

**Topics in Neurobiology and Behavior: Neurobiology of Emotion**

Spring, 2016, Thursdays 2:10pm-4:00pm

Location: Schermerhorn, Room 200C

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Office Hours: by appointment (Office: Schermerhorn 356)

**Overview:**

Emotions play a crucial role in guiding our behavior. Historically, the brain's emotion systems were largely ignored by scientists in part because it was believed that emotions did not lend themselves to empirical investigation. Over the last several decades, however, emotion research has become a leading research field in Psychology and Neuroscience. This course will provide a survey of research conducted on neuronal underpinnings of emotions including negative states like fear and stress, positive emotions like pleasure, as well as the brain systems that help us to regulate our emotions and make decisions. The course will focus on behaviors and brain circuits (anatomy, connectivity, and function) involved in emotional processing in both laboratory animals and humans. Finally we will discuss what happens when emotion circuits are compromised and the disorders that can arise from the malfunctioning of these systems including schizophrenia, bipolar disorder, major depression, autism and posttraumatic stress disorder.

**Course Prerequisite:** PSYC W1001 plus W1010 or W2450 or equivalent, plus permission of the instructor

**Readings:**

No textbook is required. Reading assignments will consist of classic and recent journal articles and reviews. All readings in .pdf form will be made available through CourseWorks (<https://courseworks.columbia.edu>).

**Course Format:** Each week, students will participate in a two-hour seminar. Most classes will be devoted to presentation and discussion of journal articles led by students (we will cover 2 original research papers in most classes, plus a review paper for background). The publications have been chosen to cover the historic and current research on neurobiology of emotions, and to serve as a stimulus for discussion. Two students will sign up to present papers and lead the discussion each week. All students will be expected to read the papers and actively participate in the discussion.

**Grading:** Grading will be based on 1 in-class exam (essay format), 2 class presentations of research articles, class participation and a final review paper on one of the topics discussed in the seminar.

**2 Presentations of Research Articles (15% for 1<sup>st</sup>, 20% for 2<sup>nd</sup> presentation):** Students will be in charge of leading the discussion on assigned readings starting from the 3<sup>rd</sup> class. Presenting students will prepare a presentation that provides a comprehensive walk through the study. You should focus most of your time on hypothesis testing and result interpretation. In preparation for their sessions, students will have an opportunity to meet with me to go over their presentations.

**Journal Entries and Class Participation (20% of the grade):** Each week, all students will prepare a short 'journal entry' on one of the articles to be discussed in class. These are due on the day of the class. They are intended as a guide to read critically and help to better remember the papers to be discussed in class. Journal entries are not graded individually but overall at the end of the course and together with in-class participation count 20% towards your grade.

**1 Exam (10%):** The exam will assess material covered in the first 5 classes and will be in essay format. This is to help you to consolidate some of the basic concepts covered up to this point in the course.

**Final Paper (35%):** Students will write an independent literature review. This will give you the opportunity to delve in-depth into one particular topic in emotion research. The topic is chosen by the student, but will require approval of the instructor. Topics must be approved by 3/30/17. The paper should be a comprehensive review of

the literature, including relevant background. It should include a critical evaluation of current theories and results, what we know, what we don't know, what are the limitations of current approaches to studying your chosen topic, and what are the possible next steps in this research. The final paper will be 10-15 pages in length (double-spaced, 1in margins), have at least 15 citations, written in accordance with the APA style guidelines, and submitted on May 11<sup>th</sup>, 2017.

## Course outline (tentative)

Week	Date	Topic	Readings (tentative)
1	1/19/17	<p>Introductions - Overview of the course</p> <p><b>What is an emotion? A neurobiological perspective.</b></p> <p>* Tips on oral presentations of scientific articles</p> <p>* Make a schedule of presentations for the semester</p>	N/A
2	1/26/17	<p><b>Historical concept of 'Limbic System' and overview on neural systems involved in emotion processing - <i>Lecture and Group Discussion</i></b></p>	See Courseworks
3	2/2/17	<p><b>Neurobiology of fear: animal studies:</b> role of the amygdala and its hypothalamic /midbrain projections, modulation by the prefrontal cortex and dopaminergic system.</p> <p><b>Presenters:</b></p>	See Courseworks
4	2/9/17	<p><b>Neurobiology of fear: human studies</b></p> <p><b>Presenters:</b></p>	See Courseworks
5	2/16/17	<p><b>Neurobiology of stress:</b> the role of the HPA axis in the stress response, regulation by hippocampus and amygdala; effects of chronic stress on the medial prefrontal cortex.</p> <p><b>Presenters:</b></p>	See Courseworks
6	2/23/17	<p><b>Neurobiology of anxiety</b></p> <p><b>Presenters:</b></p>	See Courseworks
7	3/2/17	<p><b>Intergenerational transmission of fear memory:</b> can trauma be passed on to children</p> <p><b>Presenters:</b></p>	See Courseworks
8	3/9/17	<b>EXAM</b>	
9	3/23/17	<p><b>Neurobiology of love &amp; pleasure:</b> role of the ventral striatum, amygdala, orbitofrontal cortex, modulation by dopamine and endorphins</p> <p><b>Presenters:</b></p>	See Courseworks
10	3/30/17	<p><b>Emotion Regulation &amp; Cognition</b></p> <p>What brain systems allow us to control our emotions?</p> <p><b>Presenters:</b></p>	See Courseworks
11	4/6/17	<p><b>Neurobiology of 'social' emotions:</b> empathy; perception and expression of emotions</p> <p><b>Presenters:</b></p>	See Courseworks
12	4/13/17	<p><b>The neurophysiology of major psychoses:</b> schizophrenia and bipolar disorder</p> <p><b>Presenters:</b></p>	See Courseworks
13	4/20/17	<p><b>The neurophysiology of depression:</b> major depression, post-traumatic stress disorder</p> <p><b>Presenters:</b></p>	See Courseworks
14	4/27/17	<b>TBD – Student's Choice</b>	See Courseworks
15	5/11/17	<b>FINAL PAPER IS DUE</b>	