

Biology 409B Neurobiology Laboratory

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Fall 2025

- Instructor: Dr. K. Delaney
- Email: kdelaney@uvic.ca
- Phone: 250 472 5657
- Office: Cunningham 259A
- Office hours: By appointment
- Teaching Assistant Vasil Kecheliev vasilkecheliev@gmail.com

This course is offered as in-person only. Information here is current as of Sept. 1, 2025 and subject to update. Changes to the course outline and laboratory schedule 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 their collected data in a form consistent with peer-reviewed journal articles.

Exercises will be undertaken:

- Electrical circuits modeling passive neuronal properties
- Nerve and muscle recordings of neuron activity of posture controlling motor neurons
- Correlating presynaptic action potentials with postsynaptic potentials
- Evaluation of 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
- Acquisition of 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

• **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. Attendance at laboratory sessions is required. There is only one scheduled laboratory session per week but the laboratory and the equipment are available to students outside of this period. If circumstances prevent attendance the 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. All reports and oral presentations are required course requirements.

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• 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 obtained during the exercises. Students may submit the lab report individually or as a collaborative report with their partner. The quiz will be completed independently during a lecture period. Due dates for the reports may vary depending on the success the class has in obtaining data during the lab periods.

• Course evaluation is proposed as:

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

Depending upon availability of tissue and other factors such as availability of equipment the exercises may change but the above fairly represents the scope of the course requirements.

• Grading:

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

As per Biology Dept. Policy no supplemental exams or assignments will be offered and no E grades will be awarded. 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/ exams or labs.**

As per university procedures if you do not complete all the required course components 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 exam to be written or a lab report submitted and a subsequent grade change to be completed.

• **Required text:** There is no specific textbook. A general neuroscience text, such as that assigned for Biology 367 (e.g. Purves et al.) 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.

• 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, especially <https://www.uvic.ca/students/academics/academic-integrity/index.php#ipn-what-is-academic-dishonesty->