BIOLOGY 432 PRINCIPLES OF ORGANIC EVOLUTION Spring 2006

Instructor: Craig L. Moyer
Email: cmoyer@hydro.biol.wwu.edu
Office Hours: MWF, Noon to 1:00pm & by appointment, BI 409

Class Meetings: Lecture – MW, 2:00-3:50pm, BI 234
Recitation – F, 2:00-3:50pm, BI 234

Mandatory Texts:
Evolution; Douglas Futuyma, 2005 (Lecture Text)
Adam's Curse; Bryan Sykes, 2005 (Discussion Book)
Note: Updated information & reading assignments to be posted on the class web site:
http://fire.biol.wwu.edu/cmoyer/cmoyer.courses.html

Tentative Class Schedule: (As of 05/31/2006)

			Text Readings
Week 1 Mar	29W	Overview & Organizational	Chap 1 & 22
	31F	*Sign Up & Scheduling Presentations*	
Week 2 Apr	3M	Darwinism and the Fact of Evolution	Chap 1
	5W	Tree of Life: Phylogeny ≠ Taxonomy	Chap 2
	7F	*Discussion Group 1*	
Week 3	10M	Patterns of Evolution: Homoplasy = Bad	Chap 3
	12W	The Fossil Record	Chap 4
	14F	*Discussion Group 2*	
Week 4	17M	Origins of Life & Cambrian Explosion	Chap 5
	19W	Origins of Life & Cambrian Explosion	Chap 5
	21F	*Discussion Group 3*	
	(W.I. Term Paper Outline Deadline)		
Week 5	24M	Molecular Evolution & Variation	Chap 8
	26W	Population Genetics & Drift	Chap 9 & 10
	28F	*Discussion Group 4*	

Week 6 May	01M	Midterm (Covers Chapters 1 thru 5 & 8 thru 10)	
	03W	Archaeal Diversity at Mud Volcanos (Guest: Andrea Curtis)	
	05F	*No discussion group this week*	
Week 7	08M	Selection & Adaptation	Chaps 11 & 12
	(W.I. Term Paper First Draft Hand In/Out for Review)		
	10W	Genes & Genome Evolution	Chap 19
	12F	*Discussion Group 5*	
	(Return W.I. Draft Reviews Deadline)		
Week 8	15M	Mechanisms of Speciation	Chap 15 & 16 (review Chap 6)
	17W	Developmental Genetics	Chap 20
	19F	*Discussion Group 6*	
Week 9	22M	Macroevolution	Chap 21
	(Term Paper Second Draft Deadline)		(review Chap 4)
	24W	Extinction Events	Chap 7
	26F	*Discussion Group 7*	
Week 10	29M	Memorial Day Holiday	
	31W	Sexual Selection & Human Evolution	Chap 14 (p.329-339)
June	*02F*	*Discussion Group 8*	
	(Term Paper Final Draft Deadline for ALL)		

Final Comprehensive Exam Thursday, June 8th @ **3:30pm to 5:30pm** in **BI 234**

Course Evaluation and Grading:

Midterm Exam	150 points
Final Exam	200 points
Discussion Presentation	50 points
Participation	50 points
Term Paper	50 points
Total points possible:	500 points

Course Expectations:

Every student will be expected to undertake a project that will include leading a group discussion **AND** producing a **term paper** on a evolutionary biology related topic of interest agreed upon by student and instructor ahead of time. The "basic term paper" option is expected to have 5 - 7 pages with standardized references from primary scientific literature (no websites!). All writing assignments should be double spaced, with minimal spelling errors and using proper grammatical structure. Fonts should be size 12. Times New Roman font is preferred.

Those students who option to take this course as **writing intensive** will make special arrangements with the instructor to produce an expanded term paper. You will be expected to produce an outline and a minimum of two iterations of complete drafts. These will be returned with comments prior to gaining final approval of your term paper, so make sure to budget your time (and mine!) accordingly. This expanded term paper is expected to have 9 - 10 pages with standardized references. See suggested **target draft due dates** for when you should expect to be turning in your term paper for comments. In addition, *another* written summary based on a supplemental reading assignment from class is also **required**. This written summary will be ~2 pages in length. Finally, you will be expected to **critically examine and evaluate** another student's "first draft term paper," acting as their editor, then I will assess both your first draft and your editorial comments.

The **discussion presentation** will consist of: (1) Signing-up for a topic from the assigned chapter readings in *Adam's Curse*. We may also use papers from the primary scientific literature to fill out the available time slots as the basis for your presentation. These papers will be prearranged by the instructor so copies can be distributed to the class prior to your presentation. (2) Preparing a 15 minute oral presentation with an extra 5 to 10 minutes for discussions. (3) Presentation of figures and tables, to illustrate and outline your discussion. You should take advantage of the multimedia available in our classroom. Use of Powerpoint presentations are encouraged. We will facilitate four to six student presents per discussion period.

Course Objectives: The BIG Picture

This course aims to review criticality the facts and theory of evolution. Students are exposed to case studies and current debates. The aim is to encourage students to integrate much of the factual information they have obtained from previous courses, and have them think critically about evolution. Students are encouraged to listen, think and discuss, rather than try to simply gain more facts for memorization and regurgitation. The course is organized to provide an overall synthesis and summary, and aims to provide a very different type of course in what is presumably the last year as an undergraduate.

PRINCIPLES OF ORGANIC EVOLUTION

Outline of Topics:

INTRODUCTION –

- What is evolution?
- Evolution as fact and theory

DECIPHERING THE HISTORY OF LIFE –

- Rocks as records of earth history
- Continental drift and plate tectonics
- The fossil record
- Phylogenetic inference
- Molecular phylogeny
- Historical biogeography

EVOLUTIONARY PROCESS –

- The link between genotype and phenotype
- Origin of variation
- Fitness and adaptation
- Natural selection
- Population structure and genetic drift
- Integration of evolutionary forces

EVOLUTION OF GENOTYPE AND PHENOTYPE –

- Neutral theory of molecular evolution
- Genome evolution
- Genetics of development
- Life history evolution
- Evolution of sex

SPECIATION –

- What are species?
- Origin of barriers to gene exchange
- Models of speciation
- Case histories of speciation

MACROEVOLUTION –

- Rates of evolution
- Phyletic gradualism and punctuated equilibrium
- Development and evolution
- Patterns of diversity through the fossil record
- Extinction
- Human evolution