

Biology 409B Neurobiology Laboratory

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Fall 2023

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This course is offered as in-person only. Information here is current as of Sept. 1, 2023 and subject to update. Changes to the outline will be communicated during the lecture or laboratory sessions.

• **Course objective:** To acquire in-depth knowledge of the principles of nervous system function through practical exercises exploring the cellular properties of neurons, synapses and their integration into neural circuits. Theoretical knowledge obtained from pre-requisite lecture courses will be reinforced through hands-on experiential learning exercises during which students will obtain electrophysiological recordings and microscopical images and prepare critical analyses of data in a form consistent with peer-reviewed journal articles.

Exercises will be undertaken:

- Electrical circuits modeling passive neuronal properties
- Nerve recordings of neuron activity of posture controlling motor neurons
- Correlating presynaptic action potentials with postsynaptic potentials
- Activity dependent plasticity of synapses
- Sensory activation and adaptation of muscle stretch receptors
- Tissue sectioning and confocal imaging of neuron and glial structure and immunological staining of neurons
- Prepare confocal images for analysis and presentation to the class
- Intracellular recording of action potentials from molluscan neurons
- “Independent”/self-directed project

Techniques will be learned including:

- Extracellular nerve recording
- Intracellular sharp electrode voltage recording
- Computer based analog-digital recording of voltage signals
- Basics of confocal microscopy/fluorescence imaging
- Basics of tissue immunohistochemistry
- Use of graphical/waveform analysis software and scientific figure preparation

• **Course evaluation:**

Submission of all laboratory reports, and quizzes are required for course completion. Laboratory reports will be submitted in a form consistent with a peer-reviewed journal article. Students will work in pairs, and collaboratively with the rest of the class to collect, measure, analyze and present data from the exercises. Quizzes will be completed independently during a lecture period.

• **Required course components:**

This is a laboratory course with a lecture component during which theoretical background and practical instructions will complement the primary laboratory component. There is only one scheduled laboratory session per week but the laboratory and the equipment are available to students outside of this period. Attendance at laboratory sessions is required. If circumstances prevent attendance the

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student is responsible to obtain data from their partner, other class members and/or by undertaking the exercise at another time in order to complete the required report.

Course evaluation proposed as:

- Model neuron graphs 5%
- Crayfish muscle/nerve report1 10%
- Crayfish muscle/synapses report2 20%
- Anatomy quiz 5%
- Anatomy presentation and powerpoint submission 15%
- Slug neuron report 20%
- Final Project Report and presentation 25% (presented during exam period)

Depending upon availability of tissue and time the exercises may change but the above fairly represents the scope of the course requirements.

If a missed course component cannot be completed before the submission of the final marks to the registrar then as per university procedures an N grade will be submitted. An N grade requires submission and approval of a RAC before a DEF grade can be assigned by the registrar. A DEF is required to enable submission of missed components and a subsequent grade change to be made. To reiterate: A student must submit a Request for Academic Concession (RAC) to enable their N grade to be changed to a DEF, (deferred grade) by the registrar in order for a deferred examination to be taken: no RAC = no DEF, no DEF = no grade change possible. An N eventually becomes an F (49%) if the course requirements are not completed.

• **Required text:** There is no specific textbook. A general neuroscience text, such as that assigned for Biology 367 (e.g. Purves) could be useful. Lab exercises will be described in lecture, excerpts from a practical manual for crayfish neurobiology exercises will be provided and the scientific literature should be consulted when preparing reports.

• Grading:

Marks will be assigned consistent with University Guidelines as follows: (see <https://web.uvic.ca/calendar2017-09/undergrad/info/regulations/grading.html>)

No supplemental exams or assignments will be offered and no E grades will be awarded as per Biology Dept. Policy. Students are to attend to ADD/DROP dates published in the Academic Calendar and posted on the Undergraduate Records website. See: <https://www.uvic.ca/calendar/dates/> . **Students will not be dropped automatically if they do not attend lectures or exams and attendance will not be taken.**

Students requesting DEFerral of a missed **final** exam or an Aegrotat grade must contact Undergraduate Records, Main Floor, University Centre, for a “Request for Academic Concession” form. As per university procedures if you do not write the final exam by the time final marks are submitted to the registrar you will receive an ‘N’ grade, which requires submission and approval of a RAC before a DEF grade can be assigned by the registrar to allow a make-up final exam to be written and a subsequent grade change to be completed.

• Academic Integrity:

It is assumed that you have read and understand the material at:

<https://www.uvic.ca/students/academics/academic-integrity/index.php> and will abide by the principles of academic integrity outlined therein.