

**Psychology 470\*: Advanced Topics in Behavioral Neuroscience**

**Neuroplasticity and Behavior: Principles and Applications**

**Fall Term 2019**

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**Classes:** Time: Monday, 16:00 - 17:30  
Wednesday, 14:30 - 16:00  
Room: Mac-Corry Hall C508

**Course Overview:** The course will provide an overview of the concept and mechanisms of brain plasticity. The mechanisms of plasticity in the developing and mature brain are reviewed. Further, the relevance of plasticity to behavior and cognition in human and non-human species is discussed. Emphasis is placed on the contributions of fundamental neuroplasticity research in applied, real-world settings, including child development, life-long learning, recovery from brain injury/dysfunction, and enhancing learning in educational settings.

**Text:** The required readings for the course consist of review articles and book chapters selected to complement the topics covered in the lectures. Links to the readings are available on the PSYC 470 onQ site.

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|---------------------|---|-----|
| <b>Assessments:</b> | NeuroTopic presentation:                | 25% |
|                     | Paper (40% for paper; 5% for proposal): | 45% |
|                     | Quizzes (four out of five)              | 20% |
|                     | Participation:                          | 10% |

NeuroTopic presentation (25%): One ~20 min seminar presentation summarizing the introduction, methods, results, and conclusions of an experimental paper assigned by the instructor. Typically, talks are delivered with a slide show (PowerPoint, Keynote) and should involve a critical assessment of the strengths and limitations of the paper presented.

Mini-Review Paper (40%; 5% for paper proposal): An essay-type paper dealing with one of the major topics related to neuroplasticity research. The learning objective is to allow you to gain a more in-depth understanding of a particular area of neuroplasticity research that is of interest to you. The starting point may be the paper/topic for your NeuroTopic presentation, another topic covered during the course, or a topic not covered that is of particular relevance to you. Please spend some time to think about which topic you are interested in and motivated to explore. The precise topic, your reasons for choosing it, and some general thoughts about what you hope to cover in your paper will be articulated in a brief proposal paper (1 page).

For the full essay, you are expected to:

- provide a brief introduction/summary of the background and specific research field, and why you think is important and of interest to you and a larger audience;
- identify three primary research articles that focus on this topic; one of these papers should have a more applied, practical focus;
- provide a summary of these three research articles, together with a critical assessment of the strengths and weaknesses of each article;
- complete a summary/conclusion section, integrating the individual research articles and highlighting how the three experimental papers have help to advance research in the field (or, if you feel that they have not done so, discuss reasons for this); discuss limitations of the research papers as appropriate, and suggest open questions and next steps for future research.

Format: maximal total length 10 pages (12-point font, double spaced, not including title page and reference section). Suggested breakdown (approximate): Introduction: 2 pages; three experimental papers: 5 pages together; Conclusions/Discussion: 3 pages.

Late submissions will be penalized with a 5% reduction in the grade for the paper for every 24 hour period from the submission deadline.

Quizzes (best four/five; 5% per quiz for a total of 20%): Five unannounced in-class quizzes over the course of the term. Quizzes will cover the readings assigned for each week, as well as material presented during NeuroTopics presentations; quizzes cover all material going back to the preceding quiz (i.e., not just the readings for a particular week). The best four quizzes will count towards the final grade.

Participation (10%): Active contributions to discussions during lectures and NeuroTopic presentations (please note: attendance is not the same as active participation).

## SCHEDULE OF TOPICS

| Date   | Topic   | Readings                  |
|--|---|---------------------------|
| <b>SECTION I: COURSE INTRODUCTION</b>  |   |                           |
| Mon., Sep. 9   | Introduction: The course  | Course syllabus           |
| Wed. Sep. 11   | The history of neuroplasticity research   | Stahnisch & Nitsch 2002   |
| <b>SECTION II: DEVELOPMENTAL NEUROPLASTICITY: HOW TO GROW A BRAIN</b>          |   |                           |
| Mon., Sep. 16  | Plasticity of the developing CNS I  | Insel 1995                |
| Wed., Sep. 18  | Plasticity of the developing CNS II (Quiz #1)   | (same)                    |
| Mon., Sep. 23  | <b>No class (World Sleep Congress, Vancouver)</b>   |                           |
| Wed., Sep. 25  | <b>No class (World Sleep Congress, Vancouver)</b><br><i>(...time to think about your paper and proposal...)</i> |                           |
| <b>SECTION III: NATURE, NURTURE, &amp; EXPERIENCE-INDUCED BRAIN PLASTICITY</b> |   |                           |
| Mon., Sep. 30  | Enrichment and brain functions I: Fundamentals  | Rosenzweig & Bennett 1996 |
| Wed., Oct. 2   | Enrichment and brain functions II: The human brain  | Herholz & Zatorre 2012    |
| Mon., Oct. 7   | Enrichment and brain functions III: Applications  | (R & B 1996, as above)    |
| Wed., Oct. 9   | NeuroTopic #1: Enrichment (presentations) (Quiz #2)   |                           |
| Mon., Oct. 14  | <b>No class (Thanksgiving)</b>  |                           |
| Wed., Oct. 16  | NeuroTopic #1: Enrichment (presentations)...continued   |                           |

**SECTION IV: PLASTICITY BREAKS: CRITICAL (SENSITIVE) PERIODS**

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Mon., Oct. 21      Critical periods and plasticity      none

**SECTION V: PLASTICITY, LEARNING, AND MEMORY FORMATION**

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Wed., Oct. 23      Learning and memory mechanisms I      Bear 2001

Mon., Oct. 28      **Fall term break; no class**

Wed., Oct. 30      Learning and memory mechanisms II      Morris 2013

**Paper proposal is due Thursday, Oct. 31 at 11:59 pm**

Mon., Nov. 4      NeuroTopic #2: Memory (presentations)      none

Wed., Nov. 6      ... continued (Quiz #3)

**SECTION VI: ADULT NEUROGENESIS**

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Mon., Nov. 11      Neurogenesis I: History, evidence, and functions      Baptisa & Abdrade 2018

Wed., Nov. 13      Neurogenesis II: The "Depression Link"      same

**SECTION VII: PLASTICITY, HUMAN HEALTH, AND WELLNESS**

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Mon., Nov. 18      Plasticity and brain repair

Wed., Nov. 20      Plasticity: life-long (brain) health and wellness

Mon., Nov. 25      NeuroTopic #3: Plasticity, health and wellness (Quiz #4)

Wed., Nov. 27      ...continued (USAT)

**Papers are due on Friday, Nov. 29, at 11:59 pm**

## Academic Integrity

Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility (see [http://www.academicintegrity.org/fundamental\\_values\\_project/index.php](http://www.academicintegrity.org/fundamental_values_project/index.php)). 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](#))

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](#)), on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/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.

Web-based academic resources: <http://www.asus.queensu.ca/acsfacts>

Academic integrity regulations: <http://www.queensu.ca/artsci/integrity/instructor/education.html>

## **Disability Accommodations Statement**

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Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time, not to exceed three months. Students receiving academic consideration must meet all essential requirements of a course. The Senate Policy on Academic Consideration for Students in Extenuating Circumstances was approved at Senate in April, 2017.

Each Faculty has developed a protocol to provide a consistent and equitable approach in dealing with requests for academic consideration for students facing extenuating circumstances. Arts and Science undergraduate students can find the Faculty of Arts and Science protocol and the portal where a request can be submitted here:

<https://www.queensu.ca/artsci/undergrad-students/academic-consideration-for-students>

Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

If you need to request academic consideration for this course, you will be required to provide the name and email address of the instructor/coordinator. Please use the following:

Instructor/Coordinator Name:

Instructor/Coordinator email address: