Psychology 461 - Neuroplasticity

When: Tuesdays, Thursdays 11-12:30
Where: DMCBH Rudy Theatre

Instructor: Liisa Galea, Ph.D.
Centre for Brain Health
Department of Psychology
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Email: liisa.galea@ubc.ca (please allow 24 h for email enquiries)
Office hours: Tuesdays 1230-130 or by appt.

Teaching Assistant: Rand Mahmoud
Centre for Brain Health 3rd flr, Office hour: Wednesday at 430PM Please email 24 h ahead of time so that Rand can reserve a room (likely in 3402C) or by appt.
rand.mahmoud@psych.ubc.ca

Textbook: No textbook. We will be reading and reviewing various journal publications that are available for you on CANVAS (and under Library Course Reserves) and are listed below.

Course outlines, lectures available on Canvas: https://canvas.ubc.ca/

Please note that while the lecture slides will be available in some cases the complete lectures may not be available until after the class.

Furthermore, more resources are available for you at: http://guides.library.ubc.ca/psyc460
This website was created to help you find research on your topic for your presentation and research grant.

Course description: This course is designed to introduce students to the field of hippocampal neuroplasticity with a focus on the ability of the hippocampus to undergo changes across the lifespan and how this may relate to behaviour. The lectures will focus on the hippocampus, arguably the structure of the brain that shows the most dramatic plasticity across the lifespan. Most of the course will be devoted to neurogenesis within the hippocampus but also will include topics such as changes in dendritic morphology, volume changes, with an emphasis on how sex, stress, aging, and disease can alter plasticity of the hippocampus and how this may be related to behaviour.

Policy on Missed Tests and Extensions:
Course policies: Classes of this size add certain constraints on the way in which I must teach the course. One such constraint is that there will be no (for emphasis let us repeat the word NO) make up exams in this course. This means that if you miss an exam you will simply lose the number of points associated with it. Your grade will therefore be computed as if that particular entry was a zero. The only exceptions to this are validated medical excuses. Such excuses must be in the form of a written note from your doctor or from student health, attesting to the fact that on the day of the exam you were too ill to be expected to function
reasonably. Please note, that although the Student Health Service will provide such validations for December and Final exams, they will not provide these for midterms, hence in the event of a missed midterm your medical excuse must be obtained from a private physician. If you should have a personal or psychological trauma and miss an examination, a written letter of explanation from your psychiatrist, psychologist, or student counsellor must accompany such an excuse. A letter from the attending physician or clergyman must validate exams missed due to a death in the family. In the absence of such written verification you will not be excused. All medical excuses must be personally presented to the professor as soon as you are able to return to class for a make up to be scheduled. Make-up exams will consist of an oral exam to be conducted in the presence of the professor and the teaching assistant.

If you submit medical documentation make sure it contains the statement "This student was unable to write the test (or submit term work by the last day of classes, if applicable) on (date) for medical reasons". If not, then marks will be deducted or you will have an assigned mark of zero. You are advised to see your physician within one day of the missed test. Many physicians will not provide documentation retroactively.

**Evaluation:**
- **Midterm**: 30%  October 18, 2018
- **Participation**: 10%
- **Talk**: 25%  Talks will be scheduled from Oct – Nov 30
- **Research Proposal**: 30%  November 22, 2018 @ 11 pm on Canvas
- **Quiz**: 5%  November 30 on Canvas

**Midterm**: Material from both the lectures and the papers will be on the exam. You will be responsible for reading the materials in the articles in the order shown on the schedule that follows. This class is in a discussion seminar format particularly for the second half of the term. You must come to each class prepared to discuss the readings. The readings are assigned below for the first half of the course. When you arrive for midterm you must have your student card. Please place your student card on the right hand corner of your desk prior to the beginning of the exam and leave it there until someone has checked off your name or has your signature. On days when there is an examination there will be no lecture. Be sure to arrive on time since no additional time is given to students who arrive late. Sample questions will be posted on CANVAS.

**Participation**: Participation will include peer evaluations of talks which will be done via CANVAS, performance during the breakout sessions during end of Sept (25, 27) and questions posted to the presenters on Canvas and/or in classes will also be counted towards participation credit.

**Talk** - Each student will be required to give a presentation (~10 min). A list of papers/topics listed on the next few pages, we will draw for names/topics in a random order on Sept 25. The talks will begin the class right after the midterm. Please practice your talks ahead of time (more than once!) as this is essential for determining how long your talk is but better yet is an important factor in creating a good talk. A marking rubric is available on Canvas. Better talks will include three papers that are linked by a theme that tell an overall “story” of your selected topic which will include critical appraisal of the studies.
Quiz will be conducted after the student talks and will be available via Canvas. NB there is a limited time to do these quiz as it will only be available for 24 h to complete (November 30).

Research Proposal: On a topic of your choice (to be approved by the TA or Instructor) dealing with neuroplasticity and behaviour the topic should be the same topic as your talk. Start with a literature review (up to 3 pages), provide two objectives with hypotheses for proposed research to continue in this area, and a brief outline of experiments designed to answer the objectives. The topic should be a topic examining an area of neuroplasticity and behaviour. Behaviour must be a core part of the proposal. Five pages written maximum, 1.5 line spacing, plus unlimited references and figures. 12pt Arial, 2 cm margins. Marks will be based on overall clarity (10), scientific premise of the questions asked (10), objectives (20), literature review (30), experiments proposed (20), references (5), figures (5). A sample grant will be posted on CANVAS.


**TENTATIVE LECTURE TOPICS**

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic/Readings</th>
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<tbody>
<tr>
<td>Sept 6</td>
<td>Introduction to Course: Bad Science, and Neuroscience Needs Behavior</td>
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<tr>
<td>Sept 11-18</td>
<td>Introduction to the hippocampus: Where and what Grey Matter Volume changes in the hippocampus:</td>
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<tr>
<td>Sept 18 - memory</td>
<td>Dendritic morphology, spines changes: in response to stress, aging and memory</td>
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<tr>
<td>Sept 25-18</td>
<td>Talk choices and Breakout sessions to discuss paper; Beyond neurons: Microglia and their influence on neuroplasticity (guest lecture – Rand Mahmoud)</td>
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<tr>
<td>Oct 2-18</td>
<td>Neurogenesis in the adult hippocampus: where, how, what and why as it is related to memory and emotional regulation.</td>
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**Oct 18**    | Midterm

**Nov 6, 15** | No Class

**NOV 30** | QUIZ

**Tentative LECTURE Readings**

Good overall primer on the Hippocampus:
Week 1: *Introduction and basic anatomy of the hippocampus.*

**GOALS:** Why behaviour is an important consideration in Neuroscience, What does the Hippocampus do

Why we need to consider behaviour in neuroscience:

**Week 2: Volume changes in the hippocampus: Relation to Function**

**GOALS:** What are considerations for determining volume differences, does volume matter for behaviour?

Review:

Roth TC 2nd, Brodin A, Smulders TV, LaDage LD, Pravosudov VV. Is bigger always better? A critical appraisal of the use of volumetric analysis in the study of the hippocampus. Philos Trans R Soc Lond B Biol Sci. 2010 Mar 27;365(1542):915-31. (this is a long paper but has relevant topics for the whole course.)

Paper:

**Week 3: Spines and Dendritic Morphology in the hippocampus: Relation to Function**

**GOAL:** Description of possible structural changes in the hippocampus and how they relate to behaviour.

Reviews:

Paper:

**Week 4: Microglia and Practice Discussion paper:**

**Critique Paper:**

**Week 5: Introduction to Neurogenesis in the hippocampus**

**GOAL:** What, where and timeline of neurogenesis in the hippocampus?


Research papers:

**Week 6 Neurogenesis in the hippocampus: Relation to Learning**

**GOAL:** How is neurogenesis in the hippocampus related to learning/memory?


**Week 7: Neurogenesis in the hippocampus: Relation to Disease**

**GOAL:** How is neurogenesis in the hippocampus related to stress?


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**Psychology Department’s Position on Academic Misconduct**

Cheating, plagiarism, and other forms of academic misconduct are very serious concerns of the University, and the Department of Psychology has taken steps to alleviate them. In the first place, the Department has implemented software that can reliably detect cheating on multiple-choice exams by analyzing the patterns of students’ responses. In addition, the Department subscribes to *TurnItIn* -- a service designed to detect and deter plagiarism. All materials (term papers, lab reports, etc.) that students submit for grading will be scanned and compared to over 5 billion pages of content located on the Internet or in TurnItIn’s own proprietary databases. The results of these comparisons are compiled into customized...
“Originality Reports” containing several, sensitive measures of plagiarism; instructors receive copies of these reports for every student in their class.

In all cases of suspected academic misconduct, the parties involved will be pursued to the fullest extent dictated by the guidelines of the University. Strong evidence of cheating or plagiarism may result in a zero credit for the work in question. According to the University Act (section 61), the President of UBC has the right to impose harsher penalties including (but not limited to) a failing grade for the course, suspension from the University, cancellation of scholarships, or a notation added to a student’s transcript.

All graded work in this course, unless otherwise specified, is to be original work done independently by individuals. **Do use PubMed** (first choice) on the Library’s website at [http://www.library.ubc.ca](http://www.library.ubc.ca). and try our new guide specially designed for Psyc 460/461 [http://guides.library.ubc.ca/psyc460](http://guides.library.ubc.ca/psyc460)

If you have any questions as to whether or not what you are doing is even a borderline case of academic misconduct, please consult your instructor. For details on pertinent University policies and procedures, please see Chapter 5 in the UBC Calendar ([http://students.ubc.ca/calendar](http://students.ubc.ca/calendar)).

The University accommodates students with disabilities who have registered with the **Disability Resource Centre**. The University accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled tests and examinations. Please let your instructor know in advance, preferably in the first week of class, if you will require any accommodation on these grounds. Students who plan to be absent for varsity athletics, family obligations, or other similar commitments, cannot assume they will be accommodated, and should discuss their commitments with the instructor before the drop date.

Students have the right to view their marked examinations with their TA, providing they apply to do so within a month of receiving their final grades. This review is for pedagogic purposes. The examination remains the property of the university.

Faculties, departments and schools reserve the right to scale grades in order to maintain equity among sections and conformity to university, faculty, department or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department or school. Grades are not official until they appear on a student’s academic record.

**Psychology Department’s Policy on Grade Distributions and Scaling**

In order to reduce grade inflation and maintain equity across multiple course sections, all psychology courses are required to comply with departmental norms regarding grade distributions. According to departmental norms, the mean grade in a 300-level class is 70 for a good class, 68 for an average class, and 66 for a weak class, with a standard deviation of 13. The corresponding figures for 100- and 200-level Psychology courses are 67, 65, and 63, with a standard deviation of 14. **Scaling** is likely to be used in order to comply with these norms; grades may be scaled up or down as necessary by the professor or department.
Further information about academic regulations, course withdrawal dates and credits can be found in the University Calendar. You are encouraged to read this material. If you run into trouble and need information about studying, preparing for exams, note taking or time management, free workshops and advice are available from the Student Resources Centre, which can be reached through the School and College Liaison Office at 822-4319 and from Student Success, http://www.students.ubc.ca/success/.

**TENTATIVE TOPICS FOR STUDENT LECTURES**

- Neurogenesis in other regions
- Olfactory neurogenesis
- Cocaine
- Cannabinoids
- Alcohol and Neurogenesis
- Endocannabinoids and neuroplasticity
- Pregnancy
- Postpartum
- Postpartum Depression
- Social behaviour and Neurogenesis
- Sexual behaviour and Neurogenesis
- Early life adversity
- Androgens
- Estrogens
- Aging
- Cognitive training (Luminosity?)
- Alzheimer's Disease
- Mild Cognitive Impairment
- Depression
- Circadian Rhythms
- Bipolar Disorder
- Sex changing fish
- Schizophrenia
- Chemotherapy
- Oxytocin
- Obsessive compulsive disorder
- LTP and learning
- LTD and learning
- Paired pulse inhibition
- Autism
- Epigenetics and plasticity
- Adolescent stress and plasticity
- Microbiome
- Exercise and plasticity
- Elite sports and brain morphology
- Musicians and plasticity
- Video games and plasticity
- Gambling
- Stroke
- Glia and plasticity
- Inflammation
- Multiple Sclerosis
- Chronic Pain
- Microglia
- Sleep
- Obesity
- Diabetes
- Cell adhesion molecules