

BEHAVIOURAL NEUROSCIENCE LABORATORY ONLINE NROC63

UNIVERSITY OF TORONTO SCARBOROUGH
WINTER 2021

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Lectures: Friday 10am-12pm

Office hours: By appointment only on Mondays between 3-4pm

~~***This Course***~~

COURSE OVERVIEW

The Neuroscience online laboratory course is an upper level course for the Neuroscience specialist program, that has been designed to teach research techniques that are commonly used in behavioural/systems neuroscience to students who will likely go on to post-graduate study in a neuroscience related field. The students will learn about widely used behavioural and histological procedures ranging from operant boxes (reward conditioning) to mazes (e.g., elevated plus maze) with the use of virtual software and video recordings of live sessions. Students will also acquire skills in the areas of research design, data analysis, literature review, critical thinking and research writing.

IMPORTANT NOTE: This is a fully online, synchronous course. Please note that regrettably, students will NOT have the opportunity to gain hands-on experience in this course this year, due to the restrictions and protocols in place to minimize the transmission of Covid-19.

COURSE PRE- AND CO-REQUISITES

Prerequisite:

The content of this course will be heavily based on the theoretical constructs covered in [NROC61H3](#) Learning and Motivation and [NROC69H3](#) Synaptic Organization and Physiology of the Brain.

Corequisite:

The completion of [PSYC08H3](#) Advanced Data Analysis in Psychology would be advantageous in understanding the course material.

COURSE OBJECTIVES

By the end of the course:

- You will develop a working knowledge of relevant research literature and ethical issues in the use of animal models
- You will have a working knowledge of how a research project in behavioural neuroscience is designed and conducted
- You will have advanced knowledge of behavioural and protein detection techniques in neuroscience
- You will have learned tools for data analysis
- You will have practiced writing a scientific manuscript

TENTATIVE COURSE OUTLINE

Date	Lecture	Lab	Assignments
Jan 15	Course Introduction		👉 Watch, and complete animal ethics rat handling training online (2.5%) Complete by 21st Jan 11.59pm
Jan 22	Principles of Experimental Design		👉 Conduct literature search and submit write up of two reports that successfully induced inhibitory learning (10%). Due Jan 27th 11.59pm (No late work accepted) 👉 Read 'Considerations for Experimental Design of Behavioral Studies Using Model Organisms'. J Neurosci 39:1-2
Jan 29	*From theory to practice: class discussion on designing experiments	Conduct video scoring of 1 of 3 live experiments.	👉 Read 'AUP 20012645 Investigating the neural substrates of conditioned inhibition' 👉 Submit cue learning, summation and retardation test data by 8th Feb 11.59pm (10%)
Feb 5	*From theory to practice: Testing Anxiety	Conduct video scoring of EPM, Dark and Light box and NSF	👉 Submit anxiety test data by 10th Feb 11.59pm (2.5%)
Feb 12	Review of Results/ Writing the Introduction and Methods		👉 Introduction (10%) Due 21st February 11.59pm
Feb 19	Reading Week		
Feb 26	*From theory to practice: Experiment 2 Fiji/Image J	Immunohistochemistry Cell counting	👉 Methods (10%) Due 28th February 11.59pm
Mar 5	Results/Statistics		👉 Submit cell count results (10%) Due 7th March 11.59pm
Mar 12	Review of cell counts		
Mar 19	*Results/Statistics workshop		👉 Results & Figures due (15%) Due 21st March 11.59pm
Mar 26	Writing the Discussion		
Apr 2	No Class – Good Friday		
Apr 9	Class presentations – research proposal on follow up experiment	👉 Group Presentation in breakout groups (10%)	👉 Final paper due 12th April 11.59pm (20%)

*These classes involve time with smaller, breakout groups led by one of the TAs.

Resources: Lectures slides and PDFs of papers for assigned reading will be posted on the course website (in the “Content” section) **by midnight at the latest** the night before the lecture.

Online class: Attendance of the lectures synchronously is encouraged as much as possible, for you to actively partake in class discussions.

EVALUATION

There is no final exam for this course. Instead, grading will be based on the following categories of assignments.

1. Research Paper (55% +10% lit search)

Your final paper should be written according to the specific guidelines of the Journal of Neuroscience: https://www.jneurosci.org/content/information-authors#preparing_a_manuscript

Some brief guidelines are provided below, but you must read the detailed guidelines online. All assignments must be submitted to **the appropriate assignment folders in Quercus by 11.59pm on the specified dates.**

To make paper writing more of a training process than one big assignment that has to be handed in at the end, the paper writing will be broken down into the following components. You will be provided with some feedback on your assignments, *which you are expected to use to improve your writing for the final paper.* Please note that due to the tight submission timeline of various components of the paper, a late submission of assignments will lead to a delay in getting your feedback or no feedback at all.

Literature search (10%) – due Jan 27

You will conduct a literature search, and **find two papers in which rats (or mice if justifiable)** underwent inhibitory learning, and provide a report of the task design and parameters used, as well as the findings of the paper (including details of neural substrates explored, if applicable). You will be provided with a guided document entitled '**Literature Search and Experiment Preparation**' that you need to fill out for this assignment, and you are to **upload this document on Quercus, and email the Title and pubmed ID number of your chosen papers to the course email address (nroc63rats@gmail.com) by the deadline (27th Jan).** *Late work cannot be accepted for this document (i.e., you will earn 0% if no work is handed in) as the outcome of your search will be the basis of our discussion in class on the 29th.*

Introduction (10%) – due Feb 21

The Introduction should be a maximum of 650 words in length. A lengthy review of the topic is discouraged, and the introduction must contain a **clear, concise and relevant background** of the research and a **rationale** for the study.

Materials and Methods (10%) – due Feb 28

The Methods section must contain a detailed description of the materials and experimental procedures, and an '**EXPERIMENTAL DESIGN AND STATISTICAL ANALYSES**' section as per the guidelines online.

Results and Figures (15%) - due Mar 21

You will run statistical analyses of the data compiled from data scoring and cell counting, and write up the Results section and provide Figures of all the data collected.

Final Paper (20%) – due Apr 12

The final paper should contain the following sections:

Title Page (NB this is slightly different from the requirements of J Neuroscience:

- ❖ Title (50-word maximum)
- ❖ Abbreviated title (50-character maximum)
- ❖ Author name – *just your name*
- ❖ Number of pages
- ❖ Number of figures, tables, multimedia, and 3D models (separately)

- ❖ Number of words for abstract, introduction, and discussion (separately)

Abstract: should clearly state the background, rationale, brief procedures and results of the paper, and should not exceed 250 words.

Introduction: as above

Materials and Methods: as above

Results: This section should report statistical analyses of **all the data** collected.

Discussion (max 1500 words): This section should have an in depth discussion of the data in the context of extant literature. There should be a concluding paragraph highlighting the main conclusions, as well as referring to future direction of research.

References: List the references you cite in the text in alphabetical order (by the first authors' surnames).

Figure Legends: This section must provide a brief description of the figures in the order they are referred to in the text.

Figures: The figures should appear at the end of the paper, in sequential order.

2. Lab Performance (25%)

Attendance will be taken for each lecture, as important information pertaining to the experiment will be discussed in each of these classes. The grade you achieve in the **mandatory online ethics and rat training** will count towards 2.5% of your overall grade. The rest of the grade (22.5%) will come from conducting **data scoring, filling out and submitting an excel data sheet by the stated deadlines**, as well as the accuracy of scoring. More specifically, you will score videos taken from live sessions of behavioural testing (conditioned inhibition, elevated plus maze, open field, dark/light box), and conduct cell counting of images taken from the brains of animals that have undergone behavioural training.

3. Group presentation (10%) –Apr 9 in breakout groups

You will prepare a group presentation (15min) in groups of 2-3, in which you will **outline a research proposal of a follow up experiment**, in order to address any deficiencies of the experiments conducted in this class. Your research proposal should be novel and plausible, and designed according to the principles of good experimental design that you have learned in the course. A brief guideline will be provided on Quercus.

COURSE POLICIES

Online Rat module and Animal handling training:

The completion of the online rat module and the animal handling training, and understanding of the animal used protocol is a mandatory requirement for students working with animals in person.

Psychology Department Missed Term Work Policy, WINTER 2021

For missed term work (assignments and term tests) due to illness, emergency, or other mitigating circumstances, please follow the procedures outlined below.

Notes:

- The following reasons are not considered sufficient for missed term work: travel for leisure, weddings, personal commitments, work commitments, human error.

- Missed Final Exams are handled by the Registrar's Office and should be declared on eService: <http://www.utoronto.ca/registrar/missing-examination>
- Instructors cannot accept term work any later than five business days after the last day of class. Beyond this date, you would need to file a petition with the Registrar's Office: <https://www.utoronto.ca/registrar/term-work>

Accommodations for Illness or Emergency:

For missed work due to ILLNESS OR EMERGENCY, please complete the following **two-step** process:

1. Complete the **Request for Missed Term Work Accommodations Form** (<http://uoft.me/PSY-MTW>) and email it to Keely Hicks at keely.hicks@utoronto.ca ,
and
2. **Declare your absence** on [ACORN](#) (Profile & Settings > Absence Declaration)

Deadline: You must complete the above steps **within 3 business days** of the missed work.

Note: For this semester, we do not require any additional supporting documentation (ex. medical notes) to support your missed term work accommodation request.

Accommodations for Academic Conflicts:

For missed term work due to an ACADEMIC CONFLICT (i.e. two quizzes or tests scheduled at the same time), please complete the following process:

1. Complete the **Request for Missed Term Work Accommodations Form** (<http://uoft.me/PSY-MTW>), choosing "Other" as your reason for missed work and explaining the conflict in the space provided.
2. Take screenshots of your course homepages that demonstrate the conflict.
3. Email the form and screenshots to Keely Hicks (keely.hicks@utoronto.ca).

Deadline: You should report the conflict to Keely Hicks (keely.hicks@utoronto.ca) **at least two weeks (10 business days) before the date of the activity**, or as soon as possible if it was not possible to identify the conflict earlier.

Note: Multiple assignments due on the same day are not considered conflicts. Accommodations may only be possible in the case of quizzes and tests that are both scheduled during the same discrete period. Back-to-back tests/quizzes are not considered conflicts.

Note: Students are responsible for keeping their course timetables conflict-free. Students who choose to register in two synchronous courses with overlapping lecture/tutorial/lab schedules may not necessarily be accommodated.

Accommodations for Religious Conflicts:

For missed term work due to a RELIGIOUS CONFLICT, please complete the following process:

1. Complete the **Request for Missed Term Work Accommodations Form** (<http://uoft.me/PSY-MTW>), choosing "Other" as your reason for missed work and noting "Religious conflict" in the space provided.
2. Email the form to Keely Hicks (keely.hicks@utoronto.ca).

Deadline: You should report the conflict to Keely Hicks (keely.hicks@utoronto.ca) **at least two weeks (10 business days) before the date of the activity**, or as soon as possible if it was not possible to identify the conflict earlier.

Accommodations for Time Zone Conflicts:

If you are physically in a different time zone and a quiz or midterm is scheduled outside of 7:00am to midnight in your local time, please complete the following process:

1. Complete the **Time Zone Conflict Form** (<https://uoft.me/PSY-TimeZone>), and
2. Email the form to Keely Hicks (keely.hicks@utoronto.ca)

Deadline: You should report the conflict to Keely Hicks (keely.hicks@utoronto.ca) **at least two weeks (10 business days) before the date of the activity**, or as soon as possible, if it was not possible to identify the conflict earlier.

Accommodations for Students Registered with AccessAbility Services:

For missed **TERM TESTS** due to ACCESSABILITY REASONS:

- **Contact your AccessAbility consultant** and have them email Keely (keely.hicks@utoronto.ca) detailing accommodations required.

For missed **ASSIGNMENTS** due to ACCESSABILITY REASONS:

- If your desired accommodation is **within the scope** of your Accommodation Letter (ex. your letter includes “extensions of up to 7 days” and you need 3 days):
 1. Complete the **Request for Missed Term Work Accommodations Form** (<http://uoft.me/PSY-MTW>).
 2. Email the form and your **Accommodation Letter** to Keely Hicks (keely.hicks@utoronto.ca).
- If your desired accommodation is **outside the scope** of your Accommodation Letter (ex. your letter includes “extensions of up to 7 days” but you need more time than that):
 1. **Contact your AccessAbility consultant** and have them email Keely Hicks (keely.hicks@utoronto.ca) detailing the accommodations required.

After submitting your documentation:

Within approximately one to five business days, you will receive a response from your instructor detailing the accommodations to be made (if any).

You are responsible for checking your official U of T email and Quercus course announcements daily, as accommodations may be time-critical.

You should continue to work on your assignments to the best of your ability, as extension accommodations may be as short as one business day, depending on the nature of the illness/emergency.

If an accommodation has been granted but you are unable to meet the conditions of the accommodation (ex. you need a longer extension, or you missed a make-up test), you will need to repeat the missed term work procedure and submit additional forms to request further accommodation. Note that in the case of a missed make-up test, an opportunity to write a second make-up test may not be provided.

Completion of this form does not guarantee that accommodations will be made. The course instructor reserves the right to decide what accommodations (if any) will be made. Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation.

Missed Accommodations

If an accommodation is granted but a continued illness/emergency prevents you from meeting the requirements of your accommodation, you must repeat the missed term work procedure to request additional accommodations.

(E.g.) If you miss a make-up midterm, you would need to submit another Request for Missed Term Work Accommodations form and declare your extended absence on ACORN.

Importance of Three Business Day window:

If you are unable to submit your documents within the three business day window, **you must email Keely (keely.hicks@utoronto.ca) within the three business day window** to explain the nature of the delay, and when you will be able to provide your documents. Exceptions to the documentation deadline will only be made under **exceptional circumstances**.

Questions?

If you have any questions about this Missed Term Work policy, please contact Keely Hicks (keely.hicks@utoronto.ca) **well before** the date of the test / assignment deadline to describe your circumstances and inquire about procedures.

Grading

Scale

NUMERICAL MARKS	LETTER GRADE	GRADE POINT VALUE
90 - 100%	A+	4.0
85 - 89%	A	4.0
80 - 84%	A-	3.7
77 - 79%	B+	3.3
73 - 76%	B	3.0
70 - 72%	B-	2.7
67 - 69%	C+	2.3
63 - 66%	C	2.0
60 - 62%	C-	1.7
57 - 59%	D+	1.3
53 - 56%	D	1.0
50 - 52%	D-	0.7
0 - 49%	F	0.0

Guidelines (<http://www.writing.utoronto.ca/advice/general/grading-policy>):

A+ Outstanding performance, exceeding even the A described below.

A Exceptional performance: strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter with sound critical evaluations; evidence of extensive knowledge base.

B Good performance: evidence of grasp of subject matter; some evidence of critical capacity and analytic ability; reasonable understanding of relevant issues; evidence of familiarity with the literature.

C Intellectually adequate performance: student who is profiting from her or his university experience; understanding of the subject matter and ability to develop solutions to simple problems in the material.

D Minimally acceptable performance: some evidence of familiarity with subject matter and some evidence that critical and analytic skills have been developed.

F Inadequate performance: little evidence of even superficial understanding of the subject matter; weakness in critical and analytic skills; with limited or irrelevant use of literature.

Note: for all written work, consistently poor spelling/grammar will be penalised. Please make use of the UTSC writing centre if you feel you need additional help with writing or want to develop your writing skills further: <http://ctl.utsc.utoronto.ca/twc/>.

Contesting a grade

All requests for a re-grade must be submitted **in writing** within two weeks of the day the grade is received. Only requests that include adequate written justification of an error in the original grading will be considered. *A legitimate request will result in the entire exam or assignment being re-graded. Your overall grade may be raised, lowered, or it may stay the same.* If there has been an error in our arithmetic, please let us know and we will immediately recalculate your grade (no written request necessary). **Arbitrary requests for grade increases will not be entertained (e.g., “I need to get into med school, so could you please give me a higher grade?”).**

Video and Auditory Recording

For reasons of privacy as well as protection of copyright, unauthorized video or audio recording in classrooms is prohibited. This is outlined in the Provost's guidelines on *Appropriate Use of Information and Communication Technology*. Note, however, that these guidelines include the provision that students may obtain consent to record lectures and, “in the case of private use by students with disabilities, the instructor's consent must not be unreasonably withheld.”

Copyright of lecture material

As protection of copyright, unauthorized copying, use, or uploading on www of any of the lecture slides, lab manuals and protocols produced by Professor Ito is strictly prohibited.

AccessAbility statement:

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services as soon as possible.

AccessAbility Services staff (located in Rm SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations [416-287-7560](tel:416-287-7560) or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Academic Integrity:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously.

The University of Toronto's Code of Behaviour on Academic Matters

(<http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppjun011995.pdf>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

- Using someone else's ideas or words without appropriate acknowledgement;
- Submitting your own work in more than one course without the permission of the instructor;
- Making up sources or facts;

- Obtaining or providing unauthorized assistance on any assignment

On tests and exams:

- Using or possessing unauthorized aids;
- Looking at someone else's answers during an exam or test;
- Misrepresenting your identity; and
- When you knew or ought to have known you were doing it.

In academic work:

- Falsifying institutional documents or grades;
- Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes; and
- When you knew or ought to have known you were doing so.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If students have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, they are expected to seek out additional information on academic integrity from their instructors or from other institutional resources.

Note:

You may see advertisements for services offering grammar help, essay editing and proof-reading. Be very careful. If these services take a draft of your work and significantly change the content and/or language, you may be committing an academic offence (unauthorized assistance) under the *Code of Behaviour on Academic Matters*.

It is much better and safer to take your draft to the Writing Centre as early as you can. They will give you guidance you can trust. Students for whom English is not their first language should go to the English Language Development Centre.

If you decide to use these services in spite of this caution, you must keep a draft of your work and any notes you made before you got help and be prepared to give it to your instructor on request.

Turnitin

Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.