

## BIOL 3000: Frontiers in Biology, Fall 2015

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*"Nothing in biology makes sense except in light of evolution."* -- Theodosius Dobzhansky (1973), geneticist & zoologist

The quotation above is one that is known to every biologist. Evolution is **the** central and unifying principle of modern biology and is an experimental, observational, mathematical and correlative science. In this course, we will:

1. Explore how evolutionary forces may have shaped human behavior.
2. Discuss what scientists have discovered about the genetic and physiological foundations of behavior.

### REQUIRED TEXTS/MATERIALS

*Evolution and Human Behavior*. Cartwright, 2<sup>nd</sup> edition, ISBN: 978 026 253 3041

Visit the Blackboard course site often for announcements, quizzes, and material.

I will not be making PowerPoint lectures available for student download, so take notes during lecture.

### CENSUS DATE

Students must attend **all** of the first three class sessions or they will be dropped from the course.

This course can be taken for a letter grade, or it can be taken on a credit/no credit basis. Students can only drop this course prior to the census date of September 21. Before the census date they can change their grading option without my permission, but after the census date it requires my signature on the "Registration Options" form to do so. I am willing to sign this form up to the last class meeting (December 11).

### GRADING PROCEDURE

Blackboard quizzes	200	
In-class essay	50	
Group poster assignment		
Participation	100	
Presentation	100	
Total	450 points	No +/- grading will be applied to your final grade.

### BLACKBOARD QUIZZES

There will be a weekly quiz over each assigned chapter, for a total of 10 quizzes. Quizzes will be timed (~30-45 minutes), and will typically consist of several multiple choice or true/false questions. Questions can come from lecture, BB items, and in-class videos.

### IN-CLASS ESSAY

The general review article "Genetics of Human Social Behavior" (2010, Ebstein et al, *Neuron*) is posted on the Blackboard site for this course. You should print this article and read it carefully at the beginning of the semester, and then several times throughout the semester. This article was written by scientists for other scientists, so your understanding will be limited at first. As we progress through the course, we will address most or all of the reviewed topics, and your understanding will grow very quickly. You will be expected to write an in-class essay about this article, responding to a specific question that I provide (you will be allowed to choose from a set of possible questions).

## POSTER PRESENTATION (GROUP ASSIGNMENT)

Each student in the class will select a topic relating directly to human behavioral genetics, from a list of available topics provided by the instructor. Topics will be posted on Blackboard under the “Groups” tab. All students in a group will work together to search for material on this topic, and create a **single** poster to present as a group at the end of semester Poster Session. All of the posters will be pinned to the classroom walls, and some group members will stand by the poster and answer questions, while other group members walk around and evaluate the posters of other groups. Midway through the session, circulating group members will trade places, and stand by their poster for the remainder of the session while their partners take their turn to evaluate other group’s posters.

Participation points (100) can only be earned by documenting your contributions on Blackboard.

Each group member’s contribution to the poster will be documented using the following structure:

1. Every topic is complex and multi-layered. The group’s Discussion Board will be used to discuss what each group member will focus on. Every group member chooses a different aspect of the topic to research.
2. Each group member creates a new wiki page for their research focus, with a title like “Becky Ross, Schizophrenia Poster, Environmental influences”.
3. Group members will post their section summary **on their wiki**, and other group members will use the “Comments” tab to make suggestions and revisions.
4. More lengthy discussions **about poster formatting** can be documented on the group’s Discussion Board.
5. To earn full points, a group member must:
  - post their own work on their own wiki
  - make constructive comments regarding **every other** group member’s work on member wikis
  - discuss the formatting, organization, and printing of the poster on the Discussion Board

**Any contributions which are not documented in this way (emailing, texting, Google Docs, etc.) won’t be considered for credit.**

It is easy to use Microsoft PowerPoint to prepare a poster presentation, simply by adding components (text boxes, images) to a single slide. You must format the slide as a custom size and indicate how large a print you want your final poster to be. **Your poster for class must be printed on a large format printer at a professional printing service (Kinko’s, Staples, etc), and must be a minimum of 42 x 48 inches in size.** Although I provide some rough guidelines for pricing below, talk to your print shop ahead of time to find out at what size they print posters, cost, and how long it takes.

**Color printing is not required, but your poster will be assessed by other students and color posters tend to achieve higher assessments.**

- The main goal of a poster is to relate the main points of your topic with as little effort as possible on the part of the audience to read, interpret, and understand. Clearly explain the ideas with very short, concise sentences. **Use bullet points instead of paragraphs when you can.**
- Use a large enough font size (to test this, print your poster on a single letter size sheet and hold at arm’s length...can you read it?)
- Sections should have appropriate labels.
- Include a Title, and the list of student authors.
- Graphics are required (figures, special equations, photos). Do not include figures unless they are needed to convey or explain data...don’t include pictures just because they add “pizzazz”. Make sure your figures aren’t fuzzy and pixelated when they are magnified to poster-size.
- Include a short list of the sources you used (the Ebstein *et al* paper, OMIM, NCBI, Center for Evolutionary Psychology, new media) on a separate sheet of paper, to post up next to your poster.
- **Do NOT plagiarize sources. Re-write everything in your own words. Plagiarism is very easy to detect using Google and specialized software, and if I detect plagiarism in your work I will regretfully give you an F in the course.**

## LECTURE OUTLINE

Reading assignments listed on the course outline are for *Evolution and Human Behavior* by Cartwright.  
Extra content: Links to “BB” items can be found on the BIOL 3000 Blackboard site.

Day	Lecture and (Presentations)	Reading	Extra Content
Week 1 Aug 24-28	Introduction Basic genetics		In-class video: Epigenetics
Week 2 Aug 31-Sept 4	Genes, Proteins and Behavior		In-class videos: “Deconstructing Obesity”
Week 3 Sept 7-11	Evolution and theories of mind and behavior	Ch 1	<b>Monday: Labor Day Holiday</b> In-class video: Understanding Evolution
Week 4 Sept 14-18	Darwinism, inclusive fitness and the selfish gene	Ch 2	BB article: Charles Darwin and Psychology
Week 5 Sept 21-25	Sex, sexual selection and life history theory	Ch 3	<b>Monday: Census Date</b> In-class video: Why Sex?
Week 6 Sep 28-Oct 2	Foundations of Darwinian psychology	Ch 4	<b>Friday: Deadline to join poster group</b>
Week 7 Oct 5-9	The evolution of <i>Homo sapiens</i>	Ch 5	In-class video: What Makes Us Human? BB Poll: Is Intelligent Life Inevitable?
Week 8 Oct 12-16	Encephalization and the emergence of the human mind	Ch 6, plus p.165-167	In-class video: How Smart Can We Get? In-class video: The Brain Game, What’s Sex Got to Do With It? BB article: Bad at Estimating?
Week 9 Oct 19-23	Emotions	Ch 8	
Week 10 Oct 26-30	Kin selection and altruism	Ch 9	BB article: Greed Does Not Compute
Week 11 Nov 2-6	Altruism cont.		
Week 12 Nov 9-13	Conflict within families and other groups	Ch 10	<b>Wednesday: Veteran’s Day Holiday</b>
Week 13 Nov 16-20	Primate and human mating systems and strategies	Ch 11	BB article: Cheating Cheetahs Prosper <b>Friday: In-class poster draft review</b>
Week 14 Nov 23-27	Mating strategies cont.		BB Poll: Is love in our DNA? <b>Thursday-Friday: Thanksgiving Holiday</b>
Week 15 Nov 30-Dec 4	Human mate choice and incest avoidance	Ch 12-13	In-class video: Love, Love Me Do BB Poll: Babies by Design
Week 16 Dec 7-11	Mental disorders	Ch 15	<b>Friday: In-class essay</b>
Week 17 Dec 14-18	<b>Poster Session</b> Wednesday, December 16 2:00-4:00 pm in regular classroom		

## SPECIFIC READING ASSIGNMENTS

You don't have to read the entire chapter indicated on the schedule...just read the sections below.

- Ch 1 1.2 The study of animal behavior p 5-15  
1.5 The rise of sociobiology and evolutionary psychology p 24-28
- Ch 2 2.1 The mechanism of Darwinian evolution p 30-32 (stop at 2.1.2)  
2.2 Some basic principles of genetics p 33-42  
2.3 The unit of natural selection p 42-43
- Ch 3 3.3 Describing mating behavior: systems and strategies p 55-57  
3.5 Sexual selection p 58—61  
3.6 Consequences of sexual selection p 64-69  
3.7 Life history theory p 69-71 (stop at 3.7.3)
- Ch 4 4.1 Testing for adaptive significance p 79-81 (stop at 4.1.2)  
4.1 Orders of explanation in evolutionary thinking p 89-90
- Ch 5 5.1.1 How to classify humans and their relatives p 96-97  
5.2 Origins of the hominins p 97-101  
5.3 Origins of the hominoidea pg 101-108  
5.4 Some important features of hominin evolution p 108-110  
5.5 The supremacy of *Homo sapiens* p 110-113
- Ch 6 6.1 The sizes of animal brains p 115-118  
6.2 Origins of primate intelligence p 118 -134  
6.3 Language p 134-139 (stop at 6.3.5)
- Ch 7 7.6 Sex differences in cognition p 165-167
- Ch 8 8.1 Some early theories of emotions p 172-173 (stop at 8.1.2)  
8.1 The functionality of emotions p 174-178  
8.3 Brain structure p 178-184  
8.4 Emotions and some specific functions p 184-186
- Ch 9 Preface paragraph p 181  
9.1 Kin and parental certainty p 181-192  
9.2 Sibling affection and r values p 192- 193  
9.4 The distribution of wealth p 194-198  
9.5 Reciprocal altruism p 198-201
- Ch 10 10.1 Parent-offspring interactions p 211-213  
10.2 Maternal-fetal conflict p 213-217  
10.3 Human violence and homicide p 217-222  
10.4 Human sexual conflicts p 222-226
- Ch 11 11.1 Contemporary traditional or preindustrial societies p 231-234  
11.2 Physical comparisons between humans and other primates p 235-240  
11.3 Pluralistic sexual strategies p 240-245
- Ch 12 Preface paragraphs p 247-248  
12.1 Evolution and sexual desire p 248-252  
12.4 The use of stimulus pictures p 254-262  
12.5 Facial attractiveness p 263-269
- Ch 13 13.1 Early views about inbreeding and the incest taboo p 271-272  
13.2 Westermarck's alternative Darwinian explanation p 272-273  
13.3 Testing Westermarck's hypothesis p 273-281
- Ch 15 15.1 Depression p 305 -308 (stop at 15.1.3)  
15.2 Psychopathology p 311-313  
15.3 Schizophrenia p 313-316 (stop at 15.3.3)

**STUDENT LEARNING OBJECTIVES:**

1. The student will be introduced to the intellectual significance of the scientific theory of evolution.
2. The student will be presented with an historical timeline of people, places and events that shaped our understanding and development of the modern theory of evolution and its court challenges.
3. The student will learn how evolution works through its different processes (i.e., natural selection, mutation, recombination, gene flow, genetic drift, migration, sexual selection).
4. The student will be presented with the evidence for evolution from several scientific disciplines, for example, biochemistry, paleontology, genetics, biogeography, comparative anatomy, and molecular biology.
5. Through scientific understanding of evolutionary relationships of fossils and living organisms, the student will gain further appreciation of natural history and biological diversity.