PSYC 4512 Section 01 Neuropsychology

CRN: 17677

Time: Mon., Wed., Thurs., 1:35-2:40 PM
Location: Shillman Hall Room 420
Instructor: Jamie G. Bunce, PhD
Email: j.bunce@northeastern.edu *Email is the best way to reach me.
Phone: 617-373-6327
Office hours: Tuesday and Friday 12:30-2:30 PM and by email appointment.
Office: 382 Nightingale Hall (Please use the black phone at the entrance to the 3rd floor to dial my extension [x6327] and I will escort you to the office).
Prerequisites: PSYC 3458

Course Description:
We will examine the organization, emergent function and psychopathology of three fundamental neuropsychological networks: the corticolimbic, corticostriatal and corticohippocampal circuits. Over the course of the semester we will explore these circuits from a neuroscientific perspective, relating functional anatomy to physiology and behavior. In addition, we will examine the role these circuits play in psychiatric disorders. Lecture content will be supplemented by group presentations of scientific articles describing findings from the current neuroscientific literature.

Learning Outcomes:
1) Identify and describe the key components and functions of the corticolimbic, corticostriatal and corticohippocampal circuits
2) Describe fundamental concepts that apply to advanced topics in neuropsychology
3) Evaluate, orally, current theories and relevant scientific research on advanced topics in neuroscience.

Class Web Site: Class documents, assignments, grades, and resources will be available on our Blackboard site, which also includes communication tools for the class. Check Blackboard regularly for updates and announcements.

Reading Assignments: There is no required textbook for this course. If you wish to have a resource to reinforce what we cover in class, I recommend the following textbook:


We will also read and present a number of scientific research articles and reviews over the course of the semester. Content from those articles will appear on exams and quizzes. Please see “group presentations” below. PDFs of articles will be posted on Blackboard.
**Top Hat:** See the Class Format section for description. Top Hat is a cloud based interactive lecture tool which I will use to take attendance, gather your feedback and pose questions each class period. Each question will be weighted 50% for accuracy and 50% for participation. Classroom questions can be completed only during lecture and there will be no make-ups for missed classes. Throughout the class, I will have a Top Hat Discussion open for any questions that arise.

**Class Format:** This course will consist of in-class lectures and discussions covering topics and concepts related to neuropsychology. Throughout the semester we will incorporate active learning sessions to discuss topics at hand. To make lectures more engaging and to encourage participation and attendance, interactive questions will be posted to Top Hat which you will answer on your smart phone, laptop or tablet device during each class. You will receive an invitation to join our class Top Hat.

My lecture slides will be posted on Blackboard before class to help with note taking.

**CO-OP:** If, at any time, we are covering a topic that is relevant or related to your co-op experience (or one you are planning to do), please share your experience and/or insight with the class.

**Grading:**

Exams: 3 @ 60 % of final grade  
Quizzes: 3 @ 20 % of final grade  
Presentations @ 15% of final grade  
Attendance & Participation: 5% of final grade (if you have > 90% attendance you get 100%).

Exam and quiz format may consist of: Multiple choice (scantron), Short answer, Essay, Fill-in the blank, Matching, Problem Solving, and True/False. Exams will account for 60% of your final grade.

Quizzes are designed to encourage you to regularly review your notes as well as assess the effectiveness of my lectures. Quizzes will be given at the beginning of class and should take no more than 30 minutes to complete. No make up quizzes will be given. We will have 3 quizzes over the course of the semester. Quizzes will account for 20% of your final grade.

Group Presentation: Group Presentation: As a group, you will read and present (powerpoint) a primary research article relevant to the topic *du jour* which I will provide. Each group will have 30 minutes to present their article to the class. Presentations should be organized around the article figures. Each group member should present at minimum, 1 figure highlighting what the figure shows and why it is significant to the overarching hypothesis of the article. To introduce the figure, each presenter should provide necessary/appropriate context to the audience, briefly highlighting relevant background information, relating findings to prior figures (when applicable) and briefly summarizing methodology used. The primary focus should be on the results and conclusions conveyed by the figure along with an evaluation of how the research was conducted and its significance. Groups are strongly encouraged to practice presentations ahead
of time, to ensure that it will not exceed the 30 minute time limit. Grading will reflect incomplete presentations. I will provide a handout with more detailed information on presentations and the rubric I will use for assessments. In the week following the presentation, groups should email me the presentation slides and each group member should complete a write-up, summarizing in their own words one of the figure they presented. Summaries should include what the figure showed and its relevance to the article narrative. Additionally, what questions emerged from the figure and how did you go about answering those questions? I will post presentation slides on Blackboard for the class to review.

Grades will be on the ABCDF scale with +/- modifiers. It is anticipated that letter grades for this course will be assigned to the scale below.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>90-92</td>
<td>3.6</td>
</tr>
<tr>
<td>B+</td>
<td>87-89</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>73-76</td>
<td></td>
</tr>
<tr>
<td>C-</td>
<td>70-72</td>
<td></td>
</tr>
<tr>
<td>D+</td>
<td>67-69</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>63-66</td>
<td></td>
</tr>
<tr>
<td>D-</td>
<td>60-62</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>&lt;60</td>
<td></td>
</tr>
</tbody>
</table>

Course Policies:

This course follows the College of Science Academic Course Policies, which are viewable at this link:


Exam Policy: Students will only be allowed to use the following materials during an exam: writing utensils, plain white scrap paper, and a basic calculator (if necessary). Students will not be allowed to use text books, notes, cell phones, e-readers, tablets or laptops during the exam period. Students caught with any of these materials with receive and automatic zero for the exam. Students will have the allotted class time to complete exams. Exams will primarily cover material from the current period, though knowledge of fundamental concepts covered earlier in the semester will be assumed. Make up exams can be scheduled should you have an unavoidable health or personal emergency. Only one make up exam per student per semester will be offered. Please contact me as soon as possible if you have a conflict with an exam so we can make the appropriate accommodations for you.
**Cell Phone Policy:** If there is a problem or emergency please excuse yourself and step outside of the classroom to take or make a phone call. Students who are disruptive during the class period will be warned, and receive a 2% deduction from your final grade for each time the instructor needs to address you after the first warning.

**Getting Help:** Come to my office hours; make an appointment to see me at another time; email me with questions.

**Peer tutoring:**
Students requiring additional help are advised to come to my office hours (see above) with questions. Peer tutoring is also available through the Peer Tutoring Program via this link:

[http://www.northeastern.edu/undergraduate/mentoring-advising/](http://www.northeastern.edu/undergraduate/mentoring-advising/)

**Statement on Academic Integrity:**
I adhere to Northeastern’s Policy on academic integrity:

[http://www.northeastern.edu/osccr/academic-integrity-policy/](http://www.northeastern.edu/osccr/academic-integrity-policy/)

Academic dishonesty is a serious offense and renders the offender liable to disciplinary action. Students caught violating the policy will be penalized according to the severity of the offense. Possible penalties range from grade reduction to failure of the course.

**Students with Disabilities:**
Accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resources Center (DRC), 20 Dodge Hall (x2675).

**TOPICAL OUTLINE BIOLOGICAL PSYCHOLOGY – PSYC 4512 CRN 36478**

In the event that class is canceled, all due dates (e.g., exams, quizzes) will be shifted to the next class.

**Unit I: The Corticolimbic Circuit for Recognition and Reaction**

09/07

1) Introduction to Neuropsychology
Review: Blumenfield Neuroanatomy through Clinical Cases; Chapter 2: Neuroanatomy Overview and Basic Definitions
09/08
2) Introduction to Neuropsychology Continued
How we study the brain: observation, imaging, physiology
Review: Blumenfield Neuroanatomy through Clinical Cases; Chapter 4: Introduction to Clinical Neuroradiology

09/12
3) Organization of the Corticolimbic Circuit

09/14
4) Organization of the Corticolimbic Circuit Continued
Role of hypothalamus, brain stem, substantia innominata, insula, hippocampus and prefrontal cortex

09/15
5) Organization of the Corticolimbic Circuit Continued

09/19
6) Organization of the Corticolimbic Circuit Continued
Presentation 2) Mendez-Bertolo et al., 2016 A fast pathway for fear in human amygdala.

09/21
Quiz #1
7) Organization of the Corticolimbic Circuit Continued

09/22
8) Order of the Corticolimbic Circuit
Fear learning, extinction and recall
Review: Shackman and Fox, 2016 Contributions of the central extended amygdala to fear and anxiety.

09/26
9) Corticolimbic Order Continued
Presentation 3) Quinones-Laracuente et al., 2015 The effect of repeated exposure to ethanol on pre-existing fear memories in rats.

09/28
10) Corticolimbic Order Continued
Facial expressions and fear
Review: Marsh, 2016 Understanding amygdala responsiveness to fearful expressions through the lens of psychopathy and altruism.
Presentation 4) Pera-Guardiola et al., 2016 Brain structural correlates of emotion recognition in psychopaths.
09/29
11) Corticolimbic Circuit Disorder
Disorders associated with amygdala hyperactivity

10/03
12) Corticolimbic Circuit Disorder Continued
Post Traumatic Stress Disorder
Presentation 5) Yoon et al., 2016 Recovery from posttraumatic stress requires dynamic and sequential shifts in amygdalar connectivities.

10/05
13) Corticolimbic Circuit Disorder

10/06
14) Corticolimbic Circuit Disorder Continued
Autism
Presentation 6) Nickl-Jockschat et al., 2015 Neural networks related to dysfunctional face processing in autism spectrum disorder.

10/10-Columbus Day-No Class

10/12
15) Corticolimbic Circuit Disorder Continued
Psychopathy, depression and williams syndrome

10/13
16) Corticolimbic Circuit Disorder Continued
Presentation 7) Hilimire et al., 2015 Effects of subcallosal cingulate deep brain stimulation on negative self-bias in patients with treatment-resistant depression.

10/17 EXAM #1

Unit II: Corticostriatal Circuit for Motivation and Action

10/19
17) Organization of the Corticostriatal Circuit
Dopaminergic pathway

10/20
18) Corticostriatal Circuit Order
Reward Learning
Review: Haber and Behrens, 2014 The neural network underlying incentive-based learning: implications for interpreting circuit disruptions in psychiatric disorders.

10/24
19) Corticostriatal Circuit Order Continued
Presentation 8) Heilbronner et al., 2016 Circuit-based corticostriatal homologies between rat and primate.

10/26
20) Corticostriatal Circuit Order Continued
Presentation 9) Rock et al., 2016. An inhibitory corticostriatal pathway.

10/27
QUIZ 2
21) Corticostriatal Circuit Order Continued
Costs vs. Rewards

10/31
22) Corticostriatal Circuit Order Continued
Trust and Schadenfreude
Review: Salamone et al., 2016 Activational and effort related aspects of motivation: neural mechanisms and implications for psychopathology

11/02
23) Corticostriatal Circuit Disorder
Disorders associated with ventral striatum hypo- and hyperactivity
Presentation 10) Yohn et al., 2016 Not all antidepressants are created equal: differential effects of monoamine uptake inhibitors on effort-related choice behaviors.

11/03
24) Corticostriatal Circuit Disorder Continued
Presentation 11) Jimenez-Sanchez et al., 2016 Behavioral, neurochemical and molecular changes after acute deep brain stimulation of the infralimbic prefrontal cortex.

11/07
25) Corticostriatal Circuit Disorder Continued

11/09 EXAM #2

Unit III: Corticohippocampal Circuit for Memory and Executive Control

11/10
26) Organization of the Corticohippocampal Circuit
Organization of the hippocampal formation
Medial temporal lobe memory system
Review: Hasselmo, 2015 If I had a million neurons: potential tests of cortico-hippocampal theories.
11/14
27) Organization of the Corticohippocampal Circuit
Pathways to and from the hippocampus

11/16
28) Organization of the Corticohippocampal Circuit

11/17
29) Corticohippocampal Circuit Order
Memory
Long term potentiation

11/21
Quiz #3
30) Corticohippocampal Circuit Order Continued

11/23 & 11/24
Thanksgiving Break

11/28
31) Corticohippocampal Circuit Order Continued
Prefrontal cortex and executive control
Working memory
Response selection

11/30
32) Corticohippocampal Disorder
Amnesic syndromes
Clive Wearing
Henry Molaison
Presentation 14) Annese et al., 2014 Postmortem examination of patient H.M.’s brain based on histological sectioning and digital 3D reconstruction

12/01
33) Corticohippocampal Disorder Continued
Alzheimer’s Disease
Mild cognitive impairment

12/05
34) Corticohippocampal Disorder Continued
Prefrontal executive control dysfunction
Anxiety disorders
Bipolar disorder
12/07
35) Corticohippocampal Disorder Continued
Obsessive compulsive disorder
Executive control dysfunction and schizophrenia

**EXAM 3 – (Held during finals week. Date, time and location TBA)**

This syllabus is subject to change with notification.