INSTRUCTOR: Dr. Nikol Piskuric PC 108 piskurn@mcmaster.ca

TEACHING ASSISTANTS (TAs): Sully Lyons, Department of Biology lyonssa@mcmaster.ca
Siyi Ma, Neuroscience Graduate Program mas39@mcmaster.ca
Tara Quigley, Neuroscience Graduate Program quiglt@mcmaster.ca

ADMINISTRATIVE TA: Caroul Chawar chawarc@mcmaster.ca

*If you require this information in an alternate/accessible format, please contact Dr. Piskuric at (905) 525-9140 ext. 21331.

Communication between Students and the Instructional Team:
Any e-mail addressed to faculty or TAs must have a brief, relevant subject line, must come from a mcmaster.ca e-mail account and must copy in all relevant parties (e.g., other markers, other group members). All e-mail communication addressed to students will be sent to their mcmaster.ca e-mail account.

Course Description:
Practical techniques in neuroanatomy and neurophysiology, including brightfield and fluorescence microscopy, neuronal visualization via staining, and invertebrate neurophysiological recording.

Prerequisites:
PNB 2XB3, Biology 2A03, and Med Phys 2C03; or registration in the Honours Biology Physiology specialization and completion of or concurrent registration in Biology 3P03; or registration in Honours Biophysics and completion of Biology 3P03.

Learning Objectives:
By the end of this course, you should be able to,
1. Describe the function and innervation of the flexor and extensor muscles in the crayfish tail.
2. Understand the theoretical and practical differences between intracellular and extracellular recording.
3. Perform simple dissections of the crayfish tail.
4. Work safely and autonomously in a neurophysiology laboratory.
5. Analyze electrophysiological recordings and create graphs from data.
6. Design a scientific poster and give a 5-minute poster presentation.
7. Write up the results of a scientific experiment in a concise, properly formatted lab report.

Class Activities: One lecture, one lab (three hours); one term.
Tu 9:30-10:20 LSB B130E
Wed 13:30-16:20 LSB 110

Required Text:
Lab Manual

Poster Printing
There will be a small cost associated with printing your poster for the Neuroscience Showcase. With careful consideration of design options and timely submission of your poster, this cost should not exceed $5 per person.
Evaluation:

Safety Training
All laboratory occupants are required to complete safety training. Prior to beginning your first lab, you will be required to complete the following 8 safety training modules: Asbestos Awareness, Chemical Handling and Spills, Ergonomics, Fire Safety, Health and Safety Orientation, Slips, Trips and Falls, Violence & Harassment Prevention in the Workplace, and WHMIS 2015. You must sign up for training on Mosaic by selecting “Regulatory Training”. After registering, you will be given access to online modules on Avenue to Learn within 24 hours. Each module is associated with a short quiz that must be completed before the training will appear on your record. Once you’ve completed all 8 modules, print your Mosaic Safety Training Summary and submit it in the “Safety Training Summary” submission folder in Avenue.

Pre-lab Quiz
Prior to each new lab, you will complete a Pre-lab Quiz in Avenue to Learn. Your first Quiz attempt will be graded; however, you will have unlimited attempts to complete the quiz in order to earn a minimum grade of 90%. Entry to the lab will only be permitted once you’ve earned a grade of 90% or higher.

Lab Reports
Each student will submit 2 small Lab Reports and 2 large Lab Reports during the term. Lab Reports must be submitted as Microsoft Word documents in Avenue to Learn. Deadlines for submission are posted on the Course Schedule. Students who do not submit their Lab Report on time (using the MSAF system) will be granted a 1-week extension from the original due date. A late penalty of 15% per day will be applied following the extended due date.

Scientific Poster & Presentation
NEUROSCI 3E03 will host a Neuroscience Lab Showcase on Wednesday, December 4th. During this “open house” event, faculty, staff, and students from across campus will be invited to visit the lab to learn about and observe the experiments you performed in this course. Each student will be assigned to one of the 6 lab exercises and will make a poster presentation about that lab exercise. Finally, students will make a brief (5 min.) poster presentation in class (Tues. Dec. 3) in preparation for the Neuroscience Lab Showcase.

Bell-ringer Exam
Each student will complete a bell-ringer exam. During the exam, you will visit different stations in the lab and answer questions at each station. Time at each station will be limited. You will be tested on practical skills as well as conceptual knowledge.

Laboratory Performance
You will be graded on all aspects of your lab performance, including,
- Following lab rules and safety,
- Preparedness and understanding of the techniques,
- Animal handling and dissection,
- Proper and careful use of equipment (including microscopes, dissection tools, microelectrodes and micromanipulators),
- Data analysis,
- Initiative and integrity, and
- Participation and motivation.
Office Hours: By appointment.

Absences & Missed Work:
If you are absent from the university for a minor medical reason, lasting up to 3 calendar days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form (MSAF). Absences for a longer duration or for other reasons must be reported to your Faculty office, with documentation, and relief from term work may not necessarily be granted. When using the MSAF, report your absence to course instructor or designate. You must then contact the instructor/instructional assistant/other immediately (normally within 2 working days) by email. Please refer to the contact list on the first page of this outline for appropriate email addresses. The instructor/instructional assistant will indicate what relief may be granted for the work you have missed, and relevant details such as revised deadlines, or time and location of a make-up exam/quiz/test. Please note that the MSAF may not be used for final deliverables, nor can it be used for a final examination or its equivalent.

Checking Your Grades:
Office hours with the Teaching Assistants will be arranged following the tests to review your test if you wish to do so. You will be asked to show your McMaster student ID. A copy of the answer key will be available at this time. All grade concerns and discrepancies must be reported to the TA/Instructor within 2 weeks of receiving the grade. Your marks will be recorded on Avenue. It is your responsibility to check that all grades entered into Avenue are recorded properly. You must notify your Instructor/TA about any errors with regards to how your mark was entered. You have until 48 hours prior to the final exam to discuss any Avenue mark issues.

Assignment submission and grading:
All assignments must be submitted in Avenue, in the specified file format. Author(s) name(s) and group designations, if applicable, must be clearly marked on the first page of the work handed in. Submitted files must be named in a way to easily identify the assignment and the author and/or group designation. Work that is late, handed in to the wrong person, inadequately identified, or in the wrong format, risks losing marks.

Instructors will endeavor to return marked materials within two weeks of hand-in.

Plagiarism Detection:
In this course, we will be using a web-based service (Turnitin.com) to reveal plagiarism. Students will be expected to submit their work electronically to Turnitin.com and in hard copy so that it can be checked for academic dishonesty. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to https://www.mcmaster.ca/academicintegrity/ https://www.mcmaster.ca/academicintegrity/turnitin/students/index.html

Policy about Online Access or Online Course Work Requirements:
In this course we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.
Student Responsibilities:
To get the most out of this course, you must be prepared to:

- Attend all sessions, make up all missed work, and provide documentation for authorized absences;
- Interact frequently with your instructor, group members, and TAs;
- Plan and manage your own time;
- **Recognize when you need help and ask for it.**
- Complete preparatory tasks (e.g., reading ICI instructions) in advance of sessions;
- Work as an effective, efficient, and responsive team member on group assignments;
- Check the course Avenue site, and your McMaster and Avenue e-mail daily for updates; and,
- Follow all university policies and guidelines, and in all ways be a responsible university member.

Senate Student Policies:
Students can view full policies here (http://www.mcmaster.ca/policy/Students-AcademicStudies/).
Senate Policy Statements are also available from the Senate Secretariat Office, Room 104, and Gilmour Hall.

Academic Integrity:
http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf
Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty.

The following illustrate only four of many forms of academic dishonesty:

- Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained;
- Copying or using unauthorized aids in laboratory exercises
- Improper collaboration in group work; and,
- Copying or using unauthorized aids in quizzes, tests and examinations

All students are reminded of the importance of academic integrity, and the serious consequences of academic dishonesty.

Student Code of Conduct:
You acknowledge that your behavior in all aspects of this course should meet the standards of the McMaster University Student Code of Conduct. You understand that any inappropriate behavior directed against any of your colleagues, teaching assistants, or the instructional team will not be tolerated. Disruptive behavior during any session (e.g. lecture, seminar, lab, tutorial) will not be tolerated. Abuse, ridicule, slander, inappropriate language, and discrimination towards instructors teaching staff, teaching assistants and other students will not be tolerated in any capacity. Shared spaces including e-spaces such as the Avenue to Learn course discussion board are to be considered inclusive and safe.

Copyright Policy:
In this course you will have access to material that is subject to copyright laws. This includes (but is not limited to) textbooks and all resources developed by the instructors such as lab manuals, demonstration videos, quizzes, assignments, tests, class notes and class slides. Under no circumstance are you allowed to share or redistribute this material in any printed or electronic form without the explicit written consent of the copyright holder. This includes posting any course material on Internet bulletin boards, course repositories, social networks, etc.
McMaster Accommodation for Religious, Indigenous and Spiritual Observances Form (RISO):
At the beginning of EACH term, visit the website of the Office of the Associate Dean (Academic)
https://www.science.mcmaster.ca/associatedean/current-students/procedures-forms.html if you need
accommodations for religious, Indigenous and/or spiritual observances. Follow the procedure explained there
under “Accommodation for Religious, Indigenous and Spiritual Observances Form (RISO)”.

Inclusivity and Accommodations:
McMaster University aims to foster a supportive, inclusive learning environment that will encourage both
individual and collective growth. Students who require academic accommodation must contact Student
Accessibility Services (SAS, https://sas.mcmaster.ca/) to make arrangements with a Program Coordinator.
Academic accommodations must be arranged for each term of study. Any student who then wishes to invoke an
accommodation for any aspect(s) of this course must contact the instructor at the beginning of the semester to
discuss how the accommodations detailed in their SAS letter will be fulfilled in this course.

The instructors and the university reserve the right to alter this outline if necessary.
The instructors and university reserve the right to modify elements of the course during the term. The university
may change the dates and deadlines for any or all courses in extreme circumstances. If either type of
modification becomes necessary, reasonable notice and communication with the students will be given with
explanation and the opportunity to comment on changes. It is the responsibility of the student to check their
McMaster email and course websites weekly during the term and to note any changes.

The professor reserves the right to change any and all course requirements if the need should arise. Any change in
the course requirements will be posted on the webpage, and the details will be announced in class. Any concerns
about announced changes should be addressed with the professor as soon as the changes are announced.

Grades:
Grades obtained in NEUROSCI 3E03 will be converted according to the following scheme, which is in general use
at McMaster University.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100%</td>
<td>A+</td>
<td>12</td>
<td>63-66%</td>
</tr>
<tr>
<td>85-89%</td>
<td>A</td>
<td>11</td>
<td>60-62%</td>
</tr>
<tr>
<td>80-84%</td>
<td>A-</td>
<td>10</td>
<td>57-59%</td>
</tr>
<tr>
<td>77-79%</td>
<td>B+</td>
<td>9</td>
<td>53-56%</td>
</tr>
<tr>
<td>73-76%</td>
<td>B</td>
<td>8</td>
<td>50-52%</td>
</tr>
<tr>
<td>70-72%</td>
<td>B-</td>
<td>7</td>
<td>0-49%</td>
</tr>
<tr>
<td>67-69%</td>
<td>C+</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
Tentative Course Schedule:

<table>
<thead>
<tr>
<th>Wk</th>
<th>Date</th>
<th>Lecture</th>
<th>Lab</th>
<th>Due date (Fri. 11:59 PM)</th>
</tr>
</thead>
</table>
| 1  | Sept. 2 | None | • Introduction to crayfish  
• Lab safety and introduction to equipment  
• Writing Lab Reports | Safety Training Summary  
***Due Mon. Sept. 9 at noon |
| 2  | Sept. 9 | Membrane properties | • **Crawdad Lab 1: Membrane Properties** | |
| 3  | Sept. 16 | Extracellular recording; crayfish NMJ | • **Crawdad Lab 2: Nerve Recording** | Small Lab Report 1 |
| 4  | Sept. 23 | Spike Analysis | • Nerve Recording cont’d | |
| 5  | Sept. 30 | Intracellular recording and crayfish muscle anatomy | • **Crawdad Lab 4: Resting Potential** | Large Lab Report 1 |
| 6  | Oct. 7 | | • Resting Potential cont’d | |
| 7  | Oct. 14 | **Midterm recess** | | |
| 7  | Oct. 21 | Proprioception in crayfish | • **Crawdad Lab 7: Stretch Receptor** | Small Lab Report 2 |
| 8  | Oct. 28 | Preparing scientific posters | • Stretch Receptor cont’d | |
| 9  | Nov. 4 | Synaptic integration | • **Crawdad Lab 5: Nerve-Target Matching and Synaptic Integration** | Large Lab Report 2 |
| 10 | Nov. 11 | | • Nerve-Target Matching and Synaptic Integration cont’d | |
| 11 | Nov. 18 | Critique of scientific posters | • Independent lab work; data gathering for scientific posters | Poster draft  
***Due Wed. Nov. 20 in lab |
| 12 | Nov. 25 | | | **Bell-ringer exam** |
| 13 | Dec. 2 | Practice poster presentations | • Neuroscience Lab Showcase | Final poster  
***Due Dec. 3 in class |