Biology 3422: Genes, Brains, and Behavior

Genetic studies of physiological systems underlying animal behavior, including the genetic basis for normal and abnormal behaviors in animals and humans. Topics include: history of behavioral genetics; the ongoing debate about "nature vs. nurture"; contributions of genetic model systems including the nematode *Caenorhabditis elegans*, the fruit fly *Drosophila melanogaster*, the mouse *Mus musculus*, and other animal models; molecular mechanisms underlying the evolution of behavioral phenotypes; the emerging role of epigenetics in regulating nervous-system functions and behavior; the use of genetic and genomic analyses in studies of human behavior and psychiatric disorders. **Prerequisites**: Bio 2970.

Class goals: This course is designed to help upper level students who are interested in neuroscience and genetics understand the role of the genome and the function of genes in regulating behavioral phenotypes. Students who take this course are expected to participate in informal discussions, and to read and comprehend primary research papers. By using behavior as a phenotype, a student should be able to master advanced concepts in modern genetics and molecular analyses of complex phenotypes. They should also achieve better understanding of how the nervous system functions at the cellular and molecular levels to produce behaviors. Furthermore, understanding how studies of behavior in simple organisms can affect our understanding of human behavior is important for realizing that behavior is a trait that is sensitive to natural selection and other evolutionary forces.

Reading materials: Reading materials will be assigned from the primary literature. ***No textbook will be required.***

Meeting Times:
Lectures are Mondays and Wednesdays; 11:00-12:00: Rebstock 322.
Discussion groups are Fridays 11:00-12:00:
A) McDonnell 312
B) McDonnell 412
C) Life Sciences 202
D) Life Sciences 310
E) Life Sciences 311

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Monsanto Hall 411 (office hours by appointment)

Teaching Assistants (office hours will be announced in first discussion session):

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Class Website: http://www.nslc.wustl.edu/courses/Bio3422/bio3422.html

Grading:

Exams and paper reports. There will be two in-term exams (each represents 25% of the total grade). Each exam will emphasize materials introduced since the last exam but will also require synthesis of previous lectures. Final exam will include all covered materials with an emphasis on lectures since midterm 2 (30% of total grade). Discussion sections will focus on analyses and discussions of primary literature. Students will be required to write a short report on discussed articles (20% of total grade). Each student will also present one paper in class. Instructions for writing the report will be given in class.

Syllabus:

	Date	Day	Topic	Readings
1	8/28/17	Mon	Introduction	
2	8/30/17	Wed	Behaving without a "brain" I	Preer; Kung
	9/1/17	Fri	Journal club - TA	Huntington
	9/4/17	**Mon**	**Labor day**	
3	9/6/17	Wed	Behaving without a "brain" II	
	9/8/17	Fri	Journal club - TA	
4	9/11/17	Mon	The worm I	Brenner; Kaletta
5	9/13/17	Wed	The worm II	
	9/15/17	Fri	Journal club Student 1	
6	9/18/17	Mon	The fruit fly I: Biology, genetic principles, and screens	
7	9/20/17	Wed	The fruit fly II	
	9/22/17	Fri	Journal club Student 2	
8	9/25/17	Mon	The fruit fly III	
9	9/27/17	Wed	Courtship and mating behavior	Dickson; Baker
	9/29/17	Fri	Journal club Student 3	
	10/2/17	Mon	The fruit fly: Natural variations	Mackay
	10/4/17	Wed	Review for exam 1	
	10/6/17	**Fri**	***Exam I (Lectures 1-9)***	
10	10/9/17	Mon	Sociogenetics: The honey bee	Smith
11	10/11/17	Wed	The mouse	Bucan
	10/13/17	Fri	Journal club Student 4	
	10/16/17	**Mon**	**Fall Break**	
12	10/18/17	Wed	Sensory - Chemosensation	Su et al.
	10/20/17	Fri	Journal club Student 5	
13	10/23/17	Mon	Sensory - Pain	
14	10/25/17	Wed	Learning and memory I	Kandel
	10/27/17	Fri	Journal club Student 6	
15	10/30/17	Mon	Learning and memory II	Waddell
16	11/1/17	Wed	The genetics of mammalian social behaviors	Donaldson
	11/3/17	Fri	Journal club Student 7	
17	11/6/17	Mon	Anxiety and depression	Burmeister
18	11/8/17	Wed	Genetics of addiction **(Dr. Sarah Hartz)**	
	11/10/17	Fri	Journal club Student 8	
	11/13/17	**Mon**	**Review for exam 2**	
	11/15/17	**Wed**	***Exam II (lectures 10-19)***	
	11/17/17	Fri	Journal club Student 9	
19	11/20/17	Mon	Aggression and anti-social behaviors	Popova
	11/22/17	**Wed**	**Thanksgiving Break**	
	11/24/17	**Fri**	**Thanksgiving Break**	
20	11/27/17	Mon	Biological Clocks	
21	11/29/17	Wed	Sleep	
	12/1/17	Fri	Journal club Student 10	
22	12/4/17	Mon	Behavioral epigenetics and imprinting	Miller
23	12/6/17	Wed	Genetic tools for manipulating neurons and behavior	
	12/8/17	Fri	Final Review	

Final exam: Dec 19 2017 10:30AM - 12:30PM