

DNA & Evolution

Evolution and genetics are the cornerstones of modern biology. *DNA & Evolution* will explore these fields in the context of contemporary issues that are important to individuals and societies. Although examples will be drawn from a variety of organisms, the primary emphasis will be on humans. Among the questions we will consider are these: Where did modern humans come from? Why are women and men different? Why do children resemble their parents? Do genes influence variation in personality, intelligence, and sexual orientation? What can genetic analyses reveal about evolutionary history and the relationships among species? Can genetic analyses allow us to predict the evolutionary future? Given what our society knows about evolution and genetics, should we take responsibility for guiding the evolutionary future of human populations?

Objectives

Throughout the course the goal will be to help students develop sufficient biological sophistication to understand new discoveries in genetics and evolution, talk to their doctors, and make rational personal and political choices about biological issues. Students will read secondary and primary literature, ask questions, design experiments, analyze and interpret data, and draw their own conclusions.

Time & Place

Section A - Tues 10:30 to 12:20, Denny Hall 313; Thurs 10:30 to 11:20 MGH 082A
 Computer Lab - Thurs 11:30 to 12:20, MGH 058
 Section B - Tues 12:30 to 2:20, Savery Hall 158; Thurs 12:30 to 1:20 MGH 248
 Computer Lab - Thurs 1:30 to 2:20, MGH 044

Instructor

Jon C. Herron, Biology
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Teaching Assistant

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Course Website

We have set up a web site for the course. The URL for the website is:

<http://www.evound.com/dae14>

To enter the web site you will need a username and password. These will be announced in class. Please record them here:

Username: _____ Password: _____

Items posted on the website will include:

- Readings, supplementary materials, and links to other sites of interest.
- Paper assignments (These will not be distributed in class; instead they will be posted on the web at least 1 week before the paper is due).
- Homework assignments (Some of these we will distribute in class, others we will ask you to get from the website).
- Information on computer labs.
- Online surveys and discussions.

Required Computer Labs

Each Thursday for the second hour of class we will meet in a Mary Gates Hall computer room for a virtual session. The labs will allow you to design and conduct your own experiments on simulated organisms. The lab exercises are part of a commercial package from SimBio.com. We will be accessing the labs through SimBio's *SimUText* application. To receive credit for the labs, all students are required to buy a *SimUText* subscription for \$48. Instructions for how to do so are on the course web site.

Required Text and Other Readings

The required text for the course is *The Sports Gene: Inside the Science of Extraordinary Athletic Performance* by David Epstein. It's a fascinating look at genetic and environmental influences on variation among individuals. It's available as a hardcover (copies should arrive at the UW Bookstore soon), in a Kindle edition from Amazon, in an iBook edition from Apple, and as an audiobook from Audible.

Other required readings will include draft chapters for textbooks Jon is writing. We will provide these as PDF files downloadable from the course website. PDF files can be opened on any computer with Adobe Reader installed. Reader should be already be installed on most campus computers. If you need Adobe Reader for your own computer, you can download it free from Adobe's web site at <http://www.adobe.com/>. Just go to the web site and click "get Adobe Reader."

The PDF files will require a password to open. This will be the same as the password for the course website. We will announce it in class.

Jon would appreciate your feedback, so please let him know how you feel about the chapters.

Please note that assigned readings are intended to be completed before class. To encourage students to keep up with the reading, we will begin each class with a brief graded quiz and discussion on the day's reading.

Students with Disabilities

If you have a disability, please speak with us about how we can accommodate you during the class.

Assignments, Papers, and Grading

Grades for the course will be based on papers, assignments, participation in class discussions, quizzes, and an independent project.

Papers (40% of course grade)

Papers will be due on Thursday of Weeks 2, 4, 6, and 8. Papers must be double spaced, on single-sided 8 1/2 by 11 inch white pages, with at least 1 inch margins, in a font no smaller than 10 point. We will not read past the end of the second page. Papers will be graded for accuracy of content, clarity of writing, and originality of thought. Unless you have made a prior arrangement, late papers will penalized 1/2 grade point for every day they are late.

Assignments, participation in discussions, quizzes (40% of course grade)

For most class meetings we will give you an assignment to prepare ahead of time, and/or an assignment to work on together in class. We encourage you to talk about these assignments with your classmates. The actual text of written answers and design of graphs must be your own work. On the days they are due these assignments will serve as the record of your attendance in class, must be turned in person, and will not be accepted late.

This course will succeed or fail with the quality of class discussions. Please come to class prepared every day, enjoy yourself, ask questions, and give us and your classmates the chance to learn from you.

Independent project (20% of course grade)

The final assignment for the quarter will be an independent project. This will involve posing a question of your own, framing a hypothesis, and conducting a study to address it. We will provide more information, and suggestions, later in the quarter.

Honors Portfolios

For those of you studying within the new Honors core curriculum, we offer this reminder from the Honors program:

Students are encouraged to archive items from this course in their Honors learning portfolios. Readings, lecture notes, visual materials, music, poems, syllabi, tests, papers, etc, are examples of items that might assist with reflection on experiential learning and ways of thinking within and across disciplines. The Honors electronic learning portfolios span students' undergraduate years and are best used as an ongoing, dynamic forum for the integration of knowledge. In addition to archiving items, students are also asked to take a few minutes to write-up a paragraph or two describing the significance of the archived items and how what they learned in the course contributed to their larger experiences, goals, and thoughts about education and learning.

Tentative schedule

Please note that the following schedule of topics is flexible, based on your background and interests. We want to learn from you what issues in evolution and genetics are most compelling and important from your perspective. Peruse the readings, browse the library, the newspaper, and the web, and let us know what you want to cover.

Week 1: Why Study Evolution?

Why study genetics and evolution?
Where did Earth's organisms come from?

Week 2: Evolution 101

Reconstructing history, Part 1
What makes populations evolve?

Week 3: Adaptation and variation

Studying adaptation
What makes every individual unique?

Week 4: Human Genetics

Why do offspring resemble their parents?
Genetic modification—how, why, and should we?

Week 5: Genomics

What does it mean to sequence a genome?
Reconstructing history, Part 2

Week 6: Evolutionary Genetics

Genes in populations
Predicting the evolutionary future of lab populations

Week 7: More Evolutionary Genetics

Predicting the evolutionary future of populations in the real world
Should we take responsibility for guiding our own evolutionary future?

Week 8: Genotype and Phenotype

Is intelligence heritable?
Do genes influence our personality and behavior?

Week 9: Human Evolutionary History

How closely related are humans and chimps?
Did humans and neanderthals ever fall in love?

Week 10: The Impact of History on Modern Humans

Why are women and men different?
The trouble with time travel