

# BIOL 490 - Neural Circuits Governing Social Behaviour and Memory

## Student Directed Seminar - 2018

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An exploration of emerging concepts related to the field of neural circuits, with a focus on recent findings on neuronal basis of aggression and courtship behaviour in flies and rodents and memory engrams.

**Seminar Schedule:** Tue/Thu, 3:30-5:00 PM – Life Science Centre room 1416

**Student Coordinator:** Alireza Kamyabi ([alireza.kamyabi@alumni.ubc.ca](mailto:alireza.kamyabi@alumni.ubc.ca))

**Faculty Sponsor:** Professor Michael Gordon ([gordon@zoology.ubc.ca](mailto:gordon@zoology.ubc.ca))

In this seminar, our goal is to explore how coordinated activity in a neuronal population can encode and produce a behaviour - whether the behaviour is instinctive and innately-driven (modules 1&2) or it's learnt and memory-driven (module 3). We will explore both aspects.

More precisely, we'll look at the principles that underlie the computational and behavioural functions of a neuronal circuit. With the advancement of experimental methods in systems neuroscience, increasingly more models are emerging that point to distinct neuronal populations as the main functional units in the brain. We will look at the recent literature related to the field of neural circuits and by the end of the seminar, come up with an experimental proposal that would further the field.

### Course Objectives:

1. Identify the neural circuit pathways that underlie aggression, sexual behaviour and memory
2. Explain the different molecular mechanisms that lead to sexual dimorphism in neural circuits responsible for social behaviour
3. Be able to synthesize new knowledge outside of the textbook by integrating data from a literature search
4. Identify unanswered questions and important knowledge gaps in the field of neural circuits for a potential graduate school project
5. Formulate a plan of research and experimental proposal to address a knowledge gap related to neural control of behaviour

### Grade Allocation

Type of Assignment	Value
Two written assignments	20%
One week of seminar facilitation	20%
Weekly readings and in-class discussion	20%
Experimental proposal	40%

## Weekly Structure

	Tuesday		Thursday
3:30-4:00	<b>Presentation by the facilitator</b> <ul style="list-style-type: none"> <li>• Intro to the guiding question of that week</li> <li>• Summary of 3-4 papers</li> <li>• The facilitator would ideally become an expert on the guiding question and would be helpful in clarifying concepts in the paper and group discussions</li> </ul>	3:30–4:30	Group Discussion of paper #2
4:00 – 5:00	Group Discussion of Paper #1	4:30–5:00	<b>Summary of the week</b> <ul style="list-style-type: none"> <li>• group discussion led by the facilitator for that week</li> <li>• What have we learned to answer the guiding question?</li> <li>• Summary of the main findings covered in this week</li> <li>• Questions that remain unanswered</li> </ul>

## Breakdown of grades

**Two Written Assignments (20%):** We will have two short papers throughout the term that are written individually. The first paper would be a technique paper: a detailed summary of a specific research technique used frequently in systems neuroscience. Ideally, the technique would be something that is relevant to modern day research and we have seen used often in the papers that we cover in seminar. The second paper is a conceptual paper on a line of research and a particular hypothesis that has sparked your interest. This paper is meant to be a preparation to explore possible projects for your experimental proposal. It would include references to relevant articles and would suggest possible ways of addressing the question/hypothesis at hand.

**One week of seminar facilitation (20%):** Each of us is responsible for facilitating the seminar for one week throughout the term on a given topic and guide the seminar discussion for the articles that we will read for that week. Seminar facilitation is done in groups of two. The facilitators would ideally become experts about the topic that we are covering for that week and guide the class discussion with informed knowledge and care. The facilitation is composed of two main parts that each group would complete. The mark for seminar facilitation is peer-reviewed.

- 1) A class presentation providing a short summary of 3-4 articles related to the topic of the week. The goal of the presentation is to provide the necessary context and research history behind the topic of the week. By doing this, facilitators are expected to well-informed about the topic so as to be helpful in clarifying concepts in later assigned readings and group

discussions for that week. At least two of the summarized articles must be material that is not part of that week's reading.

- 2) Facilitating group discussion on assigned readings and the concluding discussion at the end of the week on Thursday. The facilitators can choose questions/comments submitted by the students on each of the assigned readings to guide classroom. Facilitators would help to clarify conceptual difficulties and questions on the assigned readings but are not responsible for knowing everything.

**Experimental Proposal (40%):** In groups (of either 2 or 3), we'll outline and propose a research plan to explore a question or hypothesis in the field neural circuits and behaviour. Students are free to choose the topic that they wish; it's not necessary to choose from class material. The experimental proposal would be very similar to those that are done in graduate school and for grant-funding. The experimental proposal is presented as a written report and a presentation; both should provide the context, rationale, hypothesis and an outline of experiments to be done. A clear and interesting research question is a key part of any research proposal. The written report and oral presentation are weighted equally (10% each) and both are evaluated by students and by Professor Gordon, with both weighing equally towards the final grade. Along with the report, we'll also have a presentation of the proposal to the class at the end of the term, followed by class discussion and feedback. The presentation should include all aspects of the written report. The rationale is very important.

**Readings and Class Participation (20%):** Readings and class participation mark is made up of two parts:

- 1) Question and comment submission (10%): Almost every class we'll have assigned readings for one primary article. ***For each article and each class, all students would submit one question and one comment on the reading to the pre-determined online platform*** (most likely, Google Doc). The question and comment are marked by the facilitators for that week for quality and completion and also used in class to ignite discussion. The question/comment should be submitted by midnight the day before the class [For a Tuesday class, question/comment would be submitted by Sunday 11:59PM and for Thursday class, submissions should be made by Tuesday 11:59PM]
- 2) Peer Evaluation (10%): Since almost all of our assignments will be peer-evaluated, as an evaluator it is important to provide useful feedback and comments on each assignment that is marked. For a select number of assignments, the graded individual would be asked to mark the peer evaluation that he/she has received for quality of feedback and clarity of comments for areas that need improvement. All peer-evaluations are done anonymously.

### **Philosophy of the Student Directed Seminar**

The SDS Program gives students the opportunity to extend and deepen their education by turning a traditional university classroom into a rich, peer-based learning environment. Student Coordinators and their peers undertake a democratic exploration of a topic of their choice through a range of

learning activities, assignments, and discussion. Similar to a senior capstone class or directed studies, in both depth and academic rigour, students together take the lead in building, facilitating, and grading their work, with Student Coordinators creating the framework for the course and ensuring that the group upholds the ethos and practice of a truly peer-led learning environment.

**What is expected of the Student Coordinator:** The Student Coordinator is not meant to be an instructor, teacher or content expert. The Coordinator's role is that of a facilitator. They are responsible for organizing the learning resources (e.g., guest lectures, reading materials, and films) to be used in the class, and sets the parameters of course content, structure, and evaluation procedures, in conjunction with the Faculty Sponsor. Coordinators cannot position themselves as leading or lecturing in every class throughout the term. Coordinators must also complete the same coursework and assignments as all participants.

**What is expected of all participants (course coordinator included):** Due to the student-led and discussion-centered nature of the student seminar, it is important that all students participate fruitfully in group discussions and contribute to the seminar. To do this, it is expected that all students come to the seminar well-prepared – by reading the assigned material and having questions/comments prepared to ignite conversation. As a group, we should aim for a high level of critical discussion during class time – it is the debates and critical questions that will keep the seminar lively.