwellings; Deep sea hydrothermal vents</i>	Chapter 10
APRIL 20 (W)	Global Ecology: Transition from Youth to Maturity	<i>Concept of a sustainable society</i>	Chapter 11
APRIL 22 (F) Terry L. Barrett	Ecological-Societal Gaps: Culture-sustained vitality and Ecological sustainability	<i>Market and nonmarket capital; Concept of aesthetics as economy</i>	Chapter 11
APRIL 25 (M)	Restoration Ecology: Scenarios	<i>Concept of integrative science</i>	Chapter 11
APRIL 27 (W) R. Cary Tuckfield	Statistical Thinking: Research design	<i>The ecological study unit</i>	Chapter 12
APRIL 29 (F)	Problem-solving Algorithm: Problem identification	<i>Weight of evidence</i>	Chapter 12
MAY 2 (M)	Overview Comments: Planning for a sustainable future	<i>Course evaluation</i>	
MAY 6 (F)	FINAL EXAM: 8:00 AM-11:00 AM		

COURSE INFORMATION

Description: Lecture, discussions, laboratory sessions, and field trips about the science of ecology mainly focus on the following levels of organization: organism, population, community, ecosystem, landscape, biome, and global.

We will meet for lectures from 9:05-9:55 a.m. On Mondays, Wednesdays, and Fridays in the auditorium (Room 201) in the Ecology Building.

Lectures: As summarized in the lecture syllabus, a broad range of topics related to the science of ecology will be covered. The lecture material will assume that you have a basic knowledge of general biology (BIOL 1108 is a prerequisite for this course). This course is also to prepare you for more advanced courses in limnology, population and community ecology, behavioral ecology, and ecosystem ecology.

Textbook: The text *Fundamentals of Ecology, Fifth Edition*, by Eugene P. Odum and Gary W. Barrett can be purchased from the University bookstore or from other local bookstores. You are expected to read the appropriate assigned chapters before each lecture is presented. Additional readings may be used as complementary material for lecture, and will be included in exams.

Examinations/Grading: There will be three major tests and a final exam. The final exam (3 hours) is scheduled for 8:00 AM-11:00 AM on Friday, 6 May 2011. Grades will be based on the following criteria:

Test 1	15%	90 - 100% A	Example:
Test 2	15%	80 - 89% B	87% - 89% B+
Test 3	15%	70 - 79% C	83% - 86% B
Lab	30%	60 - 69% D	80% - 82% B-
Final	25%	< 60% F	

The final exam will cover material presented in lectures from 10 January through 2 May. (i.e., Final exam will be comprehensive).

Overview comments: I will periodically provide you with the opportunity to receive “**Bonus Points.**” You must follow instructions to receive bonus points. These points will be added to the next scheduled exam. *You will not be permitted to do special projects (e.g., term papers) to improve your grade later in the semester. Attend each lecture and laboratory session, understand course material on a daily basis, and you will perform well in the course. We will make a sincere effort to enrich your learning experience.*

Gary W. Barrett

LABORATORY EXERCISES FOR ECOL/BIOL 3500L

You are required to purchase *Ecology Exercise Book: An Ecosystem Approach*, Gary W. Barrett, Terry L. Barrett, Scott J. Connelly, Andrew S. Mehring, and James O. Moree.

Laboratory expectations: Actively participate in your assigned laboratory section. We will be providing learning exercises in the laboratory and in the field to deepen your understanding of the science of ecology. Two major objectives are; (1) to provide hands-on-experience to help you connect the real world with the ecological principles that you learn in lecture, and (2) to teach you to communicate your knowledge through writing. Focus will be on data collecting and writing in scientific format.

In order to maximize your experience in this course, full participation in the exercises, including interaction with other students, and instructor is essential. TAs may have unannounced quizzes at the beginning of the sessions to evaluate your familiarity with the exercises scheduled for that day.

Attendance is mandatory. Tardiness is disrespectful of the other students in class. Driving yourself to laboratory sessions, without prior permission, will be considered evidence of tardiness. If you miss a session, you must have a written documentation of your absence in order to make up the session. A valid excuse is one that is written, verifiable, and covers the date and time of your scheduled laboratory session. In the case of a valid excuse, please contact your TA as soon as possible to see about being assigned to another laboratory section later in the week. If you know in advance that you must miss a session, please inform your assigned TA as soon as possible, so that s/he may re-assign you to another lab section.

Cellular phone policy: Please turnoff your cellular phone during sessions.

Allergies, athletics, and leaning disabilities: Please keep TAs informed. Most laboratory periods are conducted in the field. If you suffer from allergies, tell TAs so that they can inform you of any possible exposure to allergens. If

you are a member of a university athletic team (varsity, not intramural), please let TAs know when you will be out-of-town to participate in these competitions. So that TAs can accommodate your needs, please provide documentation and information about a learning disability.

Field trips — On field days you must:

- Dress appropriately for the trip and weather; ***we will go rain or shine.***
- Read each ecology exercise ***prior to attending that specific laboratory session.***
- Get to Room 306 5 minutes early; ***we leave on time.***

LABORATORY SCHEDULE (As of 18 January 2011)

DAY	TIME	TEACHING ASSISTANT
Monday	10:10 AM-12:55 PM	William McDowell
Monday	1:25 PM-4:10 PM	William McDowell
Tuesday	8:00 AM-10:45 AM	Shafkat Khan
Tuesday	11:00 AM-1:45 PM	Shafkat Khan
Wednesday	10:10 AM-12:55 PM	James Moree
Wednesday	1:25 PM-4:10 PM	James Moree
Thursday	11:00 AM-1:45 PM	James Moree
Thursday	2:00 PM-4:45 PM	Shafkat Khan

Location: Laboratory sessions are held in the Biological Sciences Building, Room 306 (BioSci 306). The TA will take you to the laboratory location from BioSci 306. It is important that you meet with your laboratory group in BioSci 306, otherwise you may miss important announcements or schedule changes, which the TA is under no obligation to repeat. ***Vans will leave precisely on time. The van will return to the Ecology Building on time as well.***

Laboratory Grading: Laboratories depend on *experimental learning*. Your laboratory grade is accrued out of 450 total points and is worth 30 percent of the course grade. 390 of the 450 points is based on assignments while the other 60 points are TA discretionary points, which are awarded based on your participation in field and laboratory exercises. ***Homework will not be accepted by email unless arranged ahead of time with your TA. If an assignment is late, the grade will be lowered 10 percent for each day it is late. If you have any problems with the grading of an assignment, please speak with your assigned TA about your concerns within one week after the assignment is returned.***

LABORATORY SYLLABUS (As of 18 January 2011)

NOTE: All laboratory sessions meet in the Biological Sciences Building (BSB) Room 306. Along with your TA, where appropriate you will then proceed to an assigned destination.

DATE <i>Week of</i>	ECOLOGY EXERCISES <i>Chapter numbers in ()</i>	DESTINATION	ASSIGNMENT <i>Date due; Points in ()</i>
JANUARY 10	Orientation	BSB Room 306	
* JANUARY 17	Introduction to scientific writing (1)	BSB Room 306	
JANUARY 24	Experimental design and statistical analysis (2)	BSB Room 306	
JANUARY 31	Adaptation (3)	Botany Greenhouses	Analysis of results (30)
FEBRUARY 7	Lake ecosystem (13, 14, 15)	Lake Herrick	Adaptation (15)
FEBRUARY 14	Forest ecosystem (5)	HorseShoe Bend Experimental Site (HSB)	Science of limnology (15)
FEBRUARY 21	Forest ecosystem (6)	HSB	Population ecology (15)
FEBRUARY 28	Forest ecosystem (4)	The State Botanical Garden of Georgia	Ecosystem structure (30)
MARCH 7	Agroecosystem (16, 17, 18)	Jordan Organic Farm; HSB	Secondary succession (15)
MARCH 14	SPRINGBREAK		
MARCH 21	Stream ecosystem (10, 11, 12)	McNutt Creek	Organic farming (15)
MARCH 28	Stream ecosystem (11, 12)	Tanyard Branch	Stream ecology (30)
APRIL 4	Old field ecosystem (7, 8, 9)	HSB	
APRIL 11	Old field ecosystem (8, 9)	HSB	** Stream ecology final draft (100)
APRIL 18	Urban system (19, 20, 21)	Center for Remote Sensing and Mapping Science; University of Georgia (UGA) Campus; City of Athens Urban Gardens	
APRIL 25	Landscape and Watershed systems (Closing)	BSB Room 306	Urban ecosystem (15) ** Old-field ecology final draft (100)

TOTAL POINTS (380 + 70 TA discretionary points) = 450

* Monday, 17 January, Martin Luther King Jr. Day (*no laboratory sessions*), therefore students attending Monday sessions please choose one of the other laboratory sections during this week.

** Note: An extra week is allowed for completion of the stream ecology final draft (due during the week of 11 April), and old-field ecology final draft (due during the week of 25 April).