Neural Circuits

Instructors
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All class-related email must:
- include “3SN3 2020” in the subject line
- originate from McMaster accounts
Email that does not conform to these guidelines will not be answered (we might not even see it). Responses will normally be made within 24 hours.

Course logistics
Lectures:  Wednesdays 19:00-20:00; BSB B155
Tutorial:  Monday 17:30-18:20; BSB B155
Office hours:  Wednesdays 17:00-18:30, PC 310
TA office hours:  by appointment
Course website:  Avenue

Course description
Neural Circuits is designed to introduce concepts in circuits and systems neuroscience and to develop key skills for further study in neuroscience. During the first few weeks of the term students will review and extend key neuroscience concepts and techniques needed to read original articles in systems neuroscience. In the latter (“modules”) portion of the course, students will learn about model neural circuits and will explore specific areas of circuit and systems neuroscience in greater depth by reading and discussing original research articles.

Course Objectives
This course aims to introduce students to concepts and techniques in neural circuits/systems neuroscience and to give students tools for critical reading, discussing, and thinking about original work in the field. Exercising skills for written and oral communication is a key component of this progression. After successfully completing the course, students should be able to:
- explain how neurons may be connected to perform specific types of tasks
- describe commonly used techniques in circuit and systems neuroscience
- logically present arguments from experimental circuit and systems neuroscience
- read and intelligently discuss original articles in circuit and systems neuroscience
- clearly and accurately present experimental data from original neuroscience articles
- propose appropriate experimental approaches to questions in circuit and systems neuroscience

Materials
Required Texts  A)  3SN3 Coursepack (available from Campus Store)
B)  3SN3 Writing Guide (posted on Avenue)
C)  3SN3 Communicating in Science (posted on Avenue)
D)  Scientific articles. Students will read articles about science by scientists, as well as review articles and original research articles, all linked from the course website and freely available through the university servers.

Calculator  The McMaster Standard Calculator (Casio FX-991) will be permitted in tests and in class.

Evaluation
Distribution of marks
In-class exercises (ICE)  10% group
In-class exercises (ICE)
Each week will include at least one ICE question designed to help students think more deeply about the context/ramifications of the current topic. After the ICE question is posed in class, students will think about the question for a few minutes, then discuss in small groups, and finally submit written answers as a group. ICE questions are typically debriefed in class. Note that the lowest ICE mark is dropped before averaging.

Discussion
Students will be evaluated for the quality and relevance of their contribution(s) to discussion of primary and secondary papers, as well as for their chalk talk presentations (secondary papers and mini-grant). Students who ask questions that substantially advance the discussion in the lecture-based portion of the course can earn bonus points to “top up” their discussion mark.

Written work
Students will submit short, focused written assignments related to the articles under discussion. Written work will be marked based on content, coherence, and craftsmanship. Some written assignments may also be used for anonymous peer-editing. Written work must be submitted via the Avenue Dropbox, in *.pdf format (5% reduction for incorrect format).

Midterm
Covering content from lectures and readings up through the previous class session, the midterm will consist of 3 sections: 1) brief definition/short answer, 2) intermediate answer (4-8 sentences or simple diagram), and 3) long answer (calculation/diagram, multi-part answer, or explanation). Upon submitting the midterm, students will have the opportunity to re-write the midterm collaboratively. If higher than the individual mark, the collaborative test mark will contribute 20% of the student’s midterm grade.

Mini-Grant
Working in groups, students will identify an important open question and design an experiment to answer this question. On the last day of class, each group will submit a mini-grant (1500 words, max) and will have 10 minutes to present their mini-grant to the class. The mini-grant mark will contribute 10% to each individual’s discussion mark and 10% to their written work mark.

Final
A cumulative exam of the same format as the midterm, minus the collaborative section, covering material from class lectures and the primary required readings. Students may bring to the final exam a single-sided (8.5x11”) “cheatsheet” and clean copies of primary research articles. All such aids must be surrendered at the conclusion of the exam.

Appeals
Students may appeal any mark within one week of the date on which the marked copy is made available by submitting a written request that justifies why re-marking is warranted. If the request is judged sufficient, the entire task will be marked by the instructor (not TA); students should be aware that their marks may therefore increase or decrease.

The instructor reserves the right to adjust final marks up or down, in light of special circumstances and/or overall performance.

Missed Work
Late work will be assessed a 10% penalty for each day (or portion thereof) overdue. All requests for academic relief for missed work must be accompanied by a McMaster Student Absence Form or other notification from the appropriate Faculty or Program office. Missed in-class work for which university
approval is presented may be replaced with the average of other in-class work. If a student misses a test and has obtained appropriate university approval, the grade may be redistributed or a make-up test may be given at the discretion of the instructor. Students must contact the instructor promptly to discuss relief for missed work and/or logistics for make-up tests. Note that a missed test may be replaced by a test of a different format, including possibly a recorded oral exam in the presence of the instructor and a TA.

**Academic Integrity** (approved language)

We expect university students to follow the highest standards of academic integrity at all times. Note that, according to the McMaster University Academic Integrity Policy, Section 17, “Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage.” Students who engage in academic dishonesty will receive a zero on the relevant test or assignment and will be reported to the Office of Academic Integrity. This can result in more serious consequences including loss of credit with a notation on the transcript, “Grade of F assigned for academic dishonesty,” and even suspension/expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty and to avoid any appearance of academic dishonesty. Three examples of academic dishonesty include: plagiarism, improper collaboration, and copying or using unauthorized aids. For additional information and clarification, consult the Academic Integrity Policy at http://www.mcmaster.ca/academicintegrity.

**Schedule**

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<th>Course Introduction</th>
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<td>Introduction to neural circuits</td>
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<td>Techniques: Anatomical methods</td>
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<td>Seminal synapse findings; synaptic integration</td>
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<td>Techniques: Electrophysiology</td>
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<td>The dynamic synapse</td>
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<td>Techniques: Stimulating neural tissue</td>
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<td>Midterm</td>
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<td>Matching technique to question</td>
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<td>Reading Week – no class</td>
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<td>Module 1: Establishing neural circuits</td>
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<td>Module IV: Addiction</td>
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Paper Discussion IV
April 1  Mini-grant chalk talks
TBA     Final Exam

Notes
1) The instructor and university reserve the right to modify portions of the course or course schedule, depending on special circumstances, including student performance and/or interest. Any such changes will be announced in class and posted on the course website. It is each student’s responsibility to check the course website on Avenue regularly for updates.

2) Students who wish to audio or video record any part of the class must obtain the consent of all individuals present prior to recording the session; such consent must be obtained for each instance. Students found to be in violation will be asked to leave the class session.

3) Students are asked to refrain from using devices such as cellphones and computers to text or engage in other non-class activities during the class session. In addition to distracting the person using them – and much more importantly! – these behaviors are distracting to other students. Students who must message are asked to step out of the room; those who persist will be asked to leave the session, with a notation made against the Discussion mark.

4) The material distributed for this course and posted on the website is copyrighted and is to be used solely by students registered in this course. Dissemination of course materials to anyone other than students currently registered in this course is a breach of copyright, and may constitute a reportable breach of academic integrity.