



Morehead State University
Biology and Chemistry

Principles of Evolution
BIOL 499D
Fall 2011

Sean T. O'Keefe
301B Lappin
s.okeefe@moreheadstate.edu
783-2954
Office hrs: M-F 9:00 – 10:00, 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.

“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 (SLO’s): By the end of this course, the candidate will be able to:

1. Understand the key processes of evolutionary biology (e.g. natural selection, sexual selection, speciation, genetic drift, molecular evolution, etc.)
2. Understand and interpret phylogenetic diagrams
3. Understand the key patterns of evolutionary biology (e.g. fossil record, macroevolutionary patterns, biogeography, etc.)
4. Understand the roles of coevolution, life history patterns, and developmental processes have played in evolutionary history.
5. Improve upon oral presentation skills
6. Improve upon written expression skills
7. Improve upon literature search skills

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

Program:	[program title]		[course title]	
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)
Exams 300 pts CFO: 1 SLO: 1, 2, 3, 4, 6	1, 2, 4	1, 2		1, 2
Content presentations 50 pts CFO: 1 SLO: 1, 2, 3, 4, 5, 7	1, 2, 4	1, 2		1, 2
Discussion 50 pts CFO: 1 SLO: 1, 2, 3, 4	1, 2			1, 2
Term paper 100 pts CFO: 1 SLO: 6, 7	1, 2	1, 2		1

Term presentation 50 pts CFO: 1 SLO: 5, 7	1, 2, 4	1, 2		1
Skills assessments 30 pts CFO: SLO:				
Resume 20 pts CFO: SLO:				

Assignment Descriptions:

Program: Biology and Chemistry: Principles of Evolution	
Assessment (point value)	Description
Exams 300 pts	The evolution content of your exams will consist of four essay questions, and numerous objective questions (multiple-choice, short answer, labeling figures, calculations, etc.). The exams 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). Three exams will cover the content portion of the course. If you miss an exam, you can make it up within 7 days of the exam, provided you have a university approved documented excuse.
Content presentations 50 pts	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 pts	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 pts	The objective of this project is for you to read one of the

	recommended books on evolution, and write a concise summary of the work. The purpose of this assignment is 1) to introduce you to biological literature, 2) for you to analyze biological literature, 3) to improve upon your organization, discussion, and scientific writing skills, 4) to summarize a scientific work for you to present to your fellow classmates, and 5) to introduce you to peer review and editing.
Term presentation 50 pts	This presentation will be a summary of your term paper.
Skills assessments 30 pts	Your laboratory skills in genetics, microbiology, and biochemistry will be or have been assessed.
Resume 20 pts	For this project you are to write a resume and participate in the discussion on resume writing, cover letters, interview techniques, and possible employment opportunities after you graduate.

Grading Scale:

A = 90 - 100%

B = 80 - 89.9%

C = 70 - 79.9%

D = 60 - 69.9%

E = 0 - 59.9%

Required Textbooks: 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.

Course Evaluation:

[be very specific]

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.

Academic Honesty

Cheating, fabrication, plagiarism or helping others to commit these acts will not be tolerated. Academic dishonesty will result in severe disciplinary action including, but not limited to, failure of the student assessment item or course, and/ or dismissal from MSU. If you are not sure what constitutes academic dishonesty, read the Eagle: Student Handbook or ask your instructor. An example of plagiarism is copying information from the internet when appropriate credit is not given. The policy is located at

<http://morehead-st.edu/units/studentlife/handbook/academicdishonesty.html>

Americans with Disabilities Act (ADA)

In compliance with the ADA, all students with a documented disability are entitled to reasonable accommodations and services to support their academic success and safety. Though a request for services may be made at any time, services are best applied when they are requested at or before the start of the semester. To receive accommodations and services the student should immediately contact the Disability Services Coordinator in the Office of Academic and Career Services, 223 Allie Young Hall, 606-783-5188, www.moreheadstate.edu/acs/

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 Calendar:

COURSE CONTENT and SCHEDULE BIOL 499D FALL 2011

Part I: Introduction to Evolutionary Thought

		<u>Readings</u>	
Aug	23	What is Evolution? Evolution Facts and theories The comparative method	Futuyma Ch 1
	25	The History of an Idea Evolution before Darwin Darwin's influence Post-Darwinian evolution The evolutionary synthesis	Darwin: Myer's introduction Darwin's introduction
	30	Classification and Phylogeny Basic phylogenetics Complicating issues	Futuyma Ch 2
Sep	1	Patterns of Evolution Character evolution Patterns of evolutionary change Evolutionary trends	Futuyma Ch 3 Darwin Ch 1

Part II: Patterns of Evolution

	6	Evolution in the Fossil Record The fossil record Hominid fossils Punctuated equilibria	Futuyma Ch 4
	8	A History of Life Precambrian life Paleozoic life Mesozoic life Cenozoic life	Futuyma Ch 5 Darwin Chs 2 and 3
	13	Biogeography and Biodiversity Patterns of distributions Phylogeography Ecological biogeography Changes in taxonomic diversity Rates of extinction	Futuyma Chs 6 and 7 Darwin Ch 4
	15	Exam I (Futuyma Chapters 1 - 7, Darwin Chapters 1 - 4)	

Part III: Processes of Evolution: Microevolution

Sep	20	Variation	Futuyma Ch 9
		Basic population genetics	
		Genetic variation in populations	
		Variation among populations	
	22	Genetic Drift	Futuyma Ch 10
		Theory of genetic drift	
		Evolution by genetic drift	
		Neutral theory of molecular evolution	
		Gene flow and genetic drift	Darwin Ch 6
	27	Natural Selection and Adaptation	Futuyma Ch 11
		Natural selection	
		Levels of selection	
		Adaptations	
	29	Genetics of Natural Selection	Futuyma Ch 12
		Fitness	
		Models of selection	
		Maintenance of polymorphism	Darwin Ch 7
Oct	4	Evolution of Phenotypic Traits	Futuyma Ch 13
		Phenotypic variation	
		Evolution of quantitative characters	
		Norms of reaction	
	6	Life Histories	Futuyma Ch 14
		Life history evolution	
		Modes of reproduction	
		Inbreeding and outcrossing	Darwin Ch 8
	11	Sex and Reproduction	Futuyma Ch 15
		Conflict and Cooperation	Futuyma Ch 16
		Altruism	
		Genetic conflicts	Darwin Ch 9
	18	Exam II (Futuyma Chapters 9 - 16, Darwin Chapters 6 - 9)	

Part IV: Processes of Evolution: Macroevolution

	20	Species	Futuyma Ch 17
		Species definitions	
		Barriers to gene flow	
		Genetics of species	
		Hybridization	

	25	Speciation Allopatric speciation Sympatric speciation Speciation by polyploidy	Futuyma Ch 18 Darwin Ch 10
	27	Coevolution Mutualisms Competitive interactions	Futuyma Ch 19
Nov	1	Evolution and Development Evolution of genes and proteins Origin of new genes HOX genes Developmental constraints	Futuyma Ch 21 Darwin Ch 11
	3	Macroevolution Rates of evolution Phylogenetic conservatism Evolution of novelty	Futuyma Ch 22
	8	Evolution and Creationism Creationism 101 UnIntelligent design	Futuyma Ch 23 Darwin Ch 12
	10	Exam III (Futuyma Chapters 17 - 23, Darwin Chapters 10 - 12)	
	15	Resumes and your future	
	17	tba	
	22	Major Fields Exam	
Dec	1	Student presentations	
	6	Student presentations	
	8	Student presentations	

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.