

NSCI637: Behavioral Epigenetics

Professor: Dr. Tania Roth

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Office Hours: Wolf Hall 131, Tues & Thurs 4-5p, and by appointment

Class Meetings: Tues & Thurs 2:00-3:15pm, Purnell Hall 327

Course description: This course will provide an overview of the field of behavioral epigenetics. We will discuss landmark and current studies in humans and animal models that demonstrate the important role of epigenetic mechanisms in neurobiology and psychopathology. We will also discuss epigenetics as a biological pathway linking experiences to multi-generational trajectories in behavior, and their clinical implications as biomarkers and pharmacological targets.

Course objectives include:

- (1) to survey current clinical and basic research regarding behavioral epigenetics;
- (2) to familiarize students with basic and more advanced concepts of the rapidly evolving field of behavioral epigenetics;
- (3) to develop critical thinking skills by evaluating empirical reports; and,
- (4) to use empirical reports as a foundation for proposing questions that should be addressed/explored in the field of behavioral epigenetics.

Course materials:

- (1) Primary textbook: *Epigenetics in Psychiatry*. 2014. Peedicayil, Grayson, Avramopoulos (Eds). Academic Press.
- (2) Empirical reports that are posted on the course website (Sakai).

Course format: My lectures will cover background rationale for course material, an introduction to specific topics, and the basic molecular biology and neuroscience necessary for understanding literature. Yes, I will post my power points prior to each lecture. Instructor and student led discussions of empirical reports will compliment lecture content. You are expected to read and think about the assigned readings (book content and empirical reports) before each class. You are also expected to actively participate in class lecture and discussions. You cannot be an active participant if you are not here. Bottom line- come to class and bring the reading materials with you!

If you miss a lecture, you are responsible for obtaining lecture/discussion notes from one of your classmates.

Tests are scheduled far in advance. If you have a conflict with a test date because of a sporting event, religious holiday, military duty, or attendance at a scientific conference, let me know this in email by the 2nd week of the semester. If you

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miss an exam because of a family emergency or illness, you must notify me immediately via email (preferably before the exam, but no later than 12 hours after the missed exam). Permission for a make-up exam will be at my discretion and scheduled at my convenience.

Assessment and grading: Your course grade will be based on a total of 425 points.

3 exams, each worth 100 pts *Exam format: multiple (multiple) choice, short answer, "essay".*

1 Presentation, worth 25 pts

1 writing assignment, worth 50 pts

Class participation – 50 pts These points come from completing assignments (2@5 pts max each = 10), submitting questions for article discussions (10@2 pts max each=20), and speaking up in class/class attendance (20).

No extra credit will be available, so do not ask.

I will not respond to requests asking what you need to get in order to reach a particular grade.

If you are interested in tracking your progress you can always find your grades on the Sakai course page. Calculating your own grade is a simple process- just add your total points earned and divide by the total points possible.

I do not calculate grades until the end of the semester. Grades are determined by strict point thresholds.

Grade scale:

Letter	Percentage	Points
A	100-95%	425-402
A-	94-90%	401-381
B+	89-87%	380-368
B	86-83%	367-355
B-	82-80%	354-338
C+	79-77%	337-326
C	76-73%	325-313
C-	72-70%	312-296
D+	69-67%	295-283
D	66-63%	282-270
D-	62-60%	269-253
F	59-0%	252-

Presentation: This project has been designed to give you some experience at giving oral presentations and critically reviewing scientific research. Student led seminars will consist of a group-led (undergraduates) or individual led (graduate students) detailed description of a single published empirical report (chosen by the professor) describing an experiment/study related to topics in this course. Additional guidelines are available on Sakai. Your grade will be based on presentation, clarity, and your understanding of the article. Your presentation is worth 25 pts.

Submitting questions: In addition to speaking up during our in class discussions to earn participation points (20 pts maximum), you can also submit questions to be used in our discussions.

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You can only submit one question per article. There are a total of 18 article presentations/discussions this semester, so to earn the maximum amount of points allocated for questions (20), you need to submit 1 question for 10 articles. If your question is deemed to have significant thought behind it (clear to me you have read the article and thought about it), you will receive 2 pts for the question.

Question needs to be submitted by 9am the day of the article discussion. Email to troth@psych.udel.edu.

You cannot submit a question for the article you present.

Writing assignment: This assignment has been designed to give you some experience at scientific writing, in which you will summarize a block of information in a concise, organized manner. You will need to find 1 recent (published 2012 or after) empirical (where authors have conducted an actual study/series of experiments, not a literature review) report that is relevant to any of the ideas/research we have discussed, and must be relevant to the course (i.e. epigenetic influences on behavior and disease). It cannot be one listed on the syllabus/presented in class. You will write a 2 page summary of the article, in which you will summarize the article (question addressed, overview of methods, results and conclusion) and discuss how it relates to course objectives. Additional guidelines are available on Sakai.

Your summary is worth 50 pts. Your article summary is due: **Apr 23** – Please hand in to instructor at beginning of class, with the article attached.

You will need to keep a copy of your article, as you will also present to the class a very brief (5. min) synopsis of the main findings on our Data Blitz days.

Late summaries- You will lose 10 pts per day for each day it is late. Note, computer/prINTER problems do not constitute an excuse for late work. So start this assignment early to have sufficient time to deal with such problems.

Statement for students with disabilities: Any student who thinks he/she may need an accommodation based on a disability should contact me personally as soon as possible, as well as contact the Disability Support Service (DSS) office. dssoffice@udel.edu; Phone: 302-831-4643; www.udel.edu/DSS.

Statement on academic integrity: “All students must be honest and forthright in their academic studies. To falsify the results of one's research, to steal the words or ideas of another, to cheat on an assignment, or to allow or assist another to commit these acts corrupts the educational process. Students are expected to do their own work and neither give nor receive unauthorized assistance. Any violation of this standard will be reported to the Office of Student Conduct.”

Statement regarding cell phones: You are expected to silence your cell phone and stow it during class. Receiving/placing calls or texts during class is disruptive and discourteous to both the instructor and classmates. Using your cell phone during an exam may result in the immediate expulsion from the quiz/exam.

Approximate schedule of topics, readings, and tests:

Date	Topic	Reading	Lecturer/leaders
Feb 10	Syllabus review Introduction to epigenetics and history	Ch. 1,3	Dr. Roth
Feb 12	Introduction to epigenetics and history cont'd Epigenetics in the CNS	Ch. 1,3 Ch. 2, 4, 5	Dr. Roth
Feb 17	DNA methylation rhythms in human PFC DNA methylation tissue specificity	Sakai Sakai	Jen Blaze Julie Hoyer
Feb 19	Epigenetic epidemiology	Ch. 6	Dr. Roth
Feb 24	DNA methylation signatures after Dutch famine article Genome-wide methylation in monozygotic twins	Sakai Sakai	Carrie DePasquale, Amy Forster Tiffany Doherty
Feb 26	Animal models Assignment #1 (in-class activity)	Ch. 8-9	Dr. Roth
Mar 3	Prenatal stress, epigenetics, and schizophrenia Early-life stress and hippocampal histone acetylation	Sakai Sakai	Brittany Osborne Tara Beck, Jared Beneroff
Mar 5	Test 1		
Mar 10	5mC, 5hmC, histones, non-coding RNAs in psychiatric disorders	Ch. 10-12	Dr. Roth
Mar 12	Hydroxymethylation and maternal deprivation miRNAs and phenotypic variation	Sakai Sakai	Patrese Robinson-Drummer Trisha Chakraborty
Mar 17	Epigenetics in Bipolar Disorder, Depression, Suicide, PTSD	Ch. 13-16	Dr. Roth
Mar 19	Holocaust survivor offspring and GR methylation DNA methylation and suicide	Sakai Sakai	Mike Harvey, Cliff Hegedus Garret Sacco
Mar 24	Epigenetics in memory and cognition	Ch. 17-19	Dr. Roth
Mar 26	Hydroxymethylation and fear extinction Remodeling chromatin to affect behavior	Sakai Sakai	Teresa Mejia, Alyssa Ohara Mike Ruggiero, Hollie Sanders
Mar 31	Spring Break		
Apr 2	Spring Break		
Apr 7	Epigenetics in drug addiction	Ch. 21	Dr. Roth
Apr 9	Test 2		
Apr 14	Epigenetic therapy	Ch. 23-25	Dr. Roth
Apr 16	Valproic acid in a PTSD animal model 5HTT methylation and CBT in children	Sakai Sakai	Mel Scicchitano, Andrew Siske Timothy Snyder , Ha Song
Apr 21	Additional environmental factors	Ch. 26-27	Dr. Roth

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Apr 23	Assignment #2 (in-class activity) Writing assignment due!		
Apr 28	BPA and epigenetic alterations	Sakai	Caitlin Posillico
	Maternal diet and methyl donor supplementation	Sakai	Briana Stanfield, Laurne Terasaki
Apr 30	Transgenerational epigenetics	Ch. 28	Dr. Roth
May 5	Early-life stress in fathers and offspring behavior	Sakai	Kyle Friedman
	Inheritance of parental traumatic exposure	Sakai	Lauren Webb, Katelyn Buban, Nikki Koza
May 7	Data blitz 5 min. oral summary of writing assignment		Last name A-K
May 12	Data blitz 5 min. oral summary of writing assignment		Last name M-Z
May 14	Test 3 and last day of class		