

The University of Oklahoma
College of Liberal Studies
Ecology and Evolution
LSTD 3443 - Sec 801
October 18, 25, November 1, 8, 15, 29, December 6, 2007
5:30-9:30 pm
Rose State College
Tom Steed Center – Room 205

Faculty: Dr. Thomas J. Nolan III Email: TJNolan333@aol.com

Introduction and Overview:

Course Objective:

This course is designed to provide an introduction to ecology and evolution concepts. It will begin with the Darwinian revolution and the ideas behind speciation and extinction. We will then study both community and population ecology. This unit will center on the types of interaction that occur between species (e.g. predation and parasitism). The course will conclude by looking at environmental issues in biology.

Course Format:

A combination of lecture, discussion, videotapes, group projects, and individual study will be used.

Course Requirements:

Both class attendance and participation in class activities, such as discussions and group projects, are important aspects of the course. Therefore, a portion of your grade will be based on these factors.

Required Textbooks

Starr, C. (2002). Biology: Concepts and Applications, 6th Edition. Belmont: CA: Thomson Brooks/Cole. ISBN-10: 0495188352, ISBN-13: 978-0495188353.

Weiner, Jonathon (1995). The Beak of the Finch. New York: Vintage Books. ISBN-10: 067973337X, ISBN-13: 978-0679733379.

Description of Work Required:

All work is to be submitted by using the DROP BOX on the Class Website (learn.ou.edu) (log in and go to the course web page - LSTD 3443-801 LS FA07 - Ecology & Evolution). Send all three components i.e., 1) journals, 2) website links, and 3) course panning topic, as one (1) file (Exam I, Exam II, etc.).

Journals:

Students will be required to submit a journal entry for each unit. These should be 350-500 words in length. Journal should be emailed to the instructor. The journal due dates are as follows:

(Reflective Journal):

Select four of the five questions under Think About It and submit responses to each of them. Each of these four responses should be a half a page in length. Next, prepare a critical journal based on the theme of the remaining question. The journal entry should be one to two pages in length and include a bibliography of all resources used in its preparation.

Unit 1 – journal due no later than Thursday, October 25, 2007

Unit 2 – journal due no later than Thursday, November 8, 2007

Unit 3 – journal due no later than Wednesday, November 21, 2007

Unit 4 – journal due no later than Thursday, December 6, 2007

Website Links:

For each unit, students will be required to submit six (6) websites that the student views as particularly relevant to the unit under study. The website should be placed in the Drop Box on the class website as part of the submitted exam. The exam submissions should include the websites and a 3 or 4 sentence description of each site. The website links due dates are as follows:

Internet Research:

Prepare and submit an annotated bibliography consisting of the six Internet resources you have located. The annotation should consist of the complete URL and a sufficient description of the contents of the sites to allow the instructor to evaluate the usefulness of each site as a resource for the course. Click here for more details on this assignment.

Unit 1 – website links due no later than Thursday, October 25, 2007

Unit 2 – website links due no later than Thursday, November 8, 2007

Unit 3 – website links due no later than Wednesday, November 21, 2007

Unit 4 – website links due no later than Thursday, December 6, 2007

Course Spanning Assignment Final Essay Part A (Final Project Paper):

Unit 1 – identify 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, October 25, 2007

Unit 2 – Turn in an outline of your paper with 5 additional relevant links (with one paragraph description each). Due no later than Thursday, November 8, 2007

Unit 3 – Turn in a draft of your final Wednesday, November 21, 2007

Unit 4 – Final Project paper due Thursday, December 6, 2007

Please send all three components, 1) journal; 2) website links; and 3) course spanning topic as one file, i.e., Exam I, Exam II, etc.) Submit each exam in the Drop Box on the LSTD 3443-801 LS FA07 - Ecology & Evolution Home page.

You may email specific questions to me at Thomas.J.Nolan.III-1@ou.edu

Final Project:

Each student will be required to submit a 1000-word essay, with a minimum of 10 cited references. The project should incorporate many of the issues discussed in the readings. Websites links that were submitted for the websites links may be used as references for your essay. The final project is a very important part of the course grade.

Projects will be graded on how well the selected topic is researched, how well the 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.

Class Participation:

Class participation is required. Please note that there are only seven class sessions as the sixth class session falls on Thanksgiving. So, being in and participating in class is critical. Also, please note that Exam III is due on Wednesday November 21, 2007.

All work must be submitted by email (TJNolan333@aol.com) on the dates assigned above.

LATE WORK WILL NOT BE ACCEPTED UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE WITH THE INSTRUCTOR

Grade Policies:

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

<u>Assignments</u>	<u>Points</u>
Journals (4 x 80 points for each unit)	320
Website links (4 x 50 points for each unit)	200
Class participation (4 x 20 points per class)	80
Course spanning assignment/final paper (3 x 50 points each)	150
Final Project Paper	<u>250</u>
Total Points	1000

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

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

Procedures for Removing Incompletes:

Students will make arrangements with the instructor to complete coursework. If all coursework is completed with 4 weeks, there will be no negative consequences to the grade. Coursework completed after 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/>

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 Rodriguez (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 Listed by Week

Topics Extend Over a Two-Week Period

Unit One Overview (Week 1 & 2):

Unit One introduces the topic of ecology, which is the study of the interaction of an organism with its environment, including other organisms. We begin with ecology because it is a changing environment acting on genetically altered organisms that provide the basis for natural selection.

Unit One Objectives:

After completing this unit, students will be able to:

- Demonstrate an understanding of 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 genes underlie the behavioral ability of individuals;
- Demonstrate an understanding of how evolved modes of communication underlie social behavior;
- 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; and
- Demonstrate an understanding of the effects of pollutants as substances with which ecosystems have had no prior evolutionary experience.

Topics and Themes You Will Explore

- Exponential Growth
- Behavior's Heritable Basis
- Communication Signals
- Mutualism
- Predation
- Parasitism
- Ecosystems
- Biome
- Global Air Circulations
- Pollutants
- Human Population Growth

Reading Assignments: Please read the following chapters in your texts:

Starr Text

- Chapter One
- Chapter Thirty-nine

- Chapter Forty
- Chapter Forty-one
- Chapter Forty-two
- Chapter Forty-three

Weiner Text

- Chapter Four
- Chapter Five
- Chapter Nineteen

In addition to the above chapters, please read the contents of the Web sites listed under **Check Out These Web sites!** Also locate and read the contents of six additional Web sites that are related to the topics of Unit One, and submit an annotated bibliography providing their complete URL and a description of their content.

[Chapter Summaries](#)

Think About It! Guiding Questions to consider as you read and explore the Internet.

One of these questions will serve as the topic for your Unit One Journal entry.

You will submit responses to the remaining four questions.

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 imbalances 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.

Define co-evolution. How is it involved in predator-prey relationships in an ecosystem?

Check Out These Web sites!

[Evolution on Fast Forward](#)

[Ecology Web page](#)

[Biosphere \(defined\)](#)

[Biosphere Program](#)

[Ecosystem](#)

[USGS-The Learning Web](#)

[EPA](#)

[Environmental Games \(interactive\)](#)

[Smithsonian Institute: Natural History](#)

Unit Two Overview (Week 3 & 4):

This unit provides a basis for understanding the relation of genetic processes to the process of evolution, and describes the processes through which speciation can occur and how life could have originated.

Unit Two Objectives:

After completing this unit, students will be able to

- Demonstrate an understanding of how and why the continuity of life depends on reproduction
- Demonstrate an understanding of meiosis
- 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 cell differentiation
- Demonstrate an understanding of speciation as the process by which daughter species evolve from a parent species

Topics and Themes You Will Explore

- Cell Division
- Mitosis
- Meiosis
- Genetics
- Chromosomes
- Genetic Engineering
- Microevolution
- Speciation

Reading Assignments: Please read the following chapters for your texts

Starr Text

- Chapter Eight
- Chapter Nine
- Chapter Ten
- Chapter Eleven
- Chapter Sixteen
- Chapter Seventeen

Weiner Text

- Chapter Eight
- Chapter Twelve
- Chapter Thirteen

Required Online Reading

- The Origin of Life on Earth

In addition to the above chapters, please read the contents of the Web sites listed under Check Out These Web sites! Also, locate and read the contents of six additional Web sites that are related to the topics in the unit. You will notice that The Origin of Life of Earth online lecture concludes with a link to another lecture - this lecture, and those that follow it - are not required reading, but are provided for those who want to learn more.

Chapter Summaries

Think About It! Guiding Questions to consider as you read and explore the Internet. These questions will also be used as a topic source for your journal entry.

Describe how hybridization can contribute to speciation.

What is the role of mutation in the formation of species through hybridization?

What is genetic drift and how may it be involved in speciation?

Describe how natural selection affects our ability to develop cures for a disease such as AIDS?

Compare and contrast allopatric and sympatric speciation. Which of these, or are both of these, at work within the finch populations in the Galapagos archipelago? Explain your answer.

Check Out These Web sites!

The Way We Were

<http://trollart.com/way2.html#A>

Macro versus Microevolution

www.forerunner.com/forerunner/X0737_Macro_vs._Micro_Evol.html

How Did We Get Here? (Nova)

www.pbs.org/wgbh/nova/odyssey/debate/

Evolution of Humans

www.pbs.org/wgbh/evolution/humans/humankind/index.html

Documentary Redraws Human Family Tree

www.news.nationalgeographic.com/news/2002/12/1212_021213_journeyofman.html

Natural Selection

www.anthro.palomar.edu/synthetic/synth_7.htm

Speciation

www.users.rcn.com/jkimball.ma.ultranet/BiologyPages/S/Speciation.html

Unit Three Overview (Week 5 & 6)

This unit addresses the topics of biodiversity, and introduces the topic of mammalian immunity.

Unit Three Objectives

After completing this unit, students will be able to:

- Demonstrate an understanding of biogeography;
- Demonstrate an understanding of plant tissues;
- Demonstrate an understanding of the structure and formation of plants as adaptive responses to water and mineral concentrations;
- Demonstrate an understanding of plant reproduction; and
- Demonstrate an understanding of Immunity.

Topics and Themes You Will Explore

- Macroevolution
- Plant Tissues
- Plant Nutrition
- Plant Development
- Immunity

Reading Assignments: Please reading the following chapters for your texts:

Starr Text

- Chapter Nineteen
- Chapter Twenty-one
- Chapter Twenty-two (sections 22.1 and 22.2)
- Chapter Twenty-three
- Chapter Twenty-four
- Chapter Thirty-four

Weiner Text

- Chapter Six
- Chapter Twenty

In addition to the above chapters, please read the contents of the Web sites listed under Check Out These Web sites! Also, locate and read the contents of six additional Web sites that are related to the topics in the unit.

Chapter Summaries

Think About It! Guiding Questions to consider as you read and explore the Internet. You will submit a response to four of the following questions. The remaining question will serve as the topic for your journal entry.

What is macroevolution? How does it differ from microevolution?

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

How do evolution scientists explain the incompleteness of the fossil record (i.e., that there are “gaps” in the record)?

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

What is sex selection and what role does it play in evolution? What are some of the strategies Darwin's finches use in playing this role?

Check Out These Web sites!

UCMP Museum of Paleontology - www.ucmp.berkeley.edu/

American Museum of Natural History-fossils (Does not work) - www.paleo.amnh.org/fossil/FRC.xindex

Human Evolution Activity - www.pbs.org/wgbh/aso/tryit/evolution/#

Human Evolution: Fossil Evidence in 3-D - www.anth.ucsb.edu/projects/human/

Macroevolution of the 21st Century www.nhm.ac.uk/hosted_sites/paleonet/paleo21/mevolution.html

Animal Diversity Web – www.animaldiversity.ummz.umich.edu/site/index.html

Human Fossil Adds Fuel to Debate – www.news.nationalgeographic.com/news/2002/03/0325_0322_asiaevolution.html

Human Origins - www.nationalgeographic.com/outpost/

Becoming Human - www.becominghuman.org/

Invertebrate Fossil Gallery – www.paleo.amnh.org/projects/invert/index.html

Biodiversity and Heterogeneity – www.biology.usgs.gov/error.html

Macroevolution versus Microevolution - www.ou.edu/cls/online/lstd3443/pdfs/macrovsmicro.pdf

Unit Four Overview (Week 7 & 8)

This unit describes molecular events that contribute to genetic changes that are acted upon through natural selection to bring about evolution.

Unit Four Objectives

After completing this unit, students will be able to:

- Explain the relationship between gene structure and protein structure;
- Explain how changes in the amino acid sequence in proteins can change the three dimensional structure of the protein;
- Identify and explain the mechanisms by which new genes can be obtained in a species; and
- Understand the proposed role of RNA in the origin of life.

Topics and Themes You Will Explore

- DNA Structure and Function
- Protein Structure and Function

- Role of the different forms of RNA in gene expression through protein synthesis
- Effect of mutations on protein structure and function
- Acquisition of new genes
- Origins of life

Reading Assignments: Please reading the following chapters for your texts:

Starr Text

- Chapter Three, Sections 3.5 through 3.7
- Chapter Four, Sections 4.4 through 4.11
- Chapter Twelve
- Chapter Thirteen
- Chapter Fourteen
- Chapter Fifteen

Online Lecture: Molecular Evolution

In addition to the above chapters, please read the contents of the Web sites listed under Check Out These Web sites! Also, locate and read the contents of six additional Web sites that are related to the topics in the unit. (Note: Sections listed for Chapter Three and Chapter Four are for review if needed.)

Chapter Summaries

Think About It! Guiding Questions to consider as you read and explore the Internet. These questions may also be used as a writing prompt for your journal entry.

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

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

What are the characteristics of retroviruses? How do retroviruses (as retro-transposons) contribute to gene duplication in organisms?

Gene duplication is considered to be a very important step in evolution. If gene duplication did not occur, how would evolution occur?

Consider the following observed facts:

- Humans possess all the genes necessary for Vitamin A synthesis except one. All the other genes are capable of producing functional enzymes, and the missing gene is present as a pseudogene.
- The antifreeze glycoprotein (AFGP) is produced by notothenoid fishes that live in the frigid waters off the coast of Antarctica. The amino acid sequence of AFGP is very similar to that of the proteolytic enzyme Trypsinogen, except for these exceptions:
 - Trypsinogen contains a single grouping of three amino acids, Threonine-Alanine-Alanine, at the beginning of the domain coded for by Exon 2 of its gene. AFGP contains a series of 87 copies of the Threonine-Alanine-

Alanine grouping. (This amino acid triplet is responsible for the anti-freeze characteristic of the protein.)

- The AFGP lacks Exons 3-5 that are found in the Trypsinogen gene.
- One species of the notothenoid family produces an AFGP that contains part of the exon 3-5 grouping that is found in Trypsinogen but not in the AFGP found in other members of the family.

How would these two sets of observations be explained under the Evolution and Intelligent Design theories? Which would predict that these facts would be observed? Explain your answer.

Check Out These Web sites!

Molecular Evolution –

www.biomed.brown.edu/Courses/BIO48/12.Molecular.Evolution.HTML

Lecture on Molecular Evolution I – www.drnelson.utm.edu/evolution.html

Lecture Notes on Evolution II – www.drnelson.utm.edu/evolution2.html

The Origin of Life on Earth - www.ou.edu/cls/online/lstd3443/origin.shtml

Intelligent Design - www.talkorigins.org/faqs/cosmo.html

About the Instructor:**Name:**

Thomas J. Nolan, III
4235 Brookview
Norman, Oklahoma 73072
(405) 360-1700
Thomas3@aol.com

Relationships:

Married, two children, four grandchildren

Degrees:

BS: Mathematics and Chemistry
MS: Inorganic Chemistry
PhD: Social Psychology of Health

Certifications:

Certified Trainer- Behavior Modification Consultant in the Business Leadership Training Program (BLTP) from the McBer and Co.

Academic Teaching Experience :

Graduate Teaching Assistant - University of Oklahoma
Assistant Professor of Chemistry – Langston University
Adjunct Professor of Science and Adjunct Professor of Psychology - Oklahoma City Community College

Professional Experience:

Research Engineer - North American Rockwell, Tulsa, Oklahoma
Chemist - Dowell Division of the Dow Chemical Co. Tulsa, OK
Director of OJT Manpower Development Program - North Tulsa Contractors and Craftsmen, Inc. Tulsa, Oklahoma
Director of Project Beginnings, A Tutorial Program for At-Risk High School Students - Beginnings, Inc. of Oklahoma City, OK

Management Training Experience:**State of Oklahoma:**

Director of Minority Business Development Programs - Business & Industrial Services, Oklahoma Center for Continuing Education, The University of Oklahoma. Norman, Oklahoma

Contract Instructor for the Office of Personnel Management, Human Resource Development Services Division, State of Oklahoma

Owner, President of Dynamic Communications Co. – Norman, OK

Other Public Institutions:

Training Consultant - Head Start and Community Action Agencies, Oklahoma City, OK

Training Consultant - University of Oklahoma, Langston University, Oklahoma City Public Schools

Interests:

Hobbies and other pursuits :

Trout fishing, reading and discussing philosophical and metaphysical ideas, visiting mountain and beach areas, and daily meditation

Writing:

Developing my philosophy of being, how I deal with others, as well as, manage the drama of life

Music:

Classical, Jazz, Blues, Nouveau Flamenco

Favorite Website:

www.Borders.com

www.Audible.com

www.sky-fm.com – classical/flamenco guitar channel

www.sirius.com

Most Memorable Learning Experience:

Behavioral Modification Training Program with the McBer & Co. The program was based on David McClelland's Achievement Motivation Program. The program was designed to assist minority business people to become more successful entrepreneurs.