

Neuroscience laboratory

NROC63

University of Toronto Scarborough
Fall 2017

Instructor: Dr. Anett Schumacher

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Course E-mail: nroc63rats@gmail.com

Course website resources: Blackboard

Note about communication: All questions should be sent to nroc63rats@gmail.com, clearly indicating who the correspondence is addressed to (e.g. put the name of the TA in the subject line).

Lectures: Tuesdays 1-3pm, SW 316

Labs: SW149, SW712, SW714

Office hours: Fridays 1-3pm, SW625B

Course Overview

The Neuroscience Laboratory course is an upper level course for the Neuroscience specialist program, designed to teach hands-on 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 behavioural procedures have been carefully chosen to offer training in a wide variety of behavioural techniques ranging from the use of operant boxes (lever pressing for food) to mazes (water maze, elevated plus maze), while minimizing discomfort to the animal subjects. Students will also acquire skills in the areas of research design, animal handling, data collection and analysis, literature review, critical thinking and research writing.

Important: This is a time-intensive laboratory course. Although there is a 2-hour time slot devoted to the course each week, students will be required to *devote extra time on multiple days to behavioural testing*. **It is absolutely critical that procedures are completed as scheduled and if you are unable to complete a planned procedure, it is your responsibility to contact other students in your group that can take your place.** In addition, the lab assignments will require the collection of independent data, which will be pooled with all members of the class. Failure to meet deadlines with regards to uploading data will have consequences on all members of the class. If you are negligent in any aspect of duties related to this course (experimental procedures, animal care), you will be suspended from the lab portion of the course immediately and this will have serious consequences for your participation mark and your final grade.

Course Objectives

By the end of the course:

- You will develop a working knowledge of relevant research literature
- You will have a working knowledge of how a research project in behavioural neuroscience is designed and conducted
- You will have had experience with behavioural techniques in neuroscience
- You will have developed some skills in critically evaluating a scientific paper
- You will have practiced writing a scientific manuscript

Tentative Course Outline

Date	Topic	Lab	Assignment
Sep 5	Course Introduction	Tour of the lab	Online Rat Module
Sep 12	Animal models of brain disorders Behavioural Techniques 1: Tests of incentive motivation	Animal handling training with Kim Kovacsi (90min)	Assigned reading: Animal Use Protocol, Wyvell and Berridge (2001), Schumacher et al., 2016
Sep 19	Animal ethics lecture (David Hanwell, University Vet)	Delayed Matching to Sample Task (DMTS)	Quiz at end of lecture (5%)
Sep 26	Principles of Experimental Design Behavioural Techniques 2: Tests of memory	Delayed Matching to Sample Task (DMTS)	
Oct 3	Presentation guidelines Behavioural Techniques 3: Tests of Anxiety and Locomotion	Delayed Matching to Sample Task (DMTS)	
Oct 10	Reading week - no class!		
Oct 17	Review of behavioural procedures	Water Maze Task, Data from DMTS must be uploaded	Midterm Quiz (20%) in class
Oct 24	Class presentations – research proposal on pharmacological model of schizophrenia	Water Maze Task, DMTS data analysis	Group presentation (15%) in class
Oct 31	Writing Introduction & Methods	Elevated Plus Maze, Sucrose preference Test	
Nov 7	Writing the results		Introduction & Methods (10%), due Nov 12
Nov 14	Writing the discussion	<i>Brain extraction</i>	Results & Figures (10%) due Nov 19,
Nov 21	Stereotaxy Histological Methods		
Nov 28	No class!		Final Paper (20%) due Dec 3

Resources: Lectures slides and PDFs of papers for assigned reading will be posted on the course website by midnight at the latest the night before the lecture.

Enrolment: The online rat module, the animal ethics lecture with the University Veterinary Surgeon and the handling training with the Veterinary Technician are mandatory training requirements by the University for all students working with animals. **Students who have missed these components will not be able to enroll in the course at a later date.**

Scheduling conflict: A web option will not be offered for this course, so it would be your responsibility to ensure that you are able to attend all the lectures. We will not answer emails concerning scheduling conflict.

Evaluation

There is no final exam for this course. Instead, grading will be based on the following components:

1. Animal Ethics Lecture Quiz (5% overall grade) → September 19 in class

Quiz at the end of animal ethics lecture

2. Midterm Quiz (20% overall grade) → October 17 in class

Quiz (MCQ and SAQ) on assigned readings:

Animal Use Protocol; Wyvell and Berridge (2001); Schumacher et al (2016)

3. Group presentation - Literature Review (15% overall grade) → October 24 in class

You will prepare a group presentation (15min + 5min discussion time) in groups of 4, which should include a discussion comparing the validity of two pharmacological models of schizophrenia. Your presentation should cover a literature review of the neurobiology and behavioural consequences of repeated exposure to amphetamine compared to PCP, MK801 or ketamine. References must be drawn predominantly from animal research. You should also be able to identify gaps in research and propose a research proposal (animal research) that is novel and plausible. A brief guideline will be provided on blackboard.

4. Research Paper (40 % overall grade)

Your final paper should be written according to the specific guidelines of the journal

Neuropsychopharmacology: https://images.nature.com/full/nature-assets/npp/npp_gta.pdf. Some brief guidelines are provided below, but you must read the detailed guidelines online and on blackboard. **Submit your final paper to Turnitin on blackboard by December 3rd!**

Introduction & Methods (10%) – due Nov 12

The Introduction should be below 750 words in length. A lengthy review of the topic is discouraged, and the introduction must contain a clear and concise background of the research and a rationale for the study. The Methods section must contain a detailed description of the experimental procedures, and should not exceed 1500 words.

Results and Figures (10%) – due Nov 19

You will run statistical analyses on the data generated from the Delayed Matching to Sample Task, Water Maze tasks, Elevated Plus Maze and Sucrose Preference test, and write up the Results section including statistical analysis of all data collected.

Final Paper (20%) – due Dec 3

The final paper should contain the following sections:

Title Page: This should contain the title of the paper (be creative!), your name, and word counts for the Abstract, Introduction, Methods and Discussion, as well as the number of text pages and Figures (max 5).

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: as above

Discussion: This section should include a discussion of the results conducted in this course.

References

Figure Legends and Figures

5. Lab Performance (20% overall grade)

Attendance will be taken for each lecture/lab, as important information pertaining to the lab work is imparted in each of these classes (5%). Furthermore, you will need to demonstrate responsibility and punctuality in running the behavioural procedures, as you will be part of a tight daily roster (see below). Your performance in all aspects of lab work will be assessed in consultation with Kim Kovacs, and the teaching team (15%).

For all lab work, you will be working closely in groups of 8. We will ask you to get into a group (A-C) in the first week of lecture. Each group will be assigned 8 animals (whose treatment identity will be blind to you) that you will be responsible for throughout the duration of the course. The rats will undertake 4 different behavioural assays, some of which can be completed in a day (Elevated plus maze), while others will require repeated testing across a number of days (Water maze, operant task). All behavioural training must take place between 1pm to 6pm. For behavioural tasks that require repeated training on consecutive days, it is essential that the rats are tested at roughly the same time everyday (i.e., early vs. late afternoon), so it is important that you work out a schedule that will ensure that at least four of you are available for the allocated time slot.

Having said this, **the lab work must be equally distributed amongst the 8 of you**. You are required to take a selfie every day before starting the behavioral work and upload it daily to a google drive that all of your group members as well as the TAs and course instructor can access. Turning up late for your slot will have implications for the rest of the testing schedule, so you must be punctual, at all costs. Also bear in mind that it will take time to weigh and transfer the animals to the testing room from the vivarium, so you must be prepared to come in a little earlier than the allotted time. Just to illustrate the enormity of your undertaking, here is what a week may look like for testing a total of 24 rats on an operant task, or water maze (see Table below). Weekend testing may be necessary.

➤ Signing up for testing slots:

Time for Testing	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday + Sunday
1 - 1:30pm	Group A	Lecture	Group A	Group A	Group A	Testing may sometimes need to be done
1:30 - 2pm						
2 - 2:30pm						
2:30 - 3pm	Group B	Group A	Group B	Group B		
3 - 3:30pm						
3:30 - 4pm	Group C	Group B	Group C	Group C		
4 - 4:30pm						
4:30 - 5pm						
5 - 5:30pm	Group C	Group C	Group C	Group C		
5:30 - 6pm						

Course Policies:

➤ **Online Rat module, Animal Ethic lecture and Animal handling training:**

The completion of the online rat module, the animal ethic lecture quiz and the animal handling training is a mandatory requirement of the University for students working with animals. **Missing the module, lecture, quiz and training will mean that you will not be able to continue in the course!**

➤ **Missed Term Work due to Medical Illness or Emergency:**

All students citing a documented reason for missed term work must bring their documentation to the Psychology Course Coordinator in SW427C **within three (3) business days** of the assignment due date.

You must bring the following:

- (1.) A completed [Request for Missed Term Work form](http://uoft.me/PSY-MTW) (<http://uoft.me/PSY-MTW>), and
- (2.) Appropriate documentation to verify your illness or emergency, as described below.

Appropriate Documentation:

In the case of missed term work due to **illness**, only an **original copy** of the official [UTSC Verification of Illness Form](http://uoft.me/UTSC-Verification-Of-Illness-Form) will be accepted (<http://uoft.me/UTSC-Verification-Of-Illness-Form>). Forms are to be **completed in full**, clearly indicating the start date, anticipated end date, and severity of illness. The physician's registration number and business stamp are required.

In the case of **medical emergency**, an original copy of the record of visitation to a hospital emergency room should be provided

In the case of a **death of a family member**, a copy of a death certificate should be provided.

In the case of a **disability-related** concern, an email communication should be sent directly to the Course Coordinator (psychology-undergraduate@utsc.utoronto.ca) from your Disability Consultant at AccessAbility Services, detailing the accommodations required. The Course Instructor should also be copied on this email.

For U of T **Varsity athletic commitments**, an email communication should be sent directly to the Course Coordinator (psychology-undergraduate@utsc.utoronto.ca) from a coach or varsity administrator, detailing the dates and nature of the commitment. The email should be sent **well in advance** of the missed work.

Documents covering the following situations are **NOT acceptable**: medical prescriptions, anything related to personal travel, weddings/personal/work commitments.

Procedure:

Submit your (1.) [request form](#) and (2.) [medical](#)/other documents in person **within 3 business days** of the missed test or assignment. Forms should be submitted to **SW427C between 9 AM - 4 PM**, Monday through Friday. If you are unable to meet this deadline for some reason, you must contact the Course Coordinator via email (psychology-undergraduate@utsc.utoronto.ca) within the three business day window. Exceptions to the documentation deadline will only be made under exceptional circumstances.

Within approximately one week, you will receive an email response from the Course Instructor / Course Coordinator detailing the accommodations to be made (if any). You are responsible for checking your official U of T email and Blackboard course announcements daily, as accommodations may be time-critical. The Course Instructor reserves the right to decide what accommodations (if any) will be made for the missed work.

Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation.

Note that this policy applies only to missed term work (assignments and midterms). Missed final exams are handled by the Registrar's Office (<http://www.utsc.utoronto.ca/registrar/missing-examination>)

Missed presentation:

A grade of zero will be given if you do not give your presentation on the assigned date. Missed presentations will only be rescheduled provided an official notification comes our way from the Psychology Course Coordinator. You should be prepared to give your presentation at any lecture following the missed date.

Missed exams:

You are expected to make every effort to take the required mid-term. Absence from the mid-term will only be granted for genuine, legitimate reasons, including a documented family emergency, or a documented severe illness. This does not include reasons of scheduling conflict. **There will be one make-up test for the midterm for those who can supply legitimate documents via the official route described below. Exams that are missed without a genuine, legitimate reason will receive a 0% mark.**

Late Assignments:

Late assignments will be accepted with a penalty of **10% per day**, up until the third day after the assignment is due in. All assignments are due by **11.59pm (midnight) on the due date.**

➤ Contesting a grade:

All requests for a re-grade must be submitted **in writing** within three days 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 grad 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 of any of the lecture slides and lecture handouts produced by Dr. Schumacher 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.