

This syllabus is a general representation of the course as previously offered and is subject to change.

BIOL 460 - Neurobiology of Vision

General Course Syllabus (as of August 2023)

About the Course:

Course Description: Advanced investigation of animal vision; critical analysis of recent literature and research project development in visual neurobiology.

Course Format: Lecture

Credits: 3 credits

Prerequisites: One of BIOL 372, CAPS 301, PSYC 304, PSYC 367, PSYC 370.

Learning Outcomes: By the end of the course, students will be able to:

- Explain the conceptual advances in visual neurobiology contributed by different theories, methods, and model systems;
- Critically evaluate different types of experimental data and synthesize such data into a mechanistic understanding of animal vision;
- Compare the modulation of circuit function in response to different types of visual stimuli and internal states;
- Integrate biological mechanisms at different levels of nervous system organization (molecules, neurons, neural circuits, systems, behaviour);
- Develop skills in giving oral presentations through content about how the nervous system detects and interprets visual signals in the physical world;
- Develop skills in logical and persuasive writing through the systematic development, drafting, and workshopping of a grant proposal;
- Communicate in the language of visual neurobiology as a practitioner in the field.

Resources: All learning material will be provided on Canvas or accessible online.

Evaluation:

Assessments	Value
Paper discussion summaries	2%
Introductions to paper discussions	15%
Peer review of paper introductions	2%
Figure presentations	8%
Midterm exam	30%
Presentation of grant proposal	20%
Peer review of grant presentations	3%
Written grant proposal	20%

Details on Assessments:

Paper discussion summaries (2% of grade)

- For each paper discussion, you will submit a brief summary (~150-200 words) that answers three questions
 1. What is the big question of the paper?
 2. What was/were the main method(s)?
 3. What did they find?

Introductions to paper discussions (15% of grade)

- Prior to each paper discussion, a pair of students will introduce the topic for that day with a 20-minute digital presentation (Powerpoint, Keynote, or equivalent).
- On the calendar description of that day's events in Canvas, students will find 1-2 topics and 3-4 papers that should be used during this introduction.
- They are free to add any additional information they wish, but this is optional.
- These introductions are graded on content (5 marks), organization & clarity (5 marks), and delivery (5 marks).
- A PDF of the presentation must be provided to the instructor within two days so that it can be posted on Canvas.

Peer review of paper introduction presentations (2% of grade)

- Developing presentation skills require careful thinking and critical feedback.
- The 20-minute introductions to the paper will be the first presentation each student group makes in the class.
- The instructor will mark the presentations and provide feedback on three components:
 1. content
 2. organization & clarity
 3. delivery
- Students will also provide feedback using Canvas assignments, due within two days after each presentation.
- Feedback should be brief (~1-2 sentences per component) but clear.
 1. Bullet points are fine as long as the idea comes across.
 2. The feedback should be organized using any two of the components that the instructor uses.
 3. You will be marked on the first two components you choose to evaluate. Any additional comments (e.g., a third component) will not be marked but will be forwarded to the presenters.

Figure presentations (8% of grade)

- During each paper discussion, students will be called on to present one specific figure (or part of a figure).
- The students come prepared to present any figure, and will be assigned several figures to present over the term (but not necessarily any on a specific day).

- Performance on these figure descriptions will be judged on clarity of the figure elements and thoughtfulness of observations. Thus, if a student is called on a figure that they didn't understand, they can explain why they didn't understand it, and hopefully offer some possible insight into what it *might* show.

Midterm exam (30% of grade)

- The midterm is the only exam in the course.
- The content will cover all of the material from the five research modules in vision, up through the final paper discussion.
- The remaining third of the course focuses entirely on research proposals.
- The midterm and key from last year can found in the "Modules" tab.

Presentation of the grant proposal (20% of grade)

- The last five class sessions will be composed of grant proposal presentations by pairs of students.
- The goal of the presentations is to delve deeper into the topic that were introduced during the paper discussions, develop the skill of integrating and teaching complex information and ideas derived from primary scientific literature, and learn how to frame research questions.
- The specific topic must fall under the umbrella of the broad topic of the day you introduced during paper discussions. However, you are not restricted to the specific topic of that day's paper, or the system used. For example, if you introduced the paper on efference copies during fly saccades, then their proposal topic could be about how efference copies by a motor system interact with visual signals. This can come from any animal (e.g., flies, mice, birds, etc.), and occur at different levels of neural circuitry (e.g., midbrain, V1, etc.).
- There will be two class sessions devoted to workshops on how to develop a grant proposal. In the first one, the whole class will work together to develop the aims of a single proposal. In the second one, teams will work together on their own topics, and then receive feedback from the instructor.
- The formal presentation will be a 30-minute oral presentation to the class, which will be followed by 10 minutes of peer and instructor questions. Each student in the pair is expected to speak for approximately 15 minutes.
- Over the 30 minutes of formal presentation, the following content should be covered: relevant background research for the study, logic for the proposed aims, detailed descriptions of the methods, expected outcomes, and significance of the research. Coverage of all of these elements will provide the opportunity for sufficient feedback from both the students and instructor about which aspect are most in need of improvement for the written proposal.
- Students will self-organize into pairs and will inform the instructor and TA of the groupings, along with the order of topic preferences.
- Pairs will be assigned to specific paper discussion days, which will determine the broad topic for their proposal.

- Grades will be assigned for background content (5 marks), logic of the research aims (5 marks), organization & clarity (5 marks), and delivery (5 marks).
- A PDF of the presentation must be provided to the instructor within two days so that it can be posted on Canvas.

Peer review of grant presentations (3% of grade)

- Developing new research ideas benefits from careful thinking and critical feedback.
- The written grant proposal will be developed through conversations with your proposal partner, the two grant writing workshops, and feedback of the oral presentation of the proposal.
- The instructor will mark the presentations and provide feedback on four components:
 1. background content
 2. logic of the research aims
 3. organization & clarity
 4. delivery
- Students will also provide feedback using Canvas assignments.
 1. These are due 48 hours after each presentation.
- Feedback should be brief (~1-2 sentences per component) but clear.
 1. Bullet points are fine as long as the idea comes across.

Written grant proposal (20% of grade)

- Each pair of students will submit a written grant proposal on their topic at the end of the class.
- The grant proposal should be submitted by email to the instructor.
- The written proposal will reflect the same content as the oral presentation, but may incorporate feedback received or questions that arose during the oral presentation.
- The proposal should be no longer than 5 pages, single spaced, with 12-point Times New Roman font.
- Small figures to help explain any aspect of the proposal are permitted but not required. However, any figures are included in the 5-page limit.
- References should be presented in one of the journal formats of the field (e.g., Cell, Nature, Science, Neuron, J. Neurosci). The reference list at the end does not count towards the 5-page limit.
- Both students will receive the same grade for the written proposal.
- Grades will be assigned for the background content (5 marks), logic the research aims (5 marks), rationale & significance (5 marks), and readability & organization (5 marks).

Schedule:

Week	Assignments and activities
1	Lecture 1: Course Introduction
2	Lecture 2: Guidelines for presentations Lecture 3: Introduction to retinal ganglion cells
3	In class discussion of paper 1: retinal ganglion cells 1 In class discussion of paper 2: retinal ganglion cells 2
4	Lecture 4: Introduction to superior colliculus In class discussion of paper 3: superior colliculus 1
5	In class discussion of paper 4: superior colliculus 2 Lecture 5: Introduction to fly motion detection
6	In class discussion of paper 5: fly motion detection 1 In class discussion of paper 6: fly motion detection 2
7	Lecture 6: Introduction to zebrafish visuomotor transformation In class discussion of paper 7: zebrafish visuomotor transformation 1
8	In class discussion of paper 8: zebrafish visuomotor transformation 2 Lecture 7: Introduction to visual cortices
9	In class discussion of paper 9: visual cortices 1 In class discussion of paper 10: visual cortices 2
10	Grant writing workshop 1
11	Midterm exam Grant writing workshop 2
12	Day 1 student grant presentations a and b Day 2 student presentations a and b
13	Day 3 student presentations a and b Day 4 student presentations a and b
14	Day 5 student presentations a and b

University Policies:

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.

UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.

UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.

UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on [the UBC Senate website](#).