

## PSYC 473 - NEUROBIOLOGY OF PSYCHIATRIC DISORDERS - 2019

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**Office Hours:** Friday, 1:00 – 3:00 (or by appointment; please let me know if you plan to drop by on Friday's)

### COURSE DESCRIPTION

Lectures focus on current theories on the neurobiology of psychiatric and neurological disorders (e.g., schizophrenia, mood and anxiety disorders, autism). Seminars focus on the evaluation of animal models for investigating neural mechanisms of psychopathology.

### INTENDED STUDENT LEARNING OUTCOMES

To complete this course, students will demonstrate their ability to:

1. Describe the value and limitations of using animal models to study human psychopathology.
2. Discuss hypotheses about the neurobiology of psychiatric disorders at multiple levels of analysis (e.g., genetic, epigenetic, molecular, cellular, neural structure and neural system levels)
3. Locate relevant, current literature, and summarize and integrate complex ideas from a broad literature
4. Write effectively for different purposes (e.g., short report geared for lay public; short critical report geared for the scientific community)
5. Design and deliver an effective oral presentation (PowerPoint/Prezi/KeyNote)
6. Effectively participate in group discussions and peer evaluations

PREREQUISITES: PSYC 205 and 271 or equivalent. There is **no** required text for the course.

### ASSIGNMENTS AND GRADING

ASSIGNMENT	COMPONENTS	MARK
ORAL PRESENTATION	Peer evaluation	5%
	Instructor Evaluation	25%
PRESS RELEASE	Peer evaluation	5%
	Instructor Evaluation	20%
CLASS PARTICIPATION	<ul style="list-style-type: none"><li>• Participation in seminars</li><li>• Peer evaluations</li><li>• Reader (X 2)</li></ul>	10%
JOURNAL CLUB ARTICLE		35%

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## ORAL PRESENTATIONS

Each student will give one classroom presentation on a recently published article. (Presentation dates and articles are listed under the "Student Presentations" sections of the course schedule below). The presentations should be in Power Point (or similar) format and approximately 20 minutes in length (**MAX = 22 min**); you can't go over this limit or it can reduce the time available to the next presenter or, if you are the last presenter of the day you won't have time to finish). You should include a summary of the relevant background information, specific purpose of the study, methods (with a primary focus on behavioral methods) and results of the article. You should also discuss the relevance of the article to our understanding of psychopathology.

## PRESS RELEASE: SHORT WRITTEN REPORT

This assignment is based on the same paper assigned for your oral presentation. Your job is to summarize the paper in a media style press release, written in lay language, for a non-expert audience (maximum length is 2 pages). The press release is **due one week prior to your oral presentation** and should be sent to me as an e-mail attachment. You can be as creative as you want but your primary mark will be based on the content. You should aim to cover only the key findings (the big take-home message) in a way that an intelligent non-expert would understand. Press releases will be put on the PSYC 473 Web site to prepare your fellow students for the oral presentations.

## CLASS PARTICIPATION

- 1. EVALUATION OF PRESS RELEASES.** All students are expected to read and provide a broad, informal critique of **each** press release (PR). Your evaluation should take the form of a short paragraph (roughly 150 words – **this assignment is meant to be done quickly**). Here are some examples of what you might address: Was the layout/formatting of the PR effective? Was the flow of the information well organized? Sentence structure? Grammar? Was the report clear and sufficient for a lay audience to understand? Was it attention grabbing? Was there any aspect that you really liked? That you think didn't work? What would make it better? Provide examples to support your comments. These questions are just a guide – you don't have to answer all (or any) of them. The goal is for you to provide *your* general impression of the PR. Give the kind of critical feedback that you yourself would find helpful (e.g., what worked and what didn't). Please do this prior to class. An electronic evaluation form will be posted online that you can use for entering your evaluation of the PR and oral presentation of a given presenter (see below).
- 2. EVALUATION OF STUDENT ORAL PRESENTATIONS.** All students in the class are expected to attend seminars and provide an informal, evaluation of **each** student oral presentation. These evaluations are done "on the fly" in class (i.e., during the presentation or shortly thereafter).

Your evaluation forms should be emailed to me with the following file name: **Your last name- presenter's last name Psyc473.doc** (e.g., **Smith\_Brown\_Psyc473.doc**). **The evaluations are due on the same day as the presentation. Please be sure to put your last name first (that's helps me keep track of your participation).**

- 3. READER.** Each student will serve as an assigned reader for two oral presentations. The reader's role is to read the empirical paper being presented and come to class with 4-5 questions (written out) that you will ask at the end of the presentation. (You do NOT have to send your questions to me, having them written out just makes it easier for you in class).

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### JOURNAL CLUB ARTICLE.

The *Journal Club article* is your opportunity to write a brief, scientific communication for experts rather than a lay audience. For this assignment you will select and review a topical empirical paper of your choice. It can be the paper you did your oral presentation on, any other empirical paper showcased in class or a paper that wasn't covered in class. The only restrictions are that the paper you review:

- 1) has to be relevant to some aspect of the brain and psychopathology (it can come from either the clinical (human) or preclinical (animal) literature or both)
- 2) has been published in the last 5 years (i.e., since 2014)
- 3) is selected from one of the following journals: *Science*; *Nature*; *Nature Neuroscience*; *The Journal of Neuroscience*; or *PNAS*.

Your review should be styled like a Journal Club submission to *The Journal of Neuroscience* Journal Club (<https://www.jneurosci.org.proxy.queensu.ca/content/jneurosci-journal-club>.)

Note, there are some minor changes to the formatting requirements listed at that website and the ones for your class assignment. Please follow the formatting requirements listed below:

### **Formatting for the Journal Club Article**

- 1) **1500 words max** (not including references); Times New Roman font, 11pt, single spaced.
- 2) Double columns are a nice touch
- 3) Title is required but not on a separate title page; just put the title and your name at the top of the page
- 4) Headers are encouraged as an organizational tool (but are not required)
- 5) Use a numbered referencing system (APA in the reference list)
- 6) There is no limit to the number of references you use, but **at least 10 references** must not come from the reference list of the original paper.

As stated at *The Journal of Neuroscience* website, you should include a brief description of the topic and research question(s) addressed in the paper you are reviewing, a summary of the key findings and brief discussion of why they are important. **Your review must do more than just summarize the original article.** You need to provide a rational, original critique of the work; e.g., Are there any limitations that the original authors failed to adequately address? How well do the findings fit with other reports on the same topic? Are they supported by other reports in the literature? Did the authors fail to report any contradictory literature? How do the findings advance our understanding of the specific mental disorder under investigation? Where should the research go next? These are just general guidelines to get you started (and will not apply to all papers). You might approach your critique in a completely different way, but whatever direction you take it in, you must support your comments by citing the relevant literature.

You will be graded for content, overall readability, organization, grammar, spelling, punctuation and correct referencing style. 1500 words, single spaced is roughly 2 pages. It can be very challenging to get everything you want to say into a short report. You will want to give yourself enough time to edit several drafts of your work, and aim for tight precise prose. You are writing for an expert audience and so do not have to define concepts or over-describe things that an expert should be aware of. The experimental approach should be illustrated, but briefly; e.g., if the authors tested rats in an elevated plus-maze then all you need to say is something like; “the rats were tested in the elevated-plus maze, widely used to study anxiety-related responses in rodents” – reference your source and then indicate the findings.

If you do choose a recent paper (published within the last 2 months) from *J. Neurosci*, you could consider submitting your review article to that journal for publication).

Examples of Journal Club articles and the relevant original paper under review are available at *The Journal of Neuroscience* and at our OnQ Course website

Your Journal Club Article is due by midnight, **April 3** (1% deduction for every day a paper is late). Please email your article to me using the following file name: **YourLastName\_JournalClub\_Psyc473.doc**

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### MARKING SCHEME

Psych 473 will utilize a “Numbers In, Letters Out” marking scheme: The final grade you receive for the course will be derived by converting your numerical course average to a letter grade, according to Queen’s Official Grade Conversion Scale.

#### Queen’s Official Grade Conversion Scale

<b>Grade</b>	<b>Numerical Course Average (Range)</b>
<b>A+</b>	<b>90-100</b>
<b>A</b>	<b>85-89</b>
<b>A-</b>	<b>80-84</b>
<b>B+</b>	<b>77-79</b>
<b>B</b>	<b>73-76</b>
<b>B-</b>	<b>70-72</b>
<b>C+</b>	<b>67-69</b>
<b>C</b>	<b>63-66</b>
<b>C-</b>	<b>60-62</b>
<b>D+</b>	<b>57-59</b>
<b>D</b>	<b>53-56</b>
<b>D-</b>	<b>50-52</b>
<b>F</b>	<b>49 and below</b>

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### Statement on Academic Integrity

The following statement on academic integrity builds on a definition approved by Senate and is designed to make students aware of the importance of the concept and the potential consequences of departing from the core values of academic integrity. It is highly recommended that this statement be included on all course syllabi. Instructors may also consider including this statement with each assignment.

Academic Integrity is constituted by the six core fundamental values of honesty, trust, fairness, respect, responsibility and courage (see [www.academicintegrity.org](http://www.academicintegrity.org)). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities <http://www.queensu.ca/secretariat/policies/senate/report-principles-and-priorities>).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1 <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations/regulation-1>), on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and from the instructor of this course.

Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

**PSYC 473 - NEUROBIOLOGY OF PSYCHIATRIC DISORDERS - 2019**

<b>DATE</b>	<b>LECTURE TOPICS</b>
<b>Wed. Jan 8</b>	Course objectives and structure
<b>Fri. Jan. 10</b>	LECTURE: Animal models of psychopathology
<b>Wed. Jan. 15</b>	LECTURE: Signaling molecules, gene expression and epigenetics
<b>Fri. Jan. 17</b>	LECTURE: Neuroscience methods
<b>Wed. Jan. 22</b>	LECTURE: Neuroscience methods
<b>Fri. Jan. 24</b>	LECTURE: TBA

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<b>DATE</b>	<b>SECTION TOPIC</b> <b>STRESS, ANXIETY AND DEPRESSION</b>	
<b>Wed. Jan 29</b>	LECTURE: Stress and psychopathology	
<b>DATE/ PRESENTERS</b>	<b>STUDENT PRESENTATIONS</b>	<b>READERS</b>
<b>Fri. Jan 31</b>	<p>Raineki, et al., (2019) During infant maltreatment, stress targets hippocampus, but stress with mother present targets amygdala and social behavior. <i>PNAS</i>, 116 (45) 22821-22832.</p> <p>Provensi, et al., (2019) Preventing adolescent stress-induced cognitive and microbiome changes by diet. <i>PNAS</i>, 116 (19) 9644-9651.</p>	
<b>Wed. Feb. 5</b>	<p>Venkataraman, et al., (2019) Modulation of fear generalization by the zona incerta. <i>PNAS</i>, 116 (18) 9072-9077.</p> <p>Sun, et al., (2019) Basolateral amygdala input to the medial prefrontal cortex controls obsessive-compulsive disorder-like checking behavior. <i>PNAS</i>, 116 (9) 3799-3804.</p>	
<b>Fri. Feb. 7</b>	<p>Shabel, et al., (2019) Stress transforms lateral habenula reward responses into punishment signals. <i>PNAS</i>, 116 (25) 12488-12493.</p> <p>Heshmati, et al., (2018) Cell-type-specific role for nucleus accumbens neuroligin-2 in depression and stress susceptibility. <i>PNAS</i> 115 (5) 1111-1116.</p>	
<b>Wed. Feb. 12</b>	<p>Choi, et al., (2018) Targeted knockout of a chemokine-like gene increases anxiety and fear responses. <i>PNAS</i>, 115 (5) E1041-E1050.</p> <p>Meyer et al., (2019) Ventral hippocampus interacts with prelimbic cortex during inhibition of threat response via learned safety in both mice and humans. <i>PNAS</i>, 116 (52) 26970-26979.</p>	
<b>Fri. Feb. 14</b>	Work from home and get a head start on your final paper	

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DATE		
Feb. 17-21	Family Day – Reading Week	
	<b>SECTION TOPIC - NEUROBIOLOGY OF SCHIZOPHRENIA</b>	
Wed. Feb. 26	LECTURE: Neurobiology of schizophrenia	
DATE/ PRESENTERS	STUDENT PRESENTATIONS	READERS
Fri. Feb. 28	<p>Wang, et al., (2018) Controlling of glutamate release by neuregulin3 via inhibiting the assembly of the SNARE complex. <i>PNAS</i>, 115 (10) 2508-2513.</p> <p>Jiao, et al., (2017) Transmembrane protein 108 is required for glutamatergic transmission in dentate gyrus. <i>PNAS 2017</i>, 114, 1177-1182.</p>	
Wed. March 4	<p>Ma et al., (2019) Key role of soluble epoxide hydrolase in the neurodevelopmental disorders of offspring after maternal immune activation. <i>PNAS</i>, 116 (14) 7083-7088.</p> <p>Diamantopoulou, et al., (2017) Loss-of-function mutation in <i>Mirta22/Emc10</i>rescues specific schizophrenia-related phenotypes in a mouse model of the 22q11.2 deletion. <i>PNAS</i>, 114 (30), E6127-E6136</p>	
Fri. March 6	<p>Tomasella et. al., (2018) Deletion of dopamine D<sub>2</sub> receptors from parvalbumin interneurons in mouse causes schizophrenia-like phenotypes. <i>PNAS</i>, 115 (13) 3476-348.</p> <p>Wang, et al., (2018) Genetic recovery of ErbB4 in adulthood partially restores brain functions in null mice. <i>PNAS</i>, 115 (51) 13105-13110.</p>	



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<b>DATE</b>	<b>SECTION TOPIC - NEUROBIOLOGY OF CHILDHOOD PSYCHIATRIC DISORDERS</b>	
<b>Wed. March 11</b>	LECTURE: Neurobiology of childhood psychiatric disorders	
<b>DATE/ PRESENTERS</b>	<b>STUDENT PRESENTATIONS</b>	<b>READERS</b>
<b>Fri. March 13</b>	<p>Sawicka et al., (2016) Elevated ERK/p90 ribosomal S6 kinase activity underlies audiogenic seizure susceptibility in fragile X mice. <i>PNAS</i>, 113(41):E6290-E629.</p> <p>Bhattacharjee, et al., (2017) Neuronal cytoskeletal gene dysregulation and mechanical hypersensitivity in a rat model of Rett syndrome. <i>PNAS</i>, 114, E6952-E6961.</p>	
<b>Wed. March 18</b>	<p>Wiebe, et al., (2019) Inhibitory interneurons mediate autism-associated behaviors via 4E-BP2. <i>PNAS</i>, 116 (36) 18060-18067.</p> <p>Wang, et al., (2019) Maternal diabetes induces autism-like behavior by hyperglycemia-mediated persistent oxidative stress and suppression of superoxide dismutase 2. <i>PNAS</i>, 116 (47) 23743-23752.</p>	
<b>Fri. March 20</b>	<p>Yan, et al., (2018) Activation of autophagy rescues synaptic and cognitive deficits in fragile X mice. <i>PNAS</i>, 115 (41) E9707-E9716.</p> <p>Robson, et al., (2018) p38<math>\alpha</math> MAPK signaling drives pharmacologically reversible brain and gastrointestinal phenotypes in the SERT Ala56 mouse. <i>PNAS</i>, 115 (43) E10245-E10254.</p>	

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<b>DATE</b>	<b>SECTION TOPIC - NEUROBIOLOGY OF SUBSTANCE ABUSE</b>	
<b>Wed. March 25</b>	LECTURE: Neurobiology of substance abuse.	
<b>DATE/ PRESENTERS</b>	<b>STUDENT PRESENTATIONS</b>	<b>READERS</b>
<b>Fri. March 27</b>	<p>Damez-Werno, et al., (2016) Histone arginine methylation in cocaine action in the nucleus accumbens. <i>PNAS</i>, 113, (34) 9623-9628.</p> <p>Uhl, et al., (2018) Cocaine reward is reduced by decreased expression of receptor-type protein tyrosine phosphatase D (PTPRD) and by a novel PTPRD antagonist. <i>PNAS</i>, 115 (45) 11597-11602.</p>	
<b>Wed. April 1</b>	<p>Spiga, et al., (2014) Hampered long-term depression and thin spine loss in the nucleus accumbens of ethanol-dependent rats. <i>PNAS</i>, 111, E3745–E3754.</p> <p>Hirth, et al., (2016) Convergent evidence from alcohol-dependent humans and rats for a hyperdopaminergic state in protracted abstinence <i>PNAS</i>, 113, 3024–3029.</p>	
<b>Fri. April 3</b>	<p>Hu, et al., (2019) Compulsive drug use is associated with imbalance of orbitofrontal- and prefrontal-striatal circuits in punishment-resistant individuals. <i>PNAS</i>, 116 (18) 9066-9071.</p> <p>Kim, et al., (2018) Dopamine D2 receptor-mediated circuit from the central amygdala to the bed nucleus of the stria terminalis regulates impulsive behavior. <i>PNAS</i>, 115 (45) E10730-E10739.</p>	