

Evolution

Class meetings: TR 9:40-10:55am

Final exam: 11 Dec 8-10am

Instructor: Ben Fitzpatrick

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Textbook:

Futuyma, D. J. 2013. *Evolution*, 3rd edition. Sinauer Ass.

Other Readings:

This course incorporates scientific papers and essays about evolution (see schedule)

Description:

This course is an introduction to the major topics in evolutionary biology. We (biologists) think we know the fundamental causes of evolution: They are mutation, drift, gene exchange, and selection (yes, this will be on the test!). How do we apply these fundamentals to understand particular patterns and answer questions? Are there biological phenomena that cannot be accounted for by the four causes? We will try to address these issues this semester.

Learning objectives:

1. Be able to summarize the history of life on Earth in terms of timescale and major transitions, and explain the tools and evidence that support current hypotheses of the history of life.
2. Understand the mechanisms by which evolution occurs. Provide detailed explanations of mutation, gene flow, genetic drift, non-random mating, and natural selection.
3. Be able to discuss some of the controversial areas of evolutionary biology, including speciation, the evolution of cooperation, sex, and evolutionary psychology.
4. Understand why evolution is generally regarded as central to understanding biology.

Approach:

This year I have organized the course around 12 big questions falling into three conceptual groups:

Foundations: what is evolutionary biology?

- 1 How can we study the past?
- 2 What is macroevolution?
- 3 Is natural selection a tautology?

How does evolution explain diversity?

- 4 Why don't we see Mendelian ratios in natural populations?
- 5 Are mutations really random? Are most genetic mutations "neutral"?
- 6 Is sympatric speciation impossible?
- 7 Is there a tree of life?

How does evolution explain complexity?

- 8 Why was Lamarck wrong?
- 9 Can evolutionary theory explain altruism and cooperation?
- 10 Does endosymbiosis explain the origin of eukaryotes?
- 11 Does natural selection produce optimal organisms?
- 12 What is the unit of evolution?

Some of these questions have well-resolved answers, others remain topics of debate and research. As we take up each topic, I will lecture a bit and go over homework questions, and we will discuss the week's readings as a way to learn facts and concepts, and generate further questions.

There will be quizzes and homework almost every day. Most of the homework consists of online quizzes via the book website: sites.sinauer.com/evolution3e

You will also review and critique a recent research paper in evolutionary biology. Details will be forthcoming.

Grading:

1. Homework	20 x 10 pts
2. Quizzes	24 x 10 pts
3. Midterm exams	2 x 100 pts
4. Paper	100
5. Final exam	<u>110</u>
	850 ... this means each point is worth 0.118% of your grade

I use a standard grading scale (90% and above is an A, etc.).

There is no excuse for missing homework. You can miss up to two quizzes without losing points. If you miss no quizzes, you can get extra credit.

Policy on Extensions: No extensions will be granted for assignments on the basis of conflicts with assignments in other classes; look at all your syllabi now and plan ahead for the semester. The only exception is for medical problems serious enough that you are consulting with UT or other professional health services. If you miss a class, you are responsible for the work assigned for that day and class work from that day.

Policy for Students with Disabilities: If you have a disability and feel that you may have need for some type of academic accommodation in order to participate fully in this class, please feel free to discuss your concerns with me in private and also contact the Office of Disability Services (4 – 6087; ods@utk.edu; <http://ods.utk.edu/>)