

The University of Oklahoma  
College of Liberal Studies  
Ecology and Evolution  
LSTD 3443 716  
June 7, 14, 21, 28, July 5, 12, 19, 26, 2007  
5:30-9:30 p.m.  
Oklahoma City Community College  
Room 2N3-Main Building

Glenda J. Ochsner, Ph.D.  
David Ross Boyd Professor  
[glendao@flash.net](mailto:glendao@flash.net)

Introduction and Overview:

This course addresses the interaction of ecology and genetic alteration in bringing about biological diversity through evolution. This course assumes that students have a basic understanding of what constitutes an organism and how organisms perform the basic functions of living systems. If you find you need to review these topics, you may wish to look through Chapters 4-7 of Biology: Concepts and Applications, C. Starr.

Your course grade will be determined, in large part, by your ability to express clearly your understanding of the material you have read and how well you understand the scientific principles described in your readings.

Course Objectives:

Upon successfully completing this course, the student will be able to:

Demonstrate an understanding of topics in ecology, evolution, macroevolution, and population diversity,

Define and discuss ecology, including the biosphere, nature of ecology, and community interaction and ecology,

Define and discuss macroevolution, including: fossil records, molecular records, and human evolution,

Successfully examine and critique opposing viewpoints/positions concerning addressed topics and how they pertain to current world problems,

Explain some of the current problems presented in the texts,

Take a position on controversial topics and social issues,

Look at the course content and issues from multiple, interdisciplinary perspectives,

Make connections between course content and one's experiences,

Place the ideas, problem-solving skills, and analytical strategies within one's life, academic, or professional objectives.

**Required Text:**

Starr, C. (2002) Biology: Concepts and Application, 6<sup>th</sup> Edition, Belmont, CA: Thomson Brooks/Cole.  
ISBN: 0-534-38558-3

**Supplemental Text:**

Weiner, Jonathon (1995) The Beak of the Finch  
New York, New York: Vintage Books  
ISBN-10: 0-679-73337-X; ISBN-13: 978-0-6797-3337-X

**Description of Work Required:**

**Exams:** Students will be required to submit an at-home exam at the conclusion of each unit. These should reflect your understanding of the assigned reading as well as classroom activities and should follow the rules of academic writing (referencing ideas taken from other sources, accurate grammar and spelling, logical presentation of ideas, objectivity of view). These assignments will be sent to the instructor using D2L dropbox.

**The dropbox will close at the deadline and late work cannot be sent.**

Unit 1----exam due no later than 11:45 P.M., Friday, June 15

Unit 2----exam due no later than 11:45 P.M., Friday, June 29

Unit 3----exam due no later than 11:45 P. M.. Friday, July 13

Unit 4----exam due no later than 11:45 P.M. Friday, July 27

**Course Spanning Assignment**

This assignment is designed to help you complete your final project. Each Unit has one step in the process of writing your final project. Please think about these carefully. They are key to a good final paper.

**Unit A**—identify a topic and find five links that relate to the topic. Provide a one paragraph description of each link as it relates to your topic. Due no later than Thursday, June 14

**Unit B**—turn in an outline of your paper with 5 additional relevant links. Due no later than Thursday, June 28

**Unit C**— turn in a draft of your final paper and preliminary bibliography. Due no later than Friday, July 12

**Final Project:** Each student will be required to submit a 1500-word essay, with a minimum of 10 cited references. The final project is a very important part of the course grade and is the culmination of the course spanning assignments. Projects will be graded on how well the selected topic is researched and referenced, how well material is brought from various sources into a coherently organized whole, how well the material is critically evaluated, understanding of the science of the course, and clarity in the presentation of ideas.

The final project must be submitted by 11:45 p.m. Wednesday July 25

LATE WORK WILL NOT BE ACCEPTED UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE WITH THE INSTRUCTOR. This will involve a valid reason for the delay and an agreed upon date by which the late work will be submitted. Points will be deducted from **ALL** late work at the discretion of the instructor.

Grading Policies:

Points will be assigned for course assignments and participation as follows:

Exams( 100 each)-----	400 points
Class participation (25 points per class)-----	200 points
Course spanning(50 points for A and B; 100 for C)-----	200 points
Final Project-----	200 points

Total points-----1000 points

This course will not be graded on a curve. Grades will be assigned as follows:

900-1000 points-----	A
800-899 points-----	B
700-799 points-----	C
600-699 points-----	D
599 and below-----	F

Procedures for Removing Incompletes:

Students will make arrangements with the instructor to complete coursework. If all coursework is completed within 4 weeks, there will be no negative consequences to the grade with the exception of deductions for late work. Coursework completed after 4 weeks, will have consequences to be determined by the instructor.

**Academic Misconduct:**

Any act which improperly affects the evaluation of a student's academic performance or achievement, including but not limited to the following:

- (a) Cheating: the use of unauthorized materials, methods, or information in any academic exercise, including improper collaboration;
- (b) Plagiarism: the representation of the words or ideas of another as one's own, including:

- (1) direct quotation without both attribution and indication that the material is being directly quoted, e.g. quotation marks;
  - (2) paraphrase without attribution;
  - (3) paraphrase with or without attribution where the wording of the original remains substantially intact and is represented as the author's own;
  - (4) expression in one's own words, but without attribution, of ideas, arguments, lines of reasoning, facts, processes, or other products of the intellect where such material is learned from the work of another and is not part of the general fund of common academic knowledge;
- (c) Fabrication: the falsification or invention of any information or citation in an academic exercise;
  - (d) Fraud: the falsification, forgery, or misrepresentation of academic work, including the resubmission of work performed for one class for credit in another class without the informed permission of the second instructor; or the falsification, forgery or misrepresentation of other academic records or documents, including admissions materials and transcripts; or the communication of false or misleading statements to obtain academic advantage or to avoid academic penalty;
  - (e) Destruction, misappropriation or unauthorized possession of University property or the property of another;
  - (f) Bribery or intimidation;
  - (g) Assisting others in any act proscribed by this Code; or
  - (h) Attempting to engage in such acts.

Penalties are listed in the Academic Code. For further information on academic misconduct please refer to the following link: <http://www.ou.edu/provost/integrity/>

**PLEASE NOTE THAT I RANDOMLY APPLY SOFTWARE DESIGNED TO DETECT PLAGIARISM ON ALL WRITTEN WORK SUBMITTED.**

**Disability Issues:** Any student in this course who has a disability that may prevent her or him from fully demonstrating his or her academic abilities should contact Frank Rodriquez (405-325-1061) as soon as possible to discuss the accommodations necessary to ensure full participation and to facilitate your educational opportunities. For further information on disability issues please refer to the following link: <http://www.dsa.ou.edu/ods/index.html>

### Topics to be Addressed

Unit 1—June 7, June 14  
Ecology

This unit introduces the topic of Ecology which is the study of the interaction of an organism with its environment, including other organisms. It is the changing

environment acting on genetically altered organisms that provides the basis for natural selection.

Reading Assignments:

Starr, Chapter 1, 39. 40. 41. 42, 43

Weiner, Chapter 4, 5, 19

Objectives for Unit 1:

Demonstrate how unity underlies the world of life

Demonstrate an understanding of how ecological principles govern the growth and sustainability of all populations

Demonstrate an understanding of how various population growth models impact society

Demonstrate an understanding of how and why every species in the community has its own niche

Demonstrate an understanding of how interactions among species influence the structure of the community

Demonstrate an understanding of how an ecosystem is an association of organisms and their physical environment

Demonstrate an understanding of why energy from the sun is the initial energy source for nearly all ecosystems of Earth

Guiding Questions for Unit 1:

Ecology means the science of how all living creatures interact within our environment. Why is it important to study Ecology?

What are biomes and how are they influenced by latitude and elevation?

Describe the ecosystem in your backyard. What imbalance(s) do you see and what is (are) their cause(s)?

Think about the global issues affecting the environment of today. What threats are there to the ecosystem? Select one area of concern and elaborate on the concerns that many people have.

Describe co-evolution. How is it involved in predator-prey relations?

## Topics and Themes to be Explored in Unit 1:

- Exponential growth
- Behavior's Heritable Basis
- Communication Signals
- Mutualism
- Predation
- Parasitism
- Ecosystems
- Biome
- Human Population Growth

## Unit 2—June 21, 28

### The Genetic Basis for Evolution

This unit provides a basis for understanding the relationship of genetics to evolution. It describes the processes through which speciation could occur and how populations can change.

#### Reading Assignments:

Starr, Chapters 10, 11, 12, 13, 15

Weiner, chapter 8, 12, 13

#### Reading Review:

Starr, Chapters 8, 9. These chapters are not required, but should be reviewed if the material is not familiar.

#### Objectives for Unit 2:

Demonstrate an understanding of how and why the continuity of life depends on reproduction

Demonstrate an understanding of patterns of inheritance

Demonstrate an understanding of why each kind of gene has its own specific location in a particular type of chromosome

Demonstrate an understanding of the structure of DNA

Demonstrate an understanding of transcription and translation

Demonstrate an understanding of why genetic engineering raises social, legal, ecological, and ethical questions

Demonstrate an understanding of how mutation can result in two or more slightly different molecular forms of a gene

Demonstrate an understanding of speciation as the process by which daughter species evolve from a parent species

Guiding questions for Unit 2:

Outline the process by which the nucleotide sequence of the DNA in a gene is translated into the amino acid sequence in a protein.

Describe the various mechanisms by which new genes can be acquired by organisms.

What are retroviruses? What is the impact of retroviruses on diseases such as HIV?

Is evolution dependent on gene duplication? If so why? If not, why not?

The Human Genome Project has significantly changed many aspects of our life? How has The HGP altered our food supply? Medical treatment? Reproductive outcomes?

Topics and Themes to be Explored in Unit 2:

- Genetics
- Chromosomes
- DNA
- RNA
- Genetic Engineering
- Microevolution
- Speciation

Unit 3---July 5, 12

Macroevolution

This unit looks at the history of evolution and basic principles underlying an understanding of evolution. It explores the evidence for evolution and speciation.

Reading Assignments:

Starr, Chapter 16, 17

Weiner, Chapter 6, 20

Objectives for Unit 3:

Demonstrate an understanding the theories of evolution

Demonstrate an understanding of the causes of evolution

Demonstrate an understanding of the role of Darwin's studies on evolution

Demonstrate an understanding of the process of speciation

Demonstrate the role of extinction in speciation and evolution

### Guiding Questions for Unit 3?

What is Macroevolution and how does it differ from microevolution?

What is meant by people don't evolve, populations do?

What evidence do we find in the fossil record that indicates that macroevolution has occurred?

How do evolutionary scientists explain the incompleteness of the fossil record (the gaps in the record)?

Under what circumstances would a crossbeak finch have an advantage over finches without a crossbeak in natural selection and sex selection?

### Topics and Themes to be Explored in Unit 3:

Theories of Evolution

Selection in favor of and against extreme phenotypes

Speciation

Genetic Drift

Extinction

Allopatric speciation

Sympatric speciation

### Unit 4---July 20, 27

#### The Case for Evolution and the Diversity of Life

This unit looks at the topic of diversity of life.

#### Reading Assignments:

Starr, Chapter 18, 1 (review)

#### Reading Review:

This is not required reading, but should be reviewed if the material is not familiar.  
Starr, 21, 22, 23, 24, 28, 29, 32, 34

Objectives for Unit 4:

Demonstrate an understanding of the proposed origin of life.

Demonstrate an understanding of immunity

Demonstrate an understanding of human life cycles

Demonstrate an understanding of the diversity of life

Demonstrate an understanding of the role of extinction on the diversity of life.

Guiding Questions for Unit 4:

In 1859, European rabbits were introduced into Australia for hunting purposes. Since there were no natural predators for rabbits in Australia, the rabbits soon multiplied in an uncontrolled fashion and became a major problem. The rabbits attacked and ate crops intended for human consumption.

In 1950, two virologists introduced a virus into the rabbit population in Australia. This virus, myxoma virus, had been shown effective in killing rabbits found in America. Though the actual viral effects on the European rabbit were not known at the time, it was hoped that it could be used to control the Australian rabbits. Mosquitoes were used as a means to spread the disease throughout the rabbit population. Some of the results were:

After Year 1----90% of the rabbits were killed

After Year 2----90% of the rabbits were killed

After Year 3----50% of the rabbits were killed

Why do you think that only 50% of the rabbits were killed after the third year.

By the 7<sup>th</sup> year after the introduction of the virus, **99% of the original number of rabbits were present.** In 1957, the original viruses were injected into new rabbit hosts; only 25% of rabbits died (as opposed to 90% initially).

Why do you think the viruses originally inoculated in 1950 killed only 25% of the rabbit hosts in 1957?

Rabbits continue to be a problem in Australia. Can you think of other ways of attempting to control the rabbit population?

What negative consequences might your suggested solution have?

Topics and Themes to be considered in Unit 4:

Evolution of Life

Biodiversity  
Immunity