**Biology 421**
**Advanced Evolution**
**Fall 2012**

**Lectures:** MWF 11:30-12:20, LSS 163
**Instructor:** Paul Hohenlohe
hohenlohe@uidaho.edu
LSS 256
**Office hours:** Wed 12:30-14:00 or by appointment, LSS 256
**Required textbook:** Douglas J. Futuyma, *Evolution* 2nd edition (Sinauer)
**Final exam:** Wed, Dec 12, 10:00-12:00, LSS 163

**Course overview:** Evolution is the central explanatory framework that unifies the science of biology. Evolutionary processes are observable, and evolutionary theory encompasses a wide range of general principles about the process of evolution. At the same time, evolutionary biology is a historical science, seeking to explain the origins and diversity of organisms on Earth, past and present. The development of evolutionary biology as a science also exemplifies the scientific process and the interplay between concepts and data. This course will cover all of these perspectives.

**Course resources:** Readings will be drawn from the textbook and other sources in primary literature, available as electronic files online (bblearn.uidaho.edu). Lectures will present additional information not found in these readings. Quizzes and exams will cover all of these sources of information. Any powerpoint slides from lectures will be posted online following each lecture, but **complete lecture notes will not be provided to you** – it is your responsibility to attend lectures and take notes, or make other arrangements to get the information. If something is unclear in lecture, it is your responsibility to ask a question, come to office hours, send an email, etc. Questions and discussion are always welcome during the lecture period.

We will read several chapters of Darwin's *On the Origin of Species*. We will use the first edition, which is the edition of reference for modern use. Full text and scanned copies are easily available online and several versions are in print, and I highly encourage you to read the whole book if you haven't already.

**Grading and assignments:** Grades will be based on the quizzes, exams, and assignments. Credit will be given for improvement over the course of the term. Flexibility on scheduling and extensions for these assignments are possible only if you contact me ahead of time. Quizzes will be 10-15 minutes at the beginning of the class period, and exams will cover the full 50-minute period. Each exam will focus only on the material since the last exam, but the final will be cumulative. Final grades will be calculated from:

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|---|---|
| Assignments (x2) | 6% each |
| Quizzes (x3) | 8% each |
| Exams (x3) | 15% each |
| Final exam | 20% |

| Date | Topic | Futuyma chapter | Reading/assignments |
|---|---|---|---|
| 8/20 | Introduction to the course | | |
| 8/22 | Evolution before Darwin: change | 1 | |
| 8/24 | Evolution before Darwin: change | | |
| 8/27 | Classification and common descent | 2-3 | Losos 2011 |
| *** Special seminar: **Jonathan Losos**, Tuesday Aug 28, 12:30-13:20, LSS 277 *** | | | |
| 8/29 | Classification and common descent | | Halanych 2004 |
| 8/31 | **QUIZ I** | | |
| 9/3 | Labor Day – NO CLASS | | |
| 9/5 | Fossil record | 4-5 | |
| 9/7 | Voyage of the Beagle | | Darwin ch. 11 |
| 9/10 | Biogeography | 6-7 | |
| 9/12 | Biodiversity | | Harmon *et al* 2010 |
| 9/14 | **EXAM I** | | |
| 9/17 | Variation | | Darwin ch. 1-2 |
| 9/19 | Variation | 8-10 | |
| 9/21 | Variation | | reading TBA |
| 9/24 | Population genetics | | **Assignment 1 due** |
| 9/26 | Genetic drift | | reading TBA |
| 9/28 | Gene flow | | Lowe & Allendorf 2010 |
| 10/1 | **QUIZ II** | | |
| 10/3 | Evolution before Darwin: adaptation | | |
| 10/5 | Natural selection | | Darwin ch. 3-4 & 14 |
| 10/8 | Natural selection | 11-12 | |
| 10/10 | Natural selection | | Rice & Hostert 1993 |
| 10/12 | **EXAM II** | | |
| 10/15 | Guest lecture | | |
| 10/17 | NO CLASS | | |
| ***Special seminar: **Michael Turelli**, Thursday Oct. 18, 12:30-13:20, McClure 209*** | | | |
| 10/19 | NO CLASS | | |
| 10/22 | Phenotypic evolution | 13 | Lande & Arnold 1983 |
| 10/24 | Quantitative genetics | | Kingsolver *et al* 2001 |
| 10/26 | Quantitative genetics | | Visscher 2008; Maher 2008 |
| 10/29 | Life history evolution | **14** | **Assignment 2 due** |
| 10/31 | Sexual selection | 15 | Emlen *et al* 2012 |
| 11/2 | Inclusive fitness | 16 | |
| 11/5 | **QUIZ III** | | |
| 11/7 | Speciation | 17-18 | |
| 11/9 | Speciation | | Coyne & Orr 1989, 97 |
| 11/12 | Coevolution | 19 | reading TBA |
| 11/14 | Evolution in action: disease | | reading TBA |
| 11/16 | **EXAM III** | | |
| 11/19 | Fall Recess – NO CLASS | | |
| 11/21 | Fall Recess – NO CLASS | | |
| 11/23 | Fall Recess – NO CLASS | | |
| 11/26 | Evolution of genomes | 20 | |
| 11/28 | Population genomics | | Via 2009; Feder *et al* 2012 |
| 11/30 | Evolution and development | 21 | |
| 12/3 | Evolution in action: cancer | | Maley *et al* 2006 |
| 12/5 | Evolution in action: conservation | | Muhlfeld *et al* 2009 |
| 12/7 | Evolution in society | 23 | Kitzmiller case 2005 |