Bi 380 Evolution, Winter 2017
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This course emphasizes patterns and mechanisms of Darwinian evolution. Lectures will generally follow the text but will also include material not in the text. Discussion will generally cover assigned readings from the original literature. Grades are based on a mid-term (25%), discussion participation (25%) and a final exam (50%). Exams will cover material in lecture, from the text, and from assigned readings in the original literature and will be in multiple choice/short answer format. Lectures are in PowerPoint. Lectures for the coming week will be available on Canvas by midnight of the preceding Saturday.

Text: Douglas J. Futuyma, *Evolution*, 3rd Edition

Week 1-2. Introduction and classification of organisms
Text: Ch 1-2

Week 2-3. Patterns of evolution & the fossil record
Text: Ch 3 & 4

Week 4-5. Genetic variation in populations
Text: Ch 8-9
MID-TERM EXAM MONDAY, February 7 COVERING WEEKS 1-4

Week 6-7. Genetic drift, natural selection & adaptation
Text: Ch 10-11

Week 8. Genetic theory of natural selection & phenotypic evolution
Text: Ch 12-13

Week 9-10. Species and speciation
Text Ch 17-18

"The power of scientific reasoning derives from the complex interplay between the desire to know, the ability to reason, and the ability to evaluate ideas with data. As scientist, we have learned how to make ideas dance with reality, and we expect them to be transformed in the process. We typically add to what we already know, often showing along the way that old ideas are incomplete or, occasionally,wrong. And so we collectively build an understanding of the world that is accurate, reliable, and useful."

Charles R. Marshall (2013) *Science* **341**:1344-1345.

Bi 380 is a course in **Darwinian** evolution.

Expectations: You have to be able to demonstrate mastery of the material and ability to integrate lecture, reading in the text and reading from discussion. Realize that lecture provides an introduction to the concepts and a lot of evolutionary flavor with some nutrition, whereas the text provides a lot of evolutionary nutrition with some flavor. You need to master both to do well in this course.

Translation: Attending lecture and discussion and reading the assigned material are not, in themselves, sufficient for a passing grade in this course.

<u>What to know:</u>

Be able to discuss and explain the basic concepts
Be able to define terms and explain their relevance to evolution
Be able to interpret figures and tables and discuss their relevance to evolution
Be able to integrate lecture, text and discussion

<u>Hints to success:</u>

1. Form a study group
2. Make up a term and concept list from
   a. the list at the end of each chapter
   b. terms given in bold in the text
   c. terms & concepts in italic or capitalized in the text
   d. terms and concepts introduced in
      lecture, discussion or reading from discussion
3. Understand the **concepts** behind figures and tables, since figures or tables you have not seen before, but should be able to interpret, may appear on exams.
4. A former student (A+ in this course) says that terms & concepts that appear in both discussion and the text, repeatedly in the text, or repeatedly in lecture are particularly important and likely to appear on tests.

If you want your FINAL EXAM returned to you, bring a stamped, self-addressed envelope to the final exam.

Mid-term: Monday of week 5, covers material through week 4,
Final: comprehensive, covers material through all 10 weeks.

Learning outcomes: My goals for this course are to provide a background in basic evolution that includes historical perspectives of current evolutionary thought, sources of genetic variation that form the grist for the evolutionary mill, and "flavor" to lecture and discussion that expands the text with illustrated examples from microbes, plants, and animals, including human evolution. Science needs to be rigorous, but science is a part of life and life ought also to be enjoyable so I also seek to convey my joy and excitement for research and for being an evolutionary biologist.

Course-specific goals for students in this class include and ability to understand and articulate:

1. The basic tenets of the historical context of Darwin's intellectual milieu, Darwin's contribution, and how the modern synthesis melded Darwin and Mendel.
2. How the population genetic processes of mutation, migration, genetic drift and natural selection provide the primary mechanisms of evolutionary change.
3. The basics of classification of organisms and the application of maximum parsimony.
4. The broader patterns in the evolution of life
5. How genetic variation contributes to response to selection, microevolution, and, ultimately macroevolution.
6. The concept of species, how populations diverge to become new species, and how speciation is the origin of biodiversity.

More general goals for students in the class are increased ability

1. To interpret graphical and tabular material
2. To openly discuss articles from the original literature
3. To appreciate the value of peer-group learning.