

GENE 3000

Syllabus and Course Materials

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Office	Office Hours	Phone #	Email
Redding Building #125	Tu 10:00 AM-12:00 PM and by appointment	770-412-4093	jenkinst@uga.edu

Prerequisites

BIOL 1108-1108L or its equivalent. You should:

- 1) Know Mendelian genetics;
- 2) Understand the basic concepts of molecular genetics and biochemistry;
- 3) Be able to use algebra, basic statistics as well as apply basic probability theory.

Lectures

12:30 – 1:45 PM Tues. and Thurs.

Flynt Building Room #305

Required Materials (Books, used and new, can be ordered from amazon.com with a two day turnaround. Also all books are on reserve in the library)

BOOKS:

- I. Futuyma, Douglas J. 2005. *Evolution*. Sinauer Associates, NY (ISBN 0-87893-187-2) Textbook
- II. Darwin, C. *The Origin of Species*. Chapters 4, 5, 9-12. (On reserve in the library).
- III. Darwin, C. *Descent of Man*, Chapter VIII, "Sexual Selection" (On reserve)
- IV. Darwin, C. *Darwin The Indelible Stamp: The Evolution of An Idea*. J. D. Watson (ed) 2005. Running Press, Philadelphia, Forward: "James D. Watson on Darwin's Classic Works" pp. vii-xiv, Chapter VIII, "Sexual Selection"
- V. Wells, S. 2003. *The Journey of Man*. Random House
- VI. Olson, S. 2002. *Mapping Human History: Genes, Race, and our Common Origins*.

JOURNAL ARTICLES:

- VII. *Evolution: Educational and Outreach* (2008) 1 (4) Issue on Eye Evolution (351-462, DOI 10.1007/s12052-008-0081-4) Refer to Daily schedule.
- VIII. Hershberg R. & Margalit H. 2006. Co-evolution of transcription factors and their targets depends on mode of regulation. *Genome Biology* 7:LR62 (doi:10.1186/gb-2006-7-7-r62)
- IX. Lehmann L. & Keller L. 2006. The evolution of cooperation and altruism – a general framework and a classification of models. *J. Evol. Biol.* 19:1365-1376.

Course Description and Expected Learning Outcomes

Charles Darwin's *The Origin of species by Means of Natural Selection* ranked him, according to George Gaylord Simpson, "among the greatest heroes of

man's intellectual progress." One hundred and fifteen years after Darwin and Wallace's 1858 joint paper on natural selection, Theodosius Dobzhansky condensed Fr. Pierre Teilhard de Chardin's conviction that "evolution is a light which illuminates all facts, a trajectory which all lines of thought must follow" into "nothing in biology makes sense except in the light of evolution." Thus the theory of evolution should be understood by all educated people, particularly by all majors in the biological sciences. In light of this, GENE 3000 is a rigorous introduction to biological evolution, from the molecular level of DNA to genes to populations. The objectives for the students include to:

- 1) study the basic concepts of micro- and macroevolution, including the significance of the Hardy-Weinberg principle to population genetics;
- 2) discuss macroevolution as it relates to the fossil record, phylogenetic studies, as well as processes in genetics and ecology;
- 3) review and discuss the implications of the recent literature on the evolution of the eye from the journal *Evolution: Education and Outreach*;
- 4) study and apply the fundamental causes of genetic variation within and between populations;
- 5) become familiar with the forces of evolution;
- 6) appreciate the evolutionary processes that led to the generation of earth's biodiversity; and,
- 7) give an oral presentation on one of the topics below that demonstrates the theory ("a statement of what are held to be the general laws, principles, or causes of something known or observed, Oxford English Dictionary) of evolution.

Statement of Academic Integrity

It is expected that each student will behave honorably throughout this course. Thus all academic work must meet the standards contained in "A Culture of Honesty." Each student is responsible for informing themselves about these standards before performing any academic work (refer to http://www.uga.edu/ovpi/academic_honesty/academic_honesty.htm). All violations of the *Honor Code* will be referred to the Assistant Dean for Academic Affairs' office.

Documented Disability Statement

(For Griffin Campus)

Students with a documented disability must inform the instructor at the close of the first class meeting. You will be referred to the Office of Academic Programs, Room 107 in the Flynt Building for consultation regarding evaluation, documentation of your disability, and a recommendation as to the accommodation, if any, to be provided. Students must provide instructors with an accommodation form from the Office of Academic Programs listing reasonable accommodation to sign and return to the Office of Academic Programs. Students who do not wish to receive services are still **strongly** encouraged to register with the Office of Academic Affairs.

Attendance

- Attendance is mandatory and will only be excused with a note from a physician. While announced quizzes are taken on WebCT, **unannounced** quizzes may also be given in class with no prior notice. They will always cover homework reading assignments.
- Students are not allowed to make up a quiz. The lowest quiz grade will be dropped.. Missed quizzes are recorded as a “0”.
- Students must take all exams at the time allotted. They may make up one missed exam. Students will not, however, be given the same exam that was missed.

Requirements

- Students are expected to come to class prepared. This means that all reading assignments must be completed before the corresponding Scheduled class.
- Students should be able to discuss or work all problems at the end of chapters. If there are questions these should be addressed in class.
- Students will receive problem sets (refer to syllabus schedule), the grade for which will count as two quizzes.
- Students will write a “targeted review paper” on one of the topics below. Papers must be emailed to jenkinst@uga.edu by 9 AM on April 23rd. The review rubric below is based on targeted reviews for Author Guidelines for the *Journal of Evolutionary Biology* and examples of targeted review papers can be found at its web site http://www.blackwellpublishing.com/jeb_enhanced/review.asp. A review rubric for this journal can also be found at <http://www37.homepage.villanova.edu/jonathan.langle/REVIEW%20PAPER%20RUBRIC.doc>. This grade will count as Exam # 3.

Topics:

- 1) Alfred Russel Wallace: His life and contribution to evolutionary theory.
- 2) The evolution of transcription factor proteins and how they contribute to development.
- 3) Evolution of regulatory networks and phenotypic variation, e.g. transcription regulation network.
- 4) The disruption of phenology by phenomena such as global warming and the impact of the disruption on insect and plant co-evolution.
- 5) RNA World Theory.
- 6) The origin and migration of Native Americans throughout the Americas: Evidence from mtDNA and the Y-chromosome.
- 7) Sexual Selection generally or for a specific genus or species.
- 8) Evolution of quantitative traits for a specific family or genus

Grading

% Quiz Avg	% Exam Avg	% Final Exam	% Total
25	50	25	100

Grades

100	A ⁺	79 - 78	C+	≤ 59 = F
99 – 93	A	77 – 73	C	
90 – 92	A ⁻	72 - 70	C-	
89 - 88	B+	69 - 68	D+	
87 – 83	B	67 – 63	D	
82 - 80	B ⁻	62 - 60	D-	

Testing

- Exams are comprehensive
- Scheduled quizzes will be taken on WebCt and you will be given 30 minutes per quiz. Questions must be answered chronologically. Students will not be able to go back and review questions. Students may take the quiz any time after 5 PM on Thursday until 10 AM on the following Tuesday. Unscheduled quizzes may also be given during the first 10 minutes of class.
- Problem Sets count as **two quizzes**.
- Oral presentations count as an exam.
- Final exam (**May 5, 12:00 PM – 3:00 PM**) will be comprehensive, with over 50% on new material.

Assignments are for the Day/Date on the left. (The Library has reference materials and books for this course on reserve. Journal Articles may be downloaded from the UGA Library on-line. Please check with Ms. Regina W. Cannon, Head Librarian)

Day/Date	Topic	Text Chap	Readings/ Problem Sets	Quiz
Th, Jan 08	Introduction	1 & 22	IV. James Watson, Forward	
Tu, Jan 13	The Tree of Life: Classification and Phylogeny	2	II. Chap. 4, <i>Origin</i> , Begin VI. Olson, <i>Mapping Human History</i>	
Th, Jan 15	The Tree of Life: Classification and Phylogeny	2	Problem Set #1 handed out: Phylogenies (Computers in Student lab in Redding Building)	# 1
Tu, Jan 20	Patterns of Evolution:	3	Chap 6, <i>Origin</i>	
Th, Jan 22	Evolution in the Fossil Record	4		# 2
Tu, Jan 27	A History of Life on Earth	5	Targeted Review Topic	
Th, Jan 29	The Geography of Evolution	6	Chap. 11 - 12, <i>Origin</i>	# 3
Tu, Feb 03	The Evolution of Biodiversity	7	VII. Oakley TH & Pankey MS. 2008. <i>Evo Edu Outreach</i> 1: 390-402	
Th, Feb 05	Review and discussion of Olson's, <i>Mapping Human History</i> & evol. of the vertebrate eye		Initial References for Targeted Review Paper	

Tu, Feb 10	Exam # 1		Begin V. Wells, <i>Journey of Man</i> ,	
Th, Feb 12	Genetic Variation: Hardy-Weinberg principle	9	Problem Set # 1 due	
Tu, Feb 17	Population Variation cont., Inbreeding	9		
Th, Feb 19	Population Variation: Inbreeding	9		# 4
Tu, Feb 24	Genetic Drift	10	Hand out Problem Set 2	
Th, Feb 26	Library time, work on Problem Set # 2, Targeted Review			
Tu, Mar 03	Natural Selection and Adaptations, General Outlines of Targeted Reviews due	11	VII. Evo Edu Outreach (2008) 1: 415-426,	
Th, Mar 05	Natural Selection and Adaptations	11		
Mar 09-13	SPRING BREAK			
Tu, Mar 17	Natural Selection	12		
Th, Mar 19	Natural Selection	12	Extended outlines of targeted reviews due	# 5
Tu, Mar 24	Natural Selection	12	III or IV: Chap 8	
Th, Mar 26	Conflict and Cooperation	14	Lehman & Keller 2006	
Tu, Mar 31	Exam # 2			
Th, Apr 02	Quantitive Characters	13	Problem Set # 2 Due	# 6
Tu, Apr 07	Quant. Chars.	13		
Th, Apr 09	Species and Speciation I	15		
Tu, Apr 14	Species and Speciation II	15		
Th, Apr 16	Species and Speciation III	15		# 7
Tu, Apr 21	Coevolution	18	VIII: Hershberg, Margalit	
Th, Apr 23	Discussion: <i>The Journey of Man</i> by Wells		Targeted Reviews due.	
Tu, Apr 28	Macroevolution	21		
Tu, May 05	FINAL EXAM: 12 – 3 PM			

REVIEW PAPER RUBRIC

Title

Poses an important question or topic that your paper will address.
Descriptive, yet concise and catchy. **5 points**

Section titles

Highlight important questions or general themes investigated in your review.
Break it apart in a way that flows logically. **5 points**

Abstract

In 200 words or less summarize your paper. State the salient problems with your particular topic, any particular unique methods you used in summarizing literature, your general conclusions, and the broader significance. **10 points**

Introduction/ Justification

Gives an overview of why your topic is important and novel and the major issues/questions you will address in your paper. Survey background literature,

and narrow towards your particular angle. Why does this paper matter?

15 points

Content

The paper should be broken down into sections addressing specific questions/themes regarding your subject. It is important that these themes connect in order to achieve the overall goal of your paper. Address gaps or holes in the literature which you have found. Provide synthesis across the papers you are including.

Overall qualities (considered as part of content)

Clarity, grammar, novelty, creativity, cohesiveness, completeness

30 points

Conclusions

Make general conclusions that bring together and synthesize the findings of your paper. This should be a cohesive section which highlights why this review is important and what contribution it makes. Where should new research be directed in order to further the knowledge presented in your review, to fill the gaps which you found in the literature? **20 points**

Figures/Tables

Must have at least one figure. Could be conceptual schematic, or could include published data from other sources. Tables are optional but are very useful for succinctly summarizing your ideas, general findings, or numerical results from other literature. **5 points**

Literature Cited

Follow the format for the *Journal of Evolutionary Biology*. **10 points**