
IB 432: Genes and Behavior

Credit: 3 hours

Lecture Information**Instructor:**

Dr. Adam G. Dolezal

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Office Hours: 12-1 Fridays or by appointment; I also plan to stick around ~30 minutes after each lecture.

Schedule: 2:00 – 3:20 PM, Tuesday & Thursday, online**Zoom link information:****Text:** 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>**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.

Discussion groups

This course is highly discussion and participation based! When taught in-person, students 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. In an online format, this will be achieved through ~5 person breakout room groups that we will assign. Participation and discussion within your group will be critical.

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 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)
Student-led literature discussions/participation	200 (20%)
Final Poster	200 (20%)
Final Poster Presentation	50 (5%)
Final Poster Participation	50 (5%)
GRAND TOTAL	1000 (100%)

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

The two exams, with specific details to follow. Both will be short answer and essay based. 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 at least 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.

Student Led Literature Discussions (24 class periods combined to equal 20% of total score)

This is a paper reading and discussion class. Attendance and participation are essential! Most classes will be held as relatively informal paper discussions, with ample time for questions as they arise. We will break up into groups of ~5 students for discussion.

Your attendance will be noted, and participation graded, so ***please let me know if you need to miss a class***. To earn class participation points, you should come prepared to answer and discuss questions from the readings assigned for each class. During discussions, we will jump into breakout rooms to discuss these questions with students semi-randomly. *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!!*

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 me 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.

How will participation be graded? 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 on it to the group for discussion.

Because the course is larger than a normal ‘journal club’, we will take a collaborative approach to presenting papers. In each class period, each work group will be assigned a question/topic from the research paper or the general audience piece. The assignment of these will cycle (e.g., odd numbered groups do the research paper on Tuesdays and the general piece on Thursdays). The different forms are described as follows:

A) For the research papers, I will assign each group a specific question or component of the paper. During a discussion period in each class, each group will work together to answer the question and produce 1-2 PowerPoint slides that address it. At the end of the discussion time, a single member of each group will present their slide to the class. This will be done in order, so a single cooperative presentation on the topic will be given. The assigned topics will cycle so that each group will have to present on a different component of the study each time. All students within a group should put in equal effort and all should try to speak and present roughly the same amount. Different studies may have different questions I pose, but in general they will be similar to these:

- 1) What was the major question?
- 2) What was the hypothesis or hypotheses being tested?
- 3) How were the hypotheses tested?
- 4) Show and 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?

B) For the media/general audience pieces, I will pose different, specific questions for each topic. These questions are usually more general and may be about opinions or discussion points rather

than concrete answers. Groups focusing on these papers will not produce a slide, but will be expected to discuss the questions for the class. Grading of this will be group-level participation.

Final Poster project (Poster: 20%; Presentation 5%; Participation: 5% = 30%)

In the last few weeks of the class, students will work in small groups 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 for a grade (50 points) and the content of the poster will be assessed (150 points). Students will also have to review and provide feedback for other presentations (50 points). 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 **), which is optional reading, but can be a reference in understanding concepts and studying for exams.

Jan 25 is first day

Cancelled days - Feb 17, march 24, April 13

(Class) Date	Topic	Reading	Presenter
SECTION 1: Foundations			
(1) Jan. 26	Intro to Course	<u>Pinker</u>	Dolezal
(2) Jan. 28	Exploring Gene-Behavior Relationships	<u>Sapolsky, Robinson 1, Holden</u>	Dolezal
(3) Feb. 2	Principles of Behavioral Genetics 1: Genetics basics review	<u>Leeper, Carroll, Greenspan 1**</u>	Dolezal
(4) Feb. 4	Principles of Behavioral Genetics 2: Twins, heritability, and whole genomes	<u>Wright, Cesarini, Kendler**</u>	Dolezal
(5) Feb. 9	Principles of Behavioral Genetics 3: Forward and reverse genetic approach	<u>Flint, Rietveld, Kyriacou**</u>	Dolezal
(6) Feb. 11	Principles of Behavioral Genetics 4: Gene expression	<u>Dobbs1, Bell, Guo</u>	Dolezal
(7) Feb. 16	The fallacy of eugenics	<u>Severson, Roubertoux</u>	Dolezal
SECTION 2: Social influences on gene expression and behavior			
(8) Feb. 18	Acoustic communication in song birds	<u>WashU, Dong, Clayton**</u>	Students
(9) Feb. 23	Honey bee aggression	<u>Dobbs2, Rittschof, Zayed**</u>	Students
(10) Feb. 25	Parasite manipulation of host behavior	<u>Zimmer, Geffre, Adamo**</u>	Students
(11)	Dominance in cichlid fish	<u>Shwartz, Maruska</u>	Students

Mar. 2			
Mar. 4	EXAM 1		
(12) Mar 9	Epigenetics and maternal care in rodents	<u>Hurley, Weaver,</u> <u>Champagne**</u>	Students
(13) Mar. 11	Epigenetics and dominance in fish	<u>Skinner, Lenkov,</u> <u>Ledon-Rettig**</u>	Students

SECTION 3: The influence of genes on social behavior			
(14) Mar. 16	Genotype-environment interactions	<u>Breed, Bakermans,</u> <u>Rutter**</u>	Students
(15) Mar. 18	Courtship communication in fruit flies	<u>Greenspan 2,</u> <u>Wheeler, Yamada**</u>	Students
(16) Mar. 23	Monogamy in prairie voles <i>Introduce poster project</i>	<u>Vedantam, Lim,</u> <u>Donaldson**</u>	Students
(17) Mar. 25	Burrowing behavior in mice	<u>Callaway, Weber,</u> <u>Hu**</u>	Students
(18) Mar. 30	Human aggression: amine genes = “mean” genes?	<u>Horgan, Alia-Klein,</u> <u>Ferguson**</u>	Students
(19) Apr. 1	Speech in humans and animals and its roots	<u>Yong, Enard,</u> <u>Fisher**</u>	Students
(20) Apr. 6	Genes for domestication	<u>Willingham, vonHolt,</u> <u>Kukekova**</u>	Students
(21) Apr. 8	Personality genes	<u>Kraus, Garamszegi,</u> <u>Bell 2**</u>	Students
Apr. 13	NON INSTRUCTIONAL DAY; NO CLASS		
(22) Apr. 15	Sexuality in humans	<u>Horton, Sanders,</u> <u>Servick</u>	Students
Apr. 20	EXAM 2		
Apr. 22	<i>Poster work day</i>		
Apr. 27	<i>Poster work day</i>		
Apr. 29	<i>Poster presentations</i>		
May 4	<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 2:00 pm to 3:20 pm. We will begin promptly and will generally go for the entire 80 minutes. I expect you to be in 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.

3. Zoom etiquette. While online and via Zoom, you should treat this as an in-person class as much as possible. This means not being disruptive, dressing appropriately, and treating everyone in the class with respect. **Camera and microphone use:** During the lecture components of the class, everyone can/should be muted and turn off their camera. When in breakout rooms, I recommend that students turn on their cameras and speak freely. For technical or personal reasons, this may not always be possible and that is fine. However, if you will have a consistent issue with using a camera, please discuss this with me ahead of time.

4. Class recordings: I will record each class and post the video file afterwards. This will record only what occurs in the main meeting (not in any breakout rooms), including the chat.

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.