



**MOREHEAD STATE UNIVERSITY
PROFESSIONAL EDUCATION UNIT
COLLEGE OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF BIOLOGY AND CHEMISTRY
COURSE SYLLABUS**

**BIOLOGY 499D, PRINCIPLES OF EVOLUTION
DELIVERY METHOD - TRADITIONAL**

Fall 2010

**TTh 5:20 – 6:40 311 Lappin
Dr. Sean O’Keefe**

Office: Lappin 301B
Phone: 783-2954
Email: s.okeefe@moreheadstate.edu
Office hours: MW 10:00 – 11:00, 2:00 – 3:00, or by appointment

COURSE DESCRIPTION: Major principles of evolutionary biology are illustrated by using examples from molecular, cellular, and organismal biology, history of evolutionary theory, population genetics, natural selection, speciation, and macroevolutionary patterns. This course satisfies the integrative component for general education for students completing a major in biology.

Required Field Experience Hours: 0

“Community Engagement: A Light to and from the Mountains”

The Professional Education Unit at Morehead State University delivers rigorous, high quality programs that prepare professionals informed by best national and international scholarship, plus research, literature, and experiences specific to Appalachia- preparing professionals to improve the schools, quality of life, and the communities in which they live and serve. This statement is not only the strategic mission for the College, but it also incorporates the conceptual framework that guides all our activities.

Conceptual Framework Outcomes (CFO’s):

The Unit and the faculty within individual programs assess the degree to which its graduates:

- 1) Master the content knowledge, professional and the twenty – first century skills need to make an optimal contribution to “whole” student learning in education settings.

2) Are competent in the collection and use of data to inform decision-making and to demonstrate accountability for student learning.

3) Demonstrate professional dispositions

4) Are culturally competent and understand the regions from which they have come utilizing knowledge and experiences to effectively “bridge the gaps” (economic, achievement, and geographic) ensuring optimal learning for all students.

5) Engage in authentic field experiences in collaboration with committed school – based partners and are empowered to improve the quality of education throughout this region and beyond.

Student Learning Outcomes: This course has two primary goals: to cover the basics of evolutionary theory as the unifying principle in biology, and to assess you in multiple ways as you finish your program in the B&C at Morehead State University. When you have finished this course, you should have a general understanding of the primary components of evolutionary theory, and have improved upon your presentation skills.

By the end of the course you should have a general understanding of:

- 1.- natural selection and sexual selection
2. - the importance of intraspecific variation at all levels
3. - speciation
4. - macroevolutionary patterns
5. - molecular evolution
6. - how genetic drift, natural selection, and gene flow affect variation
7. - the role of life history evolution and coevolution have played
8. - the importance of developmental patterns and processes on evolution

By the end of the course you should have improved upon your skills of:

- 9.- oral presentation
10. - written expression

NCATE/ EPSB Accreditation Alignment of CFO’s and SLO’s:

Program: [Evolution]	[Biology-teaching]				[Principles of]
Aligned with→ Assessment↘ (point values)	Kentucky Teacher Standards (KYS)	Kentucky Education Reform Act (KERA)	Education Professional Standards Board (EPSB)	National Science Teacher’s Association (NSTA)	NCATE
[short responses, 100; quizzes, 100, final, 30]	1	2	literacy	1.2, 4	1

CFO: 1 SLO: 1-8					
[presentations, 50] CFO: 1, 2 SLO: 9	1	1	literacy	1, 2, 4	1
[discussion, 50] CFO: 1, 2 SLO: 1-8	1	1	literacy	1, 2, 4,	1
[essays, 100, term paper, 100] CFO: 1 SLO: 10	1	1	Literacy	1, 2, 4	1
[formal presentation, 50] CFO: 1, 2, 3 SLO: 9			Literacy	1, 2, 4	1
[resume, 20] CFO: 1 SLO: 10					1

Assignment Descriptions:

Program: [Biology-teaching] [Principles of Evolution]	
Assessment (point value)	Description
[short responses, quizzes, essays, final, 330]	The evolution content of your assessments will consist of essay questions and objective questions (multiple-choice, short answer, labeling figures, calculations, etc.). The assessments will test your reasoning and analytic abilities on the subject matter (90 pts), and will also allow me to assess your written expression (10 pts). 10 sets of short responses, 10 essays, and 20 quizzes will cover the content portion of the course.
[presentations, 50]	You will choose two topics from a list on which you and a partner will give a short (12 minute) PowerPoint presentation. You should pick a different partner for each presentation. I will pass out an evaluation form for your information on the point distribution.
[discussion, 50]	You are expected to participate in discussion - which means answering questions from a speaker, or asking thoughtful questions of a speaker. Scores will range from 35 (for little or no

	participation) to 50 (for extensive participation).
[term paper, 100]	Details of your term paper, and deadlines will be given in a separate handout. The paper will develop writing skills and solidify understanding of critical evolutionary concepts.
[formal presentation,50]	Your formal presentation will be a 10 minute overview of your term paper.
[resume, 20]	You will need to submit a resume. Details on the format and deadline will be given in a separate handout and information on constructing a resume is provided on Blackboard.

GRADING:

Point distribution:

10 sets of short responses	100 points
10 essays	100 points
20 quizzes	100 points
2 presentations	50 points
Discussion	50 points
Term paper	100 points
Formal presentation	50 points
Resume	20 points
Final	30 pts
Total	600 points

Grading scale:

A = 90 - 100%	D = 60 - 69.9%
B = 80 - 89.9%	E = 0 - 59.9%
C = 70 - 79.9%	

PREREQUISITES: Senior standing with completion of a minimum of 23 hours of Biology from the Biology Major, including Genetics and Microbiology.

REQUIRED TEXTS: 1) Futuyma, D.J. 2009. *Evolution*, 2nd ed. Sinauer Associates, Sunderland, MA. ISBN 978-0-87893-223-8. 2) Darwin, C. 1859. *On the Origin of Species*. Harvard University Press, Cambridge. MA. ISBN 0-674-63752-6.

STUDENT EXPECTATIONS: You are expected to attend all course meetings and participate in class discussions. I will expect that you will have read the assigned text materials before class, and will be prepared to participate in class discussions. If you are absent, it is your responsibility to see if any assignments were made, or materials returned during your absence.

ASSESSMENTS: Your grade in this course will be based on multiple forms of assessment.

These are designed to measure your analytical reasoning (short response questions, discussion), presentation skills (presentations), and written expression (essays, term paper). These skills you should have acquired in the Biology program, and will aid you in your future work.

Essays: The best ten of eleven essays will count towards your final score. Each essay is 10 pts (7 pts for content and 3 pts for style). A selection of essay topics will be given on Blackboard after class on Tue (hopefully up by midnight - depending on which Tue), and you should be prepared to write on each topic the following Thur. There will not be any makeups for missed essays.

Short responses: Each Tue you will be given four or five short answer questions, figures to label, or problems to solve. For the most part, these will be taken from the most recent four study guides. Each set of short responses will count 10 pts towards your final score. Eleven sets of short responses will be given. Your best ten scores will count. There will not be any makeups for missed short responses.

Quizzes: At the beginning of each class there will be a five point quiz. The questions will be presented on Powerpoint slides and you will have 30 seconds per question. The questions will be based on the readings for the day, or on student presentations or lectures the previous three meetings. The best 20 quizzes will count toward your final grade. There will not be any makeups for quizzes

Presentations: You will choose two topics from a list on which you and a partner will give a short (12 minute) PowerPoint presentation. You should pick a different partner for each presentation. I will pass out an evaluation form for your information on the point distribution.

Discussion: You are expected to participate in discussion - which means answering questions from a speaker, or asking thoughtful questions of a speaker. Scores will range from 35 (for little or no participation) to 50 (for extensive participation).

Term paper: Details of your term paper, and deadlines will be given in a separate handout.

Skills assessments: Details of the skills assessments will be given in a separate handout or presented by the skills assessment faculty. The skills assessments will be held during non-class hours.

Formal presentation: Your formal presentation will be a 10 minute overview of your term paper.

Resume: You will need to submit a resume. Details on the format and deadline will be given in a separate handout and information on constructing a resume is provided on Blackboard.

ATTENDANCE POLICY: You are expected to attend **all** lecture meetings, roll will be taken at each meeting. Each **unexcused** absence will result in a 10-point deduction from your final point total. The only excusable absences are documented evidences (provide written documentation) of **personal illness/injury, family emergency,** or

university-sponsored activity. Make-up exams will be given at my discretion and convenience with an excused absence only.

TECHNOLOGY IN THE CLASSROOM: Cell phones should either be turned off or set on vibrate during lectures and exams. You may use tape recorders or laptop computers during lectures (but if using laptop computers, it must be for note taking), but all electronic devices, except calculators, are not to be seen during exams.

USE OF TECHNOLOGY: You will be expected to use computer technology to search the Internet for topic-related information, access course materials on Blackboard, to write term papers, and to prepare and give multimedia technology to enhance lecture presentations.

PLAGIARISM/CHEATING: If caught cheating, you will not receive a grade for the test (i.e. a "0") at a minimum. If caught (or suspected of) plagiarizing, you will not receive a grade (i.e. a "0") for the assignment at a minimum. Plagiarizing is more than direct copying of text without proper recognition; it also constitutes slight rewording, or rearrangement of phrases. If caught cheating or suspected of plagiarizing, you will be reported to the department chair, and possibly removed from the class.

DISABILITIES: If you feel that you need an accommodation for any type of disability, please make an appointment to see me after class or during my office hours as soon as possible. You may also contact the University disability officer, Ms. Evangeline Day, AY 223, 3-5188.

Campus Safety Statement

Emergency response information will be discussed in class. Students should familiarize themselves with the nearest exit routes in the event evacuation becomes necessary. You should notify your instructor at the beginning of the semester if you have special needs or will require assistance during an emergency evacuation. Students should familiarize themselves with emergency response protocols at <http://www.moreheadstate.edu/emergency>

COURSE CONTENT and SCHEDULE 499D FALL 2010

Part I: Introduction to Evolutionary Thought.

		<u>Readings</u>
Aug	24	What is Evolution? Evolution Facts and theories The comparative method
		Futuyma Ch 1
	26	The History of an Idea Evolution before Darwin Darwin's influence Post-Darwinian evolution The evolutionary synthesis
		Darwin: Mayr's introduction Darwin's introduction
	31	Classification and Phylogeny Basic phylogenetics Complicating issues
		Futuyma Ch 2
Sep	2	Patterns of Evolution Character evolution Patterns of evolutionary change Evolutionary trends
		Futuyma Ch 3 Darwin Ch 1

Part II: Patterns of Evolution

Sep	7	Evolution in the Fossil Record The fossil record Hominid fossils Punctuated equilibria
		Futuyma Ch 4
	9	A History of Life Precambrian life Paleozoic life Mesozoic life Cenozoic life
		Futuyma Ch 5 Darwin Chs 2 and 3
	14	Biogeography and Biodiversity Patterns of distributions Phylogeography Ecological biogeography Changes in taxonomic diversity Rates of extinction
		Futuyma Chs 6 and 7 Darwin Ch 4
	16	Variation Basic population genetics Genetic variation in populations Variation among populations
		Futuyma Ch 9
	21	TBA

Part III: Processes of Evolution: Microevolution

Sep	23	Genetic Drift Theory of genetic drift Evolution by genetic drift Neutral theory of molecular evolution Gene flow and genetic drift	Futuyma Ch 10 Darwin Ch 6
	28	Natural Selection and Adaptation Natural selection Levels of selection Adaptations	Futuyma Ch 11
	30	Genetics of Natural Selection Fitness Models of selection Maintenance of polymorphism	Futuyma Ch 12 Darwin Ch 7
Oct	5	Evolution of Phenotypic Traits Phenotypic variation Evolution of quantitative characters Norms of reaction	Futuyma Ch 13
	7	Life Histories Life history evolution Modes of reproduction Inbreeding and outcrossing	Futuyma Ch 14 Darwin Ch 8
	12	Sex and Reproduction Conflict and Cooperation Altruism Genetic conflicts	Futuyma Ch 15 Futuyma Ch 16 Darwin Ch 9
	19	TBA	

Part IV: Processes of Evolution: Macroevolution

Oct	21	Species Species definitions Barriers to gene flow Genetics of species Hybridization	Futuyma Ch 17
	26	Speciation Allopatric speciation Sympatric speciation Speciation by polyploidy	Futuyma Ch 18 Darwin Ch 10
	28	Coevolution Mutualisms Competitive interactions	Futuyma Ch 19

Nov	2	Evolution and Development Evolution of genes and proteins Origin of new genes HOX genes Developmental constraints	Futuyma Ch 21 Darwin Ch 11
	4	Macroevolution Rates of evolution Phylogenetic conservatism Evolution of novelty	Futuyma Ch 22
	9	Evolution and Creationism Creationism 101 UnIntelligent design	Futuyma Ch 23 Darwin Ch 12
	11	TBA	
	16	TBA	
	18	Resumes and your future	
	23	Major Fields Exam	
	30	Student presentations	
Dec	2	Student presentations	
	7	Student presentations	
	9	Student presentations	
	14	Final	

Additional readings may be announced. Non-textbook readings will be on reserve in the CCL, and will also usually be available through electronic course reserves.

Modifications to this syllabus may be made. You will be notified of any changes.