

# NEURO 451/452: RESEARCH TOPICS IN NEUROSCIENCE

## GUIDELINES FOR STUDENTS AND SUPERVISORS

### NEURO 451 - Honours Research Project in Neuroscience

\*3 (fi 6) (first term,0-0-3)

### NEURO 452 - Honours Research Project in Neuroscience

\*3 (fi 6) (second term,0-0-3)

Research projects involving laboratory experimentation done under the supervision of a member of the Neuroscience and Mental Health Institute. Laboratory projects may involve current topics and methodologies encountered in specific areas of cellular, molecular, systems, cognitive or clinical neuroscience. Completion of this course requires a written report of the project and an oral presentation to an examining committee. Restricted to students in their 3<sup>rd</sup> or 4<sup>th</sup> year Honors program in Neuroscience. Registration must be approved by the Neuroscience and Mental Health Institute.

Students taking NEURO 451/452 and their supervisors are asked to please review the following guidelines to understand what is expected of the students in this course. This document also provides general guidelines for preparing for the exams (for students) and for evaluating students' exams (for supervisors). Your cooperation will help to establish reasonably uniform standards of evaluation among different supervisors.

*Students must find and secure a supervisor from the [NMHI Membership Listing](#) prior to registering into these courses.*

### **To register:**

1. Identify and secure a supervisor who is an NMHI member.
2. Discuss with the supervisor the nature and expectations for the project, including feasibility of the proposed project within the minimum of 8h/week allocated to the course.
3. Complete the registration form together with the supervisor. Please note that it is required that the supervisor has ethics approval in place at the time of registration. The supervisor should also identify a member of their lab who can provide day-to-day supervision and guidance for the student.

### **Objectives**

The primary objective of NEURO 451/452 is to train students in laboratory research and experimental neuroscience.

### **Expectations**

- (A) Students enrolled in NEURO 451/452 are expected to be actively involved in a research project in neuroscience for the duration of the course.
- (B) Students will write and submit a lab report to the supervisor and a second expert examiner at least one week before the final oral exam.
- (C) Students will prepare an oral presentation on their work for the final exam

#### **(A) Laboratory work**

Students enrolled in NEURO451/452 are expected to spend a minimum of 8 hours/week in the lab of their supervisor. It is important to understand that most projects may require a higher number of dedicated hours per

week, as well as a considerable degree of flexibility from the student, to adapt to laboratory dynamics and experimental requirements. Students are strongly encouraged to discuss their project and the specific minimum commitment required with their potential supervisor.

Students are also required to understand and learn the details of the experimental procedures and techniques they use in their project. They should also become familiar with the basic literature and background for their project.

### **(B) Guidelines for lab reports**

**The laboratory report** should be written in a format similar to a research article in a scientific journal. It must be **15 pages maximum**, double line spacing, not including figures, tables, and bibliography.

The report must contain the following material:

- 1) An **“Introduction”**. Provide a brief overview of the research field that is directly relevant to the project. State the hypotheses tested and discuss the rationale for the approach.
- 2) In a **“Methods” section**, describe the methods used in the project in details.
- 3) In a **“Results” section**, describe data obtained and statistical evaluations. Figures and tables should be clearly labeled and placed in order at the end of the paper, after the bibliography. Each figure or table should have a legend.
- 4) A **“Discussion” section** must be included, in which the student briefly summarizes the main findings, discusses whether the original hypothesis is supported or confuted, and clearly states his/her own conclusions. The student should try to explain how the reported data fit into the current pool of knowledge. The student should also demonstrate an understanding of the strengths and limitations of the techniques and experimental approaches that were used in his/her study.
- 5) A **list of papers cited** in the report is also required; this must conform to accepted styles of scientific literature citations. For example: Woo, N.H., Duffy, S.N., Abel, T., and Nguyen, P.V. (2000). Genetic and pharmacological demonstration of differential recruitment of cAMP-dependent protein kinases by synaptic activity. *The Journal of Neurophysiology*, 84: 2739-2745.

**The report must be submitted to the supervisor and the second expert examiner at least one week before the oral examination.**

Supervisors and second examiner should read and mark the report before the oral examination takes place.

Supervisors are encouraged to provide students with suggestions on the structure and the content of the report, but are not required to revise drafts of the document.

### **(C) Guidelines for the oral presentation**

In addition to the written report, the student must give an oral presentation to an examining committee at the end of the course. **The presentation must be no more than 20 minutes, and it is followed by questioning from the committee members. The selection of a second faculty member is the responsibility of the supervisor.**

The presentation should include background information on the research topic. Hypothesis and research questions should be clearly stated. Depending on the nature of the project, a description of the methods used should also be included. Results should be presented with the use of images, graphs and/or tables as appropriate. At the end of the presentation, data should be summarized and conclusions should be clearly stated. Depending of the nature of the project, a model where hypothesis, findings and conclusions are presented in the context of current knowledge should also be presented.

### **Final exam**

Students will give an oral presentation and will be examined by a committee composed by the supervisor, the second examiner and the course coordinator. **The selection of a second faculty member with expertise in the specific area of research is the responsibility of the supervisor.**

Students will be expected to know the general background literature relevant to their particular research topic, and details of the experimental procedures used. They should be able to discuss the significance, strengths and limitations of their findings and put them in context with current knowledge in the field.

After the presentation and at a separate time that is convenient for both, the supervisor and the student are encouraged to meet formally so that feedback concerning the student's performance at the oral exam can be provided. In particular, the supervisor should point out the strengths and weaknesses of the student's oral presentation and written report, as discussed by the examining committee.

### **Guidelines for the evaluation of the laboratory report**

There is much leeway for objectively determining what constitutes "fair" or "excellent" performance in a course. However, some fundamental criteria can be suggested:

- 1) The report should be clearly written with a logical organization and "flow" of ideas and hypotheses.
- 2) Hypothesis and rationale for the experiments performed should be clearly stated.
- 3) Literature that is relevant to the research project should be discussed, to help framing the scientific questions asked, the hypothesis and the conclusions of the student's work.
- 4) Material and methods used should be clearly and sufficiently reported.
- 5) Results should be clearly laid out, in an organized and logical manner. Figures and tables should be clearly labeled and of a quality that would be suitable for a thesis or research paper.
- 6) The discussion should clearly reveal the ability of the student to critically interpret the significance of the project and/or data produced, limitations and strengths.

Essays that are superbly written (with no errors in logic, style and facts), that satisfy all of the above criteria, AND that show **excellent critical thinking and significant insight(s)** should be graded as "**outstanding**" (94-100%).

Essays that are well-written, and that satisfy all of the above criteria while showing no novel and potentially significant insight(s), should be graded as "**excellent**" (85-93%).

Essays that solidly satisfy most of the criteria above, without showing evidence of logical critical assessment of the literature or insights into the significance of the project and data should be graded as "**very good**" (81-84%).

The full grade scale should be used to assign marks below 81% as appropriate.

Any essay that, in the opinion of the supervisor, shows evidence of plagiarism on the part of the student, should receive a failing mark, and the course coordinator should be notified.

### **Grading**

The final grade for the course will be determined from the aggregate marks obtained from the written report, oral presentation, and laboratory performance, each weighed as follows:

**Lab report** (due one week prior to the final examination):  
average of supervisor's mark & second examiner's mark ..... 1/3  
**Oral presentation:** average of supervisor, second examiner and course co-ordinator's marks..... 1/3  
**Lab performance mark** (supervisor-assigned)..... 1/3

The lab performance mark should consider the student's diligence, hours spent on laboratory work, technical competence at the bench, originality where applicable, problem-solving ability, perseverance, motivation, and general aptitude for laboratory research.

Final grades in this course are on a 4-point scale, defined as follows:

Outstanding	94-100%	4.0	A+
Excellent	85-93%	4.0	A
Very good	81-84%	3.7	A-

	77-80%	3.3	B+
Good	73-76%	3.0	B
	70-72%	2.7	B-
	64-69%	2.3	C+
Satisfactory	61-63%	2.0	C
	57-60%	1.7	C-
Minimal Pass	54-57%	1.0	D
Fail	1-53%	0.0	F