

IB 432: Genes and Behavior (3 credit hours)

Lecture Information

Instructors:

Dr. Adam G. Dolezal

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Office Hours: by appointment; I also plan to stick around ~30 minutes after each lecture.

TAs:

Ed Hsieh

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Office hours: by appointment

Schedule: 8:00 – 9:20 AM, Tuesday & Thursday, 2020 NHB

Textbook: As a “Frontier” area in biology, there is still no suitable textbook for this course. We will mainly be reading book chapters, primary literature, and newspaper articles provided through the moodle site.

Course Web Site: Materials for the course will be posted on the course Moodle site:
<https://learn.illinois.edu>

Course Description: Concepts, methods, and problems in the analysis of the relationship between genes and behavior, the complex neurobiological processes that mediate action on behavior, in appropriate ecological and evolutionary contexts.

Learning Objectives:

1. To understand the different ways in which genes can affect complex phenotypes, including behavior
2. To appreciate the importance of both genes and environment, and their interaction, in affecting behavior
3. To have a basic understanding of quantitative and molecular genetic techniques, including modern genomic approaches, for studying the genetic basis of behavior
4. To understand how genes that underlie behavior can be deeply conserved across animals, but still evolve and contribute to the evolution of new forms of behavior
5. To be able to read, understand, and critically assess behavioral genetics papers from the primary literature
6. To lead and participate in critical discussions of scientific literature and its portrayal in

popular articles

7. Work responsibly, respectfully, and effectively with other students.

Grading

1) I use the standard 90, 80, 70, 60% scores as starting cutoff points for A, B, C, and D grades, respectively. Depending on the distribution of points at the end of the semester I **may** drop the cut off points slightly (e.g., 88% might become the A cut off) but I **will not raise** the cut-offs.

2) This is an upper-level course for students interested in the topic. As such, the expectations for preparation and participation are high. That said, they are achievable to all students – i.e., if all students meet these expectations, this will be reflected in their grade. I.e., I have no expectation that some percentage of the class will get any given grade (e.g., a bell curve of grade distribution).

Your final grade in the course ***will be based on the following point allocations.***

Assessment	POINTS TOTAL
Exam 1	150 (15%)
Exam 2	150 (15%)
Figure Facts sheets (20 x 10 pt each)	200 (20% -1% per sheet)
Attendance and participation	200 (20%)
Final Poster + Participation	300 (30%)
GRAND TOTAL	1000 (100%)

Exams (2 exams x 15% each = 30% total grade)

The two exams, with specific details to follow. Exam questions will draw heavily from class discussions and lectures, but all of the readings and additional readings are also fair game. You will have the full class time to complete each exam.

Figure Facts Sheets (FFS) (20 FFS's x 1% = 20% total grade)

For each data paper we read, you are required to fill out a “Figure Facts Sheet”, worth 10 points. These are short assignments that are designed to help you in understanding the data papers by focusing on the data presented in each of the major figures in the paper. They will also help me, as the instructor, to know which papers and pieces of data students are struggling with, so we can devote more time to explaining these. These are to be turned via Moodle on the day that the reading is due **by the beginning of class**. You can only turn these in **before class begins**.

During class, I suggest making changes to your FFS if you have misunderstood something. These are really valuable as study guides for reviewing the papers we read, as they can help you remember the highlights without re-reading all the papers.

Attendance and Student Participation (200 points = 20% of total grade)

This course is highly discussion and participation based! Students will work on questions and discuss literature in groups in every class period. The goal is to use this format to help students discuss complex concepts together and then have a class-wide participatory discussion.

During each class period, groups will discuss the assigned readings and then we will go through the papers in class. For data papers, topics that are expected to be covered by the group are as follows:

- 1) What was the major question?
- 2) What was the hypothesis or hypotheses being tested?
- 3) How were the hypotheses tested?
- 4) How do you interpret each figure?
- 5) Do the results support the hypothesis/es?
- 6) What are the main conclusions?
- 7) What was good about this study?
- 8) What could be improved about this study?
- 9) What would be a good follow-up study?

To earn class participation points, you should come prepared to answer and discuss questions from the readings assigned for each class. Coming prepared for these discussions by **doing your reading** and noting questions or things that you need clarification on during your reading will contribute to better and more informed participation!

Each class period, we will take attendance and track attendance throughout the course. Conceptually, you can think of starting the course with 200 participation points. Missing class and/or not participating will slowly erode these points.

That said, this course is flexible! Everyone has other things that come up (illnesses, job interviews, etc.). I just ask that, if you cannot make a class, you let the TAs know, preferably ahead of time. If you participate normally, missing a few classes will not affect your participation grade. This is a discussion class and being absent from the discussions will negatively affect your ability to get the most out of the course. But obviously **don't come if you feel sick!!!** *Since your participation grade is dependent on your attendance, **please let me know if you need to miss a class.***

What will participation look like? In most class periods, we will read two different types of literature – a scientific ‘data’ or review paper and a news or perspective piece meant for a more general audience. The goal of this course is to partially recreate the context of a small ‘scientific journal club’ (like a book club but with scientific papers); this is a common tool used by scientists to keep up with or learn research literature. Often in situations like this, someone leads the presentation of a paper and presents it to the group for discussion. Our discussion system is meant to provide a similar experience.

Final Poster project (300 points = 30% of total grade)

In the last few weeks of the class, students will work in groups of 3-4 to come up with a behavior they are interested in and produce a poster describing it and planning a research project to investigate it. The posters will be presented in class and the content of the poster will be assessed for a grade. Students will also have to review and provide feedback for other presentations during the preparation periods. Students will have time in class to prepare the posters and presentations will occur during normal class periods.

COURSE SCHEDULE

In most classes, we will have one or two main papers (in **bold**) and one non-technical paper (underlined) for discussion (from popular magazines, news, blogs). For some classes, there is a longer review paper (denoted with OPT), which is optional reading, but can be a reference in understanding concepts and studying for exams.

(Class) Date	Topic	Reading
(1) Jan 16	Intro to Course	<u>Pinker</u>
(2) Jan 18	Exploring Gene-Behavior Relationships	<u>Sapolsky</u> , Robinson(1) , Holden
(3) Jan 23	Principles of Behavioral Genetics 1: Genetics basics review	<u>Leeper</u> , Carroll , Greenspan(1)OPT
(4) Jan 25	Principles of Behavioral Genetics 2: Twins, heritability, and whole genomes	<u>Wright</u> , Cesarini , KendlerOPT
(5) Jan 30	Principles of Behavioral Genetics 3: Forward and reverse genetic approach	<u>Flint</u> , Rietveld , KyriacouOPT
(6) Feb 7	Con't	TBD
(7) Feb 6	The fallacy of eugenics	<u>Severson</u> , Roubertoux
(8) Feb 8	Principles of Behavioral Genetics 4: Gene expression	<u>Dobbs(1)</u> , Bell , Guo
(9) Feb 13	Con't	TBD
(10) Feb 15	Acoustic communication in song birds	<u>WashU</u> , Dong , ClaytonOPT
(11) Feb 20	Honey bee aggression	<u>Dobbs(2)</u> , TBD , ZayedOPT
(12) Feb 22	EXAM 1	
(13) Feb 27	Parasite manipulation of host behavior	<u>Zimmer</u> , Geffre , AdamoOPT
(14) Feb 29	Epigenetics and maternal care in rodents	<u>Hurley</u> , Weaver , ChampagneOPT

(15) Mar 5	Epigenetics and dominance in fish	<u>Skinner</u> , Lenkov , Ledon-RettigOPT
(16) Mar 7	Genotype-environment interactions	<u>Breed</u> , Bakermans , RutterOPT
March 9-17: Spring Break		
(17) Mar 19	Gut-brain-behavior axis	<u>Svoboda</u> , Sgritta
(18) Mar 21	Con't	con't
(19) Mar 26	Monogamy in prairie voles Introduce poster project	<u>Vedantam</u> , Lim , DonaldsonOPT
(20) Mar 28	Burrowing behavior in mice	<u>Callaway</u> , Weber , HuOPT
(21) Apr 2	Personality genes	<u>Kraus</u> , Garamszegi , Bell(2)OPT
(22) Apr 4	Sexuality in humans	<u>TBD</u>
(23) Apr 9	Genes for domestication	<u>Willingham</u> , vonHolt , KukekovaOPT
(24) Apr 11	EXAM 2	
(25) Apr 16	<i>Poster Work Day</i>	
(26) Apr 18	<i>Poster Work Day</i>	
(27) Apr 23	<i>Poster Work Day</i>	
(28) Apr 25	<i>Poster Presentations</i>	
(29) April 30	<i>Poster Presentations</i>	

This schedule is subject to change if it becomes apparent that we need to spend more or less time on a given subject. Reading assignments are also subject to change if I find a new and exciting paper to share!

COURSE POLICIES AND ETIQUETTE

1. **Be punctual.** This class is scheduled from 8:00 am to 9:20 am. We will begin promptly and will generally go for the entire 80 minutes. I expect you to be ready to begin at this time, and for you to give me your undivided attention for the entire time.
2. **Be respectful, considerate, and open minded.** In this course we will discuss topics involving subject areas that may touch on aspects of the human experience that may be sensitive or

controversial. At all times we will maintain a respectful and professional atmosphere of discussion. This means respecting the opinions and thoughts of your classmates, but also respecting discussion and disagreement as long as it remains pertinent to the topic and professionally presented. The goal is to have open discussions to lead to a better understanding of genes and behavior – keep this in mind at all times.

Intolerance, aggression, or any form of denigration is unacceptable. One of the challenges of breakout rooms is that I cannot be present or monitor them all. If, at any time, something occurs in the class that makes you uncomfortable or you need to discuss, I will make time to meet with you ASAP.

Contesting Grades

If you feel that your assignment or exam has been graded inappropriately, you are welcome to contest grades via a written statement within one week of receiving the graded assignment. To contest a grade, you must submit a written statement (preferably via email) of what you believe was graded incorrectly and why the grade should be altered. No oral contesting of grades will be considered, nor will we consider any contest of grades submitted after one week.

Disabilities Statement

If you require special accommodations, please tell Dr. Dolezal as soon as possible. All accommodations will follow the procedures as stated in Article 1-110 of the Student Code (http://studentcode.illinois.edu/article1_part1_1-110.html).

Academic Misconduct

Academic integrity is essential to maintaining a learning environment that promotes excellence. We expect that all students will complete all academic and scholarly assignments with fairness and honesty. We adhere to the academic misconduct guidelines outlined by the Student Code of Conduct and will report any suspected academic misconduct. Please see http://studentcode.illinois.edu/article1_part4_1-402.html for additional details. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact Dr. Dolezal.