

BIOLOGY 3232/5232—Behavioral Genetics

Fall 2012

Lectures: Tuesdays and Thursdays, 2:00 PM – 3:20 PM, Barton BB 409

Instructors: Deb Stull, PhD

Jorune Balciuniene, PhD

Office: BL 248C

BL 436

Office phone: 1-6140 (from on campus); 215-204-6140 (from off campus)

1-0291 (from on campus); 215-204-0291 (from off campus)

E-mail: debstull@temple.edu

jorune@temple.edu

Office hours: Mondays, 9:00 AM – 12:00 PM and happily by appointment.

Mondays and Thursdays, 3:30 PM –5:00 PM or happily by appointment.

Required Text

- Instead of a traditional textbook we have collected a number of textbook chapters from a variety of sources and compiled them into a course packet that you can purchase from University Readers (<http://www.universityreaders.com/>). More information on how to order them will follow on Blackboard.
- In addition to the course packet, there will be a set of research articles assigned as well. Many of these articles will be current review articles on the genetics of the specific behaviors discussed. These articles, which will be posted on Blackboard for you to download and print, allow us to bring you the most up-to-date information. For that reason, not all of the articles are currently listed on the course schedule at the end of this document. Rest assured, however, that students will be advised of the necessary reading well in advance of exams. Please stay look for that information on lecture slides and on Blackboard.
- Many of the textbook sources included in the packet are on reserve at Paley Library. However, please note, not all of the textbook sources are on reserve and some of the editions Paley had available are older editions.

Course Description

Researchers (as well as all of us!) have long been interested in understanding what makes us each the specific person we are. Specifically, we want to know why we each act the way we do. The unraveling of the genetic code for physical attributes plus the (relatively) recent sequencing of the human genome has (re)opened the debate on the relationship between genes and behaviors. In fact, according to some researchers in the field of behavioral genetics, behaviors such as homosexuality, aggression, impulsivity, and nurturing, may have a genetic basis. This scientific and popular focus on genes and behavior has contributed to a resurgence of behavioral genetic determinism—the belief that genetics is the major factor in determining behavior.

So what is the relationship between nature and nurture with regard to behavior? As biologists, we know that human behavior only occurs in an environmental context, but what role (if any) do genes play? Does this relationship depend on the behavior in question? And what are the social, medical, and legal ramifications if genetics is linked to certain behaviors? For example, what if there is a gene associated with a predisposition towards violence? What effect might that have on our legal system? Should it have an effect at all?

The course provides a broad overview of the application of genetics to the study of behavior, focusing especially on human behavior. Emphasis is placed on the use of genetic designs and methods to address psychologically relevant questions concerning the nature and etiology of individual differences in behavior. Specifically, we will examine the biology underlying certain behaviors and discuss the potential role of genetics in them.

Course Objectives

By the end of this course, you should be able to:

1. Understand how the principles of genetics can be used in the study of human behavior
2. Evaluate the evidence that psychological characteristics are influenced by genetic inheritance
3. Consider the implications of examining the role of genetics in certain behaviors

At the end of this course you should have a clearer understanding of how genetics contributes to individual differences in behavior. You will be in a better position to evaluate the evidence for or against genetic or environmental influences. Achieving these objectives will give you an appreciation of the interrelationships of biological and cultural determinants of behavior.

Finally, it is our goal that you will enjoy this class and develop an appreciation for the complexities of behavioral genetics!

Course Work/Grading

Overall

Grades will be based on scores on exams and homework assignments. There will be 3 non-cumulative term exams and a cumulative final exam; although all 3 exams will count towards the final exam, the lowest score will be weighted less (see below for details). Exams will consist of short answer and multiple-choice/true-false/fill-in-the-blank questions. See the schedule at the end of this document for the dates for problem sets, presentations, and exams.

- Homework assignments/in-class presentations: **20%**
- In-class exams: **50% (20% for highest 2 scores and 10% for lowest score)**
- Final: **30%**

All exams are required of all students. The exam dates are listed at the end of this document so you can plan accordingly. If you are unable to take an examination as scheduled, it is your responsibility to contact us before the exam—unexcused absences from an exam will result in a score of 0 for that test. Problem sets that are turned in late will be marked down 5% each day they are late, and they must be turned in before those that were turned in on time are returned (typically on the following Tuesday).

****Graduate students***

Graduate students will be expected to write up one position as short research communications that still clearly states their position argued from the perspective of the additional research they have done on the topic. More direction will be given on the scope of this paper in class, but briefly, we expect that the papers will be succinctly written with a clear storyline that argues their positions with convincing (and fully referenced) evidence.

In addition, graduate students will be given additional questions that are more conceptual and in depth on problem sets and exams.

Problem Sets, Including Presentations

There will be a total of 3 problem sets (which include an in-class presentation). Each student will be responsible for turning in his/her own problem set (in his/her own words), although working in groups is perfectly fine (and even encouraged). The presentations (more below) will be done in groups (we will have sign ups as the dates for the presentations get closer).

Presentations Overview

Behavioral genetics is a controversial topic. In fact, its position in history could be considered checkered at best! And so, there are many questions in this field for which there is not 1 “right” answer; instead, arguments can be made both for and against, using the information available. In other words, although the facts are the facts, their interpretation is up for grabs. And so we would like students to have a chance to explore their own feelings for these controversial topics based on what they have learned in class in a series of “debates.”

Specifically, we will provide students with a yes/no question related to the material being covered currently in the class. Then, in groups of 5-6, students will be expected to present their arguments and evidence in support of their position to the rest of the class in a 5-10 minute presentation. Each student is responsible for participating in 1 presentation (however, “participating” does not mean that everyone has to actually talk during the presentation; research counts too), the grade of which counts as 1 problem set. For each topic there will be 1 group that is FOR (ie, “yea”) and 1 that is AGAINST (ie, “nay”). Positions will be randomly assigned to groups.

Some important facts to keep in consideration:

- The position is clearly stated at the onset of the presentation; no intermediate positions are accepted (think of Congress—it’s always a “yea” or “nay”).
- The claims are supported with specific evidence (eg, facts, examples), which may require research above and beyond what is presented in the textbook and lecture. (**See example below for definitions of “claims” and “evidence”**)
- The position will be more strongly supported if multiple lines of evidence are included. In other words, considering the position from different angles (eg, genetics, physiology, anatomy) will strengthen the argument.
- Students will be asked to assess the extent of their contribution to the presentation as well as the contributions of each of the other members of the group. All students in a group will receive the same grade unless it is clear from these assessments that the work was not done equally by all members of the group. It is up to the students to determine how the work is divided up among them.

And no worries! The instructors are concerned with how well the position/view is argued rather than what the position/view is.

Presentations—Grading

From a grading perspective each student group will be responsible for writing up a **BRIEF** explanation of the individual roles of each student in the presentation and how much each student contributed to the project. Individual grades will be determined based on this evaluation. If there is a disagreement about contributions, then each STUDENT is responsible for writing up the roles of each member of the group, including him/herself. Please note, it is not necessary for each student to SPEAK during the presentation; equal involvement does not mean equal speaking time—research counts too!

EXAMPLE:

Argument/conclusion/finding: Mice prefer dark chocolate to milk.

Evidence: In a study of 617 mice given the choice of dark chocolate or milk chocolate, 85% chose dark chocolate.¹

1. Author. Journal. Year or Author. Web site. (Web sites from Google Scholar are fine. We will also accept information from .edu, .gov, and .org sites)

Attendance

Lecture attendance and punctuality, while strongly encouraged, are not required. Please try to come to class on time if you plan on coming to class out of respect for your classmates. Also, please keep in mind that we may cover some topics in greater detail than in they are covered in your text.

Format

In this course, you will learn the fundamentals of behavioral genetics at all of these levels through a variety of activities, including lectures, problem sets, independent/group study, and in-class exercises. Please note that you are responsible for all the material in the assigned chapters, including figures, summaries, and “boxes,” regardless of whether it is covered in lectures. Thus, you will be responsible for covering some material from the text or readings on your own. You are also responsible for material covered in lecture, including information not covered in the assigned text book.

Blackboard/Class Communications

Course announcements, assignments, and additional materials will be posted online using Blackboard. When available, lecture outlines will be posted. Updates to this syllabus (regarding topics and reading; exams and homework dates will remain fixed) will be posted. Please check periodically.

You will also receive important course announcements via your Temple email account. If you do not use your Temple email account, you need to activate it. If you have forgotten your password, you need to go to Computing Services and have them assign you a new password.

It is strongly recommended that you check your e-mail regularly. We may send messages—sometimes with attachments—to the class using this medium. You should also feel free to email us if you have any questions or problems. But please too feel free to call us as well, if you prefer a more personal communication. We are also available during the office hours listed above. If you would like to meet at another time, please don't hesitate to e-mail or to call, and we can schedule a time to meet.

Honesty and Civility

You must abide by Temple's Code of Conduct (http://policies.temple.edu/getdoc.asp?policy_no=03.70.12), which prohibits:

1. Academic dishonesty and impropriety, including plagiarism and academic cheating.
2. Interfering or attempting to interfere with or disrupting the conduct of classes or any other normal or regular activities of the University.

We take plagiarism and other forms of cheating very seriously. If you have any questions as to whether something is plagiarism, please ask us, or, if that's not possible, assume that it is and don't do it!

Disabilities

Any student who needs accommodation because of a disability should contact us privately to discuss the specific situation as soon as possible. The Office of Disability Resources and Services (215-204-1280) in Ritter Annex 100 can coordinate reasonable accommodations for students with documented disabilities.

Academic Rights and Responsibilities

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02) that can be accessed through the following link: http://policies.temple.edu/getdoc.asp?policy_no=03.70.02.

Final Note

We know that some students struggle with genetics and in course of this struggle may begin to question its importance. But genetics is a complex, complicated, multifaceted discipline, which goes well beyond fruit flies and pea plants. Our hope is that in this course, you will gain a better understanding of the importance of genetics in the real world. And, perhaps, enjoy the ride along the way.

TOPICS AND READINGS—TENTATIVE SCHEDULE

Please note that this is a tentative schedule and may be modified depending on how the course is progressing. All changes will be announced in advance, and students will be well aware of them—particularly regarding what is going to be included on exams.

Week	Date	Lecture Topics	Assigned Readings	Homework Due
1	Week of 8/27	<ul style="list-style-type: none"> • Introduction • Neuroscience foundation: action potentials 	<ul style="list-style-type: none"> • Vossell LB. <i>Nature</i>. 2007;450:193-7; Holden C. <i>Science</i>.2008;332:382-5 (8/28) • Breedlove: Chapter 3, pages 59-70 (8/30) 	
2	Week of 9/3	<ul style="list-style-type: none"> • Neuroscience foundation: synaptic transmission • Neuroscience foundation: neurotransmitter systems 	<ul style="list-style-type: none"> • Breedlove: Chapter 3, pages 69-80 (9/4) • Breedlove: Chapter 4, pages 89-95; Purves, 4th edition, Chapter 6, pages 119-142 (9/6) 	
3	Week of 9/10	<ul style="list-style-type: none"> • Neuroscience foundation: anatomy • Human genome and genetic variation 	<ul style="list-style-type: none"> • Purves, Appendix, pages 815-833; 837-841 (9/11) • Frazer KA et al. <i>Nature Reviews</i>. 2009;10:241-251; “Human Genome” and “Understanding Human Genetic Variation” (9/13) 	<ul style="list-style-type: none"> • PS 1—9/13 (neuro)
4	Week of 9/17	<ul style="list-style-type: none"> • Mendel’s laws as applied to humans • EXAM 1 (9/20) 	<ul style="list-style-type: none"> • Plomin: Chapters 2 and 3 (9/18) 	
5	Week of 9/24	<ul style="list-style-type: none"> • Quantitative traits I • Quantitative traits II 	<ul style="list-style-type: none"> • Carey: Chapters 17 and 18 (9/25) • Plomin: Chapter 5 (9/27) 	
6	Week of 10/1	<ul style="list-style-type: none"> • Research methods in quantitative genetics • Research methods in quantitative genetics 	<ul style="list-style-type: none"> • Carey: Chapter 19(10/2) • Plomin: pages 105-114 and “Molecular Genetics” pages 402-410 (10/4) 	
7	Week of 10/8	<ul style="list-style-type: none"> • Cognition I (introduction, intelligence in humans) • Cognition II (learning and memory in animals) 	<ul style="list-style-type: none"> • Toga AW, Thompson PM. <i>Annu Rev Neurosci</i>. 2005;28:1-23 (10/1) • Breedlove, Chapter 18, pages 543-59; 563-4; Anholt: Chapter 14, pages 231-8; 240-4; Plomin R. <i>Nat Rev Neurosci</i>. 2001;2:136-141 (10/11) 	<ul style="list-style-type: none"> • PS 2—10/11 (genetics)
8	Week of 10/15	<ul style="list-style-type: none"> • Human cognitive disabilities • EXAM 2 (10/18) 	<ul style="list-style-type: none"> • Huang, et al. <i>Cell</i>. 2012;148:1222; Fortini, ME. <i>Nature</i>. 2003;425:565-6 (10/16) 	

Week	Date	Lecture Topics	Assigned Readings	Homework Due
9	Week of 10/22	<ul style="list-style-type: none"> • Childhood psychopathology • Schizophrenia 	<ul style="list-style-type: none"> • Cortese, S. <i>Eur j of ped neur.</i> 2012;16:422-433. • Geschwind, D, <i>Annu. Rev. Med.</i> 2009; 60:367–80 • The autism enigma. <i>Nature.</i> 2011;479, pages 21-35. (10/23) • Breedlove: Chapter 16, pages 481-494; Gejman PV, Sanders AR, Kendler KS. <i>Annu. Rev. Genomics Hum. Genet.</i> 2011; 12:4.1–4.24 (10/25) 	
10	Week of 10/29	<ul style="list-style-type: none"> • Social instinctive behaviors I • Sexual behaviors 	<ul style="list-style-type: none"> • Robinson GE, et al. <i>Science.</i> 2008;322:896-900; • Donaldson ZR et al. <i>Science.</i> 2008;322:900 (10/30) • Dickson BJ, et al. <i>Science.</i> 2008; 322: 904 (11/1) 	
11	Week of 11/5	<ul style="list-style-type: none"> • Awake and asleep I • Awake and asleep II 	<ul style="list-style-type: none"> • Anholt: Chapter 11 (11/6) • Anholt: Chapter 11 (11/8) 	
12	Week of 11/12	<ul style="list-style-type: none"> • PRESENTATION 1 (11/13); Addiction in humans • PRESENTATION 2 (11/15); Addiction in animals 	<ul style="list-style-type: none"> • Kreek, MJ, <i>Nat Neurosc.</i> 2005;8:1450-57; • Goldman, D et al, 2005; <i>Nat Rev Genet.</i> 2005; 6:521-32 (11/13) • Ojelade, SA, <i>Curr Biol.</i> 2009; 19(24):R1110-1 • Kaun et al, <i>Hum Genet.</i> 2012; 131:959-975 	<ul style="list-style-type: none"> • Presentation day 1— 11/13 • Presentation day 2— 11/15
12	Week of 11/19	<ul style="list-style-type: none"> • PRESENTATION 3 (11/22); Personality • THANKSGIVING 	<ul style="list-style-type: none"> • Reichborn-Kjennerud T. <i>Clin Lab Med.</i> 2010;30:893-910 (11/20) 	<ul style="list-style-type: none"> • Presentation day 3— 11/20
13	Week of 11/26	<ul style="list-style-type: none"> • Mood (introduction, depression, bipolar disorder, anxiety) • EXAM 3 (11/29) 	<ul style="list-style-type: none"> • Breedlove: Chapter 16, pgs 494-510; Scharinger C, Rabl U, Sitte HH, Pezawas L. <i>NeuroImage.</i> 2010;53:610-21 (11/27) 	
14	Week of 12/3	<ul style="list-style-type: none"> • Wrap-up/review 		
15	Tuesday, December 11, 2012 1:00 PM– 3:00 PM	<ul style="list-style-type: none"> • FINAL EXAM 		

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