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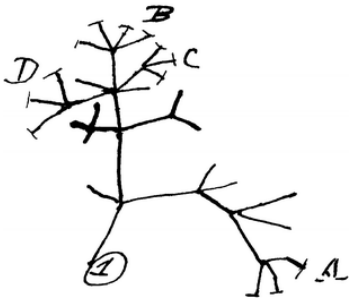

Biology 407 – Evolution
Winter 2012

Instructor information
Dr. Ross A. McCauley
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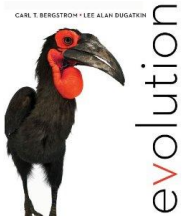
Office hours: MWF 11:15 am-12:10 pm, R 9:05 am-12:10 pm and by appointment

Course information
Meeting time and place: MWF 12:20-1:15 pm, Theatre 105
Required text:

Bergstrom, C. T. and L. A. Dugatkin. 2012. Evolution. W. W. Norton & Company, New York.



Course Website: http://moodle.fortlewis.edu
All readings and pertinent lecture material will be posted on Moodle. Some assignments along with software and datasets will also be made available here as well.

Prerequisite: BIO 260 (Genetics)

Course Description
Evolution is recognized as providing an underlying foundation for all other branches of biology. Thus a full understanding of modern biological science requires an understanding of the basic principles of evolution. The goal of this course is to examine the basic evolutionary processes at scales ranging from the molecular to the ecological and understand the patterns resulting from these processes. This course will draw on and use information you have learned in other biology classes and should allow you to make connections between things learned in your other courses. Unlike some other courses the goal of this course is not the accumulation of facts regarding a biological group or specific set of information. The study of evolution tends to be more conceptual than most other areas of biology and thus we will focus on these conceptual aspects of the field. It is not the goal of this course to learn everything about evolution – the topic is much too large. Rather we will work as scientists to think in a more evolutionary context.

Course Structure
While this is a "lecture" course with no lab it will not be a class where you will sit and listen to me lecture. It will rather be more of a discussion or seminar class. Thus for productive discussion I expect you to have completed the day's readings **prior** to class. I will lead the discussion and sometimes provide additional information but we will primarily be discussing the points brought up in the reading with the goal being your understanding of these and linking of these to you already existing knowledge of biology. I will lead through questions and we will spend time discussing those points which are of most interest to the class as a whole.

Course Evaluation
Grades will be determined roughly according to the following percentages:

Exams (2 @ 100 pts. each)	45%
Term paper	20%
Presentation	10%
Other (Assignments, Class participation)	25%

Exams: We will have two exams during the semester, a midterm and a final. Both of these will be take home exams in which you will have to examine data, read original research papers and consult outside literature to fully answer the problems. You will have approximately one week to complete each of the exams.

Assignments: There will be various small assignments during the semester will vary from performing a genetic simulation to taking "quizzes".

Term Paper and Presentation: Your single largest assignment will be the completion of a written review paper and oral presentation on a topic you choose related to evolution. This review could be over the evolution of a particular group of organisms, a summary of a specific type of evolutionary mechanism, evolution and medicine, the review and application of a new experimental technique in evolutionary biology, etc. Use your imagination to select a topic – but make sure it is something both feasible and interesting to you.

The first part of the assignment will be your submission of a topic proposal at the end of the fourth week of class (February 5). This will be worth 10 pts toward the overall grade and should include a rough idea of your topic and 1-2 listed bibliographic sources. I will evaluate your proposal and make suggestions for how to circumscribe the topic (particularly if it appears too unwieldy).

The written paper will be expected to be approx. 10 pages in length with standard 1 in. margins and 10-12 pt font. You will be expected to cite at least 10 published journal articles and/or book sources. **General web sources will not be permitted.** Your paper should be organized with a specific title, a summary paragraph in the form of an abstract, the body of the text divided into appropriate sections with subtitles, and a literature cited section which lists only the sources you refer to in the text and should follow a commonly used citation method in biology. Within the text you should follow the "Author, date" style of citation [eg. "…as was shown by the brilliant experiments of McCauley and What's-his-name (2011)..." or "…the evidence for a successful plant-animal hybrid was deemed inconclusive (McCauley and What's-his-name, 2011)]. You should not include page numbers within this in-text citation. Your final paper will be due on Friday March 30.

The second part of the assignment will be your preparation of an in-class lecture on your selected review topic. The lectures will be scheduled for the class periods between March 19 through 30. The order of presentations will be determined through a lottery. The lecture should be prepared as a power-point presentation which you have practiced and should extend for approximately 15 minutes leaving time for questions and/or discussion. **You will be required to submit to me a copy of your presentation two days before the date of your presentation so I can review it for content.** You should include pictures, graphs and diagrams in your presentation to help illustrate key points. These figures must be cited on the presentation and presented in a literature cited slide. Your grade on the presentation will be largely determined through a peer evaluation following a standard critique sheet. I too will critique the presentation and average my grade in with those of your peers and will be worth a total of. As your presentations will be part of the lecture sequence and since some questions on the final exam could be derived from the student presentations, you will also be required to submit to me a digital copy of your final presentation for posting on the course Moodle site.

Other Course policies

Academic Integrity:

The Biology Department upholds College policy on Academic Integrity. Therefore, students who commit acts of academic dishonesty (a.k.a. cheating, copying, plagiarizing):

1) on homework or other less major assignments, will receive a ZERO on the assignment in question, and will be reported to Academic Affairs.

2) on exams, major papers or reports will earn a ZERO and be automatically removed from the COURSE, and will be reported to Academic Affairs.

Any student who accumulates two reported incidents of dishonesty with the Academic Affairs office will have a formal hearing with the Academic Standards Committee and faces academic dismissal from the College.

Attendance:

While I do not take a daily role, regular attendance is expected – particularly if you want to do well. If you know you are going to miss class please let me know beforehand. If your absence results in your missing an exam, you can make up an exam within 5 days of the original exam date ONLY in the case of a legitimate absence. If you miss an exam for a legitimate reason and are unable to make up the exam within 5 days the score on the final exam will be substituted for the

missed exam score. Legitimate absences will include any absence with a letter documenting that absence from the appropriate college official, be a documented medical excuse, or be a documented religious observance. If you miss for an illegitimate reason then you will receive a zero for that particular exam.

Classroom conduct:
While I hope it goes without saying, please respect the rights of myself and your fellow classmates. If you are late try not to disturb everyone else. Additionally please leave mobile phones, pagers, iPods, etc, at home or turn them off and keep them stowed during class. I will not allow texting or checking of messages on any electronic device during class time. If this becomes a problem you will be asked to forfeit your device. Such activity is not only very disrespectful both to me and your fellow students but also interferes with your ability to learn.

Drops:
The college deadline for dropping this class for it not to appear on your transcript is census date, January 24. Without exceptional circumstances (ie. death in family, hospitalization, etc.) I will not assign a grade of "W" on a drop slip after this date unless you are currently passing the course with a C or better.

Accommodations:
Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements must register with the Disability Services Office. If you qualify for services through the Disability office, bring your letter of accommodations to me as soon as possible so I can make the appropriate arrangements. Letters are available through Dian Jenkins, Coordinator of Disability Services, 280 Noble Hall, 247-7459.

Tentative Schedule

This schedule is very much like DNA. It is subject to additions, deletions, and rearrangements. Changes will be announced in class and posted on Moodle.

Wk	Date	Topics/Readings/Assignments
1	Jan. 9/11/13	
		M: Introduction: What does Evolution mean to you? • **B & D Chap. 1** • **Dobzhansky, T. 1973. Nothing in Biology makes sense except in the light of evolution. American Biology Teacher 35: 125-129.** W: Evolutionary theory and the general public • **Homework: "Measure of Acceptance of the Theory of Evolution"** • **Miller, J. D., et al. 2006. Public acceptance of evolution. Science 313: 765-766.** F: A brief history of Evolutionary thought • **B & D Chap. 2**
2	Jan. 16/18/20	
		M: Natural Selection and Adaptations – Basic concepts • **Homework: "Conceptual inventory of Natural Selection"** • **B & D Chap. 3** • **Darwin, C. R. 1859. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. John Murray, London. (Available on-line at http://darwin-online.org.uk/) Chap. 1 & 2 (skim)** W: Natural selection in Legos (My son will lend us his Legos for the day) F: Ultimate and proximate causes of variation and adaptation – a contemporary example • **Hoekstra, H. E. 2011. From Darwin to DNA: The genetic basis of color adaptations. pp. 277-295 *in* In the Light of Evolution: Essays from the Laboratory and Field, Losos, J. (ed). Roberts and Company Publishers, Greenwood Village, Colorado.**
3	Jan. 23/25/27	
		M: Exaptations • **Gould, S. J. & R. C. Lewontin. 1979. The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme. Proceedings of the Royal Society London series B 205: 581-598.** W: Phylogeny and Evolutionary History – Reading and using trees • **B & D Chap. 4** **For more help interpreting phylogenetic trees see also:** • **Gregory, T. R. 2008. Understanding evolutionary trees. Evolution: Education and Outreach 1: 121-137.** • **Meikle, W. E. & E. C. Scott. 2010. Why are there still monkeys? Evolution: Education and Outreach 3: 573-575.** F: Inferring phylogeny • **B & D Chap. 5** **Term Paper proposal Due (Friday)**
4	Jan. 30 Feb. 1/3	
		M: Review of transmission genetics and sources of variation • **B & D Chap. 6** W, F: Population genetics • **B & D Chap. 7** • **Assignment: Population genetic simulations using *Populus* (software available for download on Moodle)**
5	Feb. 6/8/10	
		M: Evolution of Finite populations • **B & D Chap. 8** W: Evolution and Conservation • **Westemeier, R. L. et al. 1998. Tracking the long-term decline and recovery of an isolated population. Science 282: 1695-1698.** F: Biogeography

		• **Petit, R. J. et al. 2002. Identification of refugia and post-glacial colonization routes of European white oaks based on chloroplast DNA and fossil pollen evidence. Forest Ecology and Management 156: 49-74.**
6	Feb. 13/15/17	
		M: Evolution at multiple loci • **B & D Chap 9** W: Quantitative genetics • **Bratteler, M. et al. 2006. Genetic architecture of traits associated with serpentine adaptation of *Silene vulgaris*. Journal of Evolutionary Biology 19: 1149-1156.** F: Open
7	Feb. 20/22/24	
		Open lectures (videos, student initiated discussions, etc) **Midterm Exam – Give Monday – Return Friday**
8	Feb. 27/29 Mar. 2	
		M: Genome Evolution and Major Transitions • **B & D Chap 10, 12** W: Horizontal gene transfer • **Davis, C. C. & K. J. Wurdack. 2004. Host-to-Parasite Gene Transfer in Flowering Plants: Phylogenetic Evidence from Malpighiales. Science 305: 676-678.** F: Open
9		**Spring Break**
10	Mar. 12/14/16	
		M: Evolution and Development • B & D Chap. 13 • **Lewis, E. B. 1978. A gene complex controlling segmentation in *Drosophila*. Nature 276: 565-570.** W, F: Modern examples of development and inheritance • **Lynch, V. J. et al., 2011. Transposon-mediated rewiring of gene regulatory networks contributed to the evolution of pregnancy in mammals. Nature Genetics (Advance on-line publication)** • **Rechavi, O. 2011. Transgenerational inheritance of an acquired small RNA-based antiviral response in *C. elegans*. Cell 147: 1248-1256.**
11	Mar. 19/21/23	
		• Student Presentations
12	Mar. 26/28/30	
		• Student Presentations **Final Term Paper Due (Friday)**
13	Apr. 2/4/6	
		M, W: Species and Speciation • **B & D Chap. 14** • **Hausdorf, B. 2011. Progress toward a general species concept. Evolution 65: 923-931.** • **Gould, S. J. 1983. What, if anything, is a zebra? Chap. 28 in Hen's Teeth and Horse's Toes: Further Reflections in Natural History. W.W. Norton and Company, New York.** F: Contemporary Speciation • **Rolshausen, G. et al. 2009. Contemporary evolution of reproductive isolation and phenotypic divergence in sympatry along a migratory divide. Current Biology 19: 2097-2101.**
14	Apr. 9/11/13	
		M: Extinction and Evolutionary Trends • **B & D Chap. 15** W: Phyletic Gradualism and Punctuated Equilibria • **Eldredge, N. & S. J. Gould. 1972. Punctuated equilibria: an alternative to phyletic gradualism" pp. 82-115 *in* Models in Paleobiology, Schopf, TJM (ed) Freeman, Cooper & Co, San Francisco.** • **Dawkins, R. 1998. Puncturing punctuationism. Chap. 9 in The Blind Watchmaker: W.W. Norton and Company, New York.** F: Video: Call of Life

15	Apr. 16/18/20	
		M: Evolutionary Interactions • **B & D Chap. 19** W: Paper • **Shultz, S. et al., 2011. Stepwise evolution of stable sociality in primates. Nature 479: 219-222.** F: Open lecture
16	**Mon. Apr. 23**	**Final Exam 9:45 – 11:45 a.m**