BZ 433: Behavioral Genetics
Fall 2015
Lecture, Yates 306, T Th 2:00 – 3:15 pm
Recitation, Yates 306, M 4 – 5:15

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Prerequisite: BZ310 or other Cell Biology class

Course Description: This course will provide an in-depth introduction to the study of the genetic basis of behavior. We will focus on aims, methods, and data interpretation in the field. The course will focus on the genetics of a wide variety of natural behaviors in animals including humans.

Mode of Instruction: The format will be primarily lecture-based with active learning exercises. Students will contribute to discussions throughout the lectures and recitation sections.

Course Objectives: The primary learning goals for this course are for students to:

- read critically the primary literature on behavioral genetics
- devise experiments and interpret evidence that test major hypotheses in behavioral genetics
- describe how genetic and environmental causes interact to create behavioral phenotypes in offspring that resemble parents
- identify specific molecular, neural, and developmental mechanisms by which the genome can influence behavior
- identify specific molecular, neural, and developmental mechanisms by which the environment can influence behavior
- explain how genetic and environmental influences on behavior shape evolution and are shaped by natural selection
- assess uses and limitations of various research approaches to explain genetic basis of behavior
- contrast research on behaviors with simple and complex genetic bases
- appraise challenges in human behavioral genetics research and discovering genetic risk factors
- discuss ethical implications of behavioral genetics research for issues such as prejudice and judicial system

*** This text and all the reading from it are OPTIONAL. A copy exists in the library***

Additional class materials: Primary literature and all assignments will be posted on RamCT.
Grading: percentage

Class participation: 5
Twitter: 5
Short answer questions in class: 35
Writing assignments: 40
In-class presentation & feedback to classmates: 15
Total: 100

Class participation: This is a small seminar class, and a major part of the class is an in-depth discussion of the topics. Your participation grade will reflect preparation (reading the assignments before the recitation), and contribution to discussion in both lectures and recitation.

Twitter: Having the ability to concisely summarize an article is an important skill in scientific writing. We will use a weekly twitter to have you post an article that you find and read based on your interests (ideally leading up to your end-of-semester presentation. With this post you will also include a couple sentences describing the main scientific impact of the paper. We will use the “hashtag” #BZ433, to follow posts and have the opportunity to read new articles beyond assignments in the class. Go to https://twitter.com/CSUBZ433 to find main account and primary example.

Short answer questions in class: A major goal of the class is to teach students how to interpret evidence in light of hypotheses. Lectures will include in-class assignments that require you to frame research questions, state alternative hypotheses, propose experiments to test hypotheses, draw predicted outcomes, and interpret data. Other assignments will offer problems to clarify fundamental of quantitative genetics. Assignments will sometimes allow group discussion and others reflect individual answers. Students will receive points both for content (e.g. creative ideas that are scientifically sound) and for clearly articulating that content. We will drop the lowest 5 grades to enable a reasonable number of absences. Discuss in advance with the instructor grading changes if extended excused absences will occur.

Writing assignments: This writing-intensive course will include 10 writing assignments and opportunities for 2 revisions. Writing assignments will vary in their topics, audience, length, total points, and grading rubrics. We will post assignments on Mondays at 5 am the week before they are due, and all assignments are due by 4 am on the following Monday. Late assignments will receive half-credit if turned in by 4 pm Monday (the recitation). See schedule below for due dates. The TA will grade these assignments.

In class presentation: You will give one presentation on a topic you choose. Presentations must include research questions, hypotheses, and data interpretation. To help you prepare, your weekly writing assignments will include a topic statement and a thorough outline. Presentations will be 15 minutes plus 5 minutes for questions and discussion. We will schedule presentations during the last two weeks of the class. Prior to the final presentations, each student will give feedback to 2 classmates, and each student will also give feedback to two final presentations.

Academic dishonesty and plagiarism: Plagiarism is a form of academic dishonesty. Plagiarism is the use of facts or ideas (like sentences, phrases or sections of a paper) without citing the original author even if the wording is changed. Copying a section from a paper and citing the original author is NOT sufficient either – use your own words, AND cite the origin of the ideas. If you have questions about plagiarism, please ASK. If we find evidence of cheating or plagiarizing, you will fail the course and a letter will be sent to your program reporting your
actions. If you feel like the assignment is unclear or the work too difficult, come talk to one of us.
“I didn’t know” is NOT an excuse.
Lectures on Tuesday and Thursday will be given by Kim Hoke, and Monday recitations led by Kim Dolphi.

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<thead>
<tr>
<th>Week</th>
<th>Writing Assignment</th>
<th>Recitation</th>
<th>Tuesday Lecture</th>
<th>Thursday Lecture</th>
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<tr>
<td>Aug 24 - 30</td>
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<td>Syllabus, course goals, writing assignments</td>
<td>Questions &amp; hypotheses in behavioral genetics</td>
<td>Genes in individuals &amp; populations</td>
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<td>Aug 31 – Sept 3</td>
<td>In-class response to podcasts on Aug 31</td>
<td>CRISPR technology</td>
<td>Allelic effects, genotypic values</td>
<td>Heritability, variance components</td>
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<td>Sept 7 - 10</td>
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<td>Labor day: no class</td>
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<td>Heritability case studies</td>
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<td>Sept 14 - 17</td>
<td>Reading response due Sept. 14</td>
<td>Natural selection &amp; adaptation</td>
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<td>Gene x environment interactions</td>
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<td>Sept 21 - 24</td>
<td>Reading response due Sept. 21</td>
<td>Host plant effects on signaling</td>
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<td>Environment case studies</td>
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<td>Sept 28 – Oct 1</td>
<td>Reading response due Sept. 28</td>
<td>Epigenetics, maternal care, stress physiology &amp; behavior</td>
<td>Identifying individual genes: QTL mapping &amp; association mapping</td>
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<td>Oct 5 – 8</td>
<td>Research questions for presentation due Oct. 5</td>
<td>Genetics in society</td>
<td>Identifying individual genes: Genetic screens</td>
<td>Identifying individual genes: Testing candidate genes</td>
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<td>Oct 12 – 15</td>
<td>Response to genetics in society due Oct. 12</td>
<td>Nonapeptides primary literature</td>
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<td>Case studies: courtship &amp; mating</td>
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<td>Oct 19 – 22</td>
<td>Contrast primary literature and media coverage due Oct. 19</td>
<td>Media coverage on love</td>
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<td>Case studies: social affiliation &amp; pair bonding</td>
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<td>Oct 26 - 29</td>
<td>Optional: revise and resubmit assignment, due Oct. 26</td>
<td>Sex, gender, and sexual orientation</td>
<td>Multiple QTL &amp; complex environmental contributions</td>
<td>Analysis of gene expression</td>
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<td>Nov 2 - 5</td>
<td>Limitations of inference, due Nov. 2</td>
<td>Race and behavioral genetics</td>
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<td>Case studies: dominance &amp; aggression</td>
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<td>Nov 9 - 12</td>
<td>Outline and references for presentation due Nov. 9</td>
<td>Autism readings</td>
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<td>Case studies: autism</td>
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<td>Nov 16 - 19</td>
<td>Contrast pros and cons of human vs. animal research, due Nov. 16</td>
<td>Debate: human neurogenetics vs. research in animal models</td>
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<td>Case studies: human neurogenetics</td>
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<td>Nov 21 - 29</td>
<td>Thanksgiving</td>
<td></td>
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<td>Nov 30 - Dec 10</td>
<td>Optional: revise and resubmit assignment, due Dec. 1</td>
<td>Presentations: Peer review and final presentations</td>
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Brief guide to reading primary literature – BZ433

Here is an overview of the kinds of things you should be able to understand after reading a paper. Every paper is different, so some questions may not apply. For response papers in this class, you typically will be focusing on the types of questions outlined for the discussion – summarizing methods and results is not necessary. NOTE: some journals print methods at the end of the paper, but reading them after the introduction is usually better.

Introduction:
What is/are the hypothesis/competing hypotheses that this work addresses?
What predictions would be consistent with each hypothesis?
What results from previous research have tested some predictions?
What is the open question that this paper will fill in to the story?

Methods:
What did the authors do in this paper?
What are they measuring?
What experimental groups did they include?
What controls did they have?
How did they analyze the results?
(advanced: why did they choose these methods instead of alternatives; did they use the most appropriate methods; did they demonstrate effective use of methods?)

Results:
What did the authors find for each question/prediction?
For each figure panel or table, what does that figure demonstrate? What was the specific question/prediction, what were the associated methods, and what does the figure/table show the answer is?
Do different experimental methods testing related predictions show consistent results?

Discussion:
Did the experimental findings fit the predictions?
Did the results clearly distinguish between competing hypotheses?
Do the results conflict with any previous findings, or are they consistent?
If conflicting results, what might the explanations be?
What are alternate explanations for the results other than the authors’ main conclusions?
What further experiments would help distinguish between hypotheses or alternative explanations? How important are these further experiments in convincing you that the authors’ argument is correct?
How much stronger is the evidence now in support of the main hypotheses? Or, how strongly have the authors made us questions the dominant hypothesis currently in favor in the field?
What new concepts/results/analyses have the authors contributed to the field?
What kind of general contributions have the authors made that would be important beyond their specific system/field of study?