Neuroscience laboratory NROC63
University of Toronto Scarborough
Fall 2019

Instructor: Dr Rutsuko Ito

TAs: Dr Sandeep Dhawan
Mr Bilgehan Cavdaroglu

Lectures: Thursday 1pm-3pm, SW316

Lab: UTSC vivarium

Office hours: Friday 1-3pm, SW627

***Website**: Quercus

***E-mail**: nroc63rats@gmail.com

* *Your TAs are your first point of contact for any queries you have. You can also post course/content related questions to relevant Quercus discussion forum for the benefit of other students.*

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), mazes (water maze, elevated plus maze) and other equipment (Open field), 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 two-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 further developed some skills in critically evaluating a scientific paper
- You will have practiced writing a scientific manuscript

TENTATIVE COURSE OUTLINE

Date	Lecture	Lab	Assignment
Sep 5	**Course Introduction**	**Please complete online animal ethics and rat module**	
Sep 12	No lecture this week	**Animal handling training** with Kim Kovacsi (2hrs) Sign up needed for 1 of 5 sessions organized for training	**Assigned reading:** Animal Use Protocol Lab Manual
Sep 19	**Animal models of brain disorders** Behavioural Techniques 1: Tests of Memory	**Delayed Matching To Sample Task (DMTS)- Rm713 16th-2oth**	**Assigned reading:** Lipska & Weinberger 2012
Sep 26	**Principles of Experimental Design** Behavioural Techniques 2: Tests of hedonia	**Delayed Matching To Sample Task -Rm713 23rd-27th**	**Quiz at the beginning of lecture (15%)** on assigned readings and content of Lecture 2 (Animal models of brain disorders)
Oct 3	**Writing the Introduction & Methods** Behavioural Techniques 3: Tests of Anxiety	**Delayed Matching To Sample Task Rm713 30th-Oct 4th**	
Oct 10	**Review of the Behavioural Procedures**	**Social Interaction Test 7-11th Oct Rm TBD**	
Oct 17	**Reading Week**		**Introduction (10%) due 20th October**
Oct 24	**Class presentations – research proposal on pharmacological model of schizophrenia**	**Water Maze Task Rm 616 21st-25th Oct**	**Group Presentation (15%)**
Oct 31	**Writing the Results**	**Water Maze Task Rm 616 28th-1st Nov**	**Methods (10%) due 3rd Nov**
Nov 7	**Results/Statistics workshop**	**Water Maze Task Rm 616 4th-8th Nov**	
Nov 14	**Results/Statistics workshop with Sonny**	**Elevated plus maze & Sucrose Preference Test Rm TBD 11-12th Nov**	**Results & Figures (up to and including water maze data) due (10%) 17th Nov**
Nov 21	**Writing the Discussion**		
Nov 28	**Histological Methods**		**Final paper due 2 Dec (20%)**

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.

Enrolment: The online training module and handling training with the Veterinary Technician is a mandatory training requirement by the University for all students working with animals. *Students who have missed these components will not be able to enrol 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 categories of assignments.

1. **Quiz (15%) – a combination of multiple choice and short answer questions.**

   Quiz on Assigned readings and content from Lecture 2- Animal models of brain disorders:– Sep 26th in class

2. **Group presentation (15%)** – **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 ketamine compared to MK801. 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 Quercus.

3. **Research Paper (50%)**
   Your final paper should be written according to the specific guidelines of the journal Neuropsychopharmacology:
   https://www.nature.com/documents/npp_gta.pdf.
   Some brief guidelines are provided below, but you must read the detailed guidelines online. A copy of the final paper must be submitted to **Turnitin as well as the assignment folder in Quercus by Dec 2nd.**

   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 first two or three assignments, upon which you can improve for the final paper.

   Introduction (10%) – due Oct 20th
   The Introduction should be between 750-1000 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. This assignment will help you prepare for the Group presentations too.

   Methods (10%) – due Nov 3rd
   The Methods section must contain a detailed description of the materials and experimental procedures, and should not exceed 1500 words.

   Results and Figures (10%) - due Nov 17th

You will run statistical analyses on the data generated from the Delayed Matching to Sample Task, Social interaction test and Water Maze tasks, and write up the Results section and provide Figures of all the data collected.

Final Paper (20%) – due Dec 2nd
The final paper should contain the following sections:
Title Page: This should contain the title of the paper (please be creative!), your name, and word counts for the Abstract, Introduction, Methods and Discussion, as well as the number of text pages and Figures.
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 (including EPM and sucrose preference test)** collected.
Discussion: 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.

4. **Lab Performance (20%)**

Attendance will be taken for each lecture, as important information pertaining to the lab work is discussed in each of these classes (2.5%). Furthermore, 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 (15%) will come from your demonstrated responsibility and punctuality in running the behavioural procedures, uploading of the data in google drive, other duties such as laundry and room/apparatus cleaning, as you will be part of a tight daily roster (see below, and manual for details). Your performance in the online training and all aspects of lab work will be assessed in consultation with Kim Kovaszi, and the teaching team.

For all lab work (and presentations), you will be working closely in groups of 6-7. We will ask you to get into a group (A-C, see below) 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 5 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 7am and 7pm. 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., morning or afternoon), so it is important that you work out a schedule that will ensure that at least **two (operant, other maze tasks) or three (water maze)** of you are available for the allocated time slot.

Having said this, **the lab work must be equally distributed amongst the 6-7 of you**.
You are required to take a **'selfie'** before every behavioural session and to upload it daily to a folder in the **course 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). **Collected data must be uploaded into the excel data file in your google drive folder at the end of each testing week to allow monitoring of data by the TAs.**

Time of testing

Time of Testing	Monday	Tuesday	Wednesday	Thursday*	Friday	Saturday + Sunday
11.30-12pm						
12-12.30pm				Group A		
12.30-1pm						
1 - 1:30pm						
1:30 - 2pm	Group A	Group A	Group A	Lecture	Group A	
2 - 2:30pm						
2:30 - 3pm						
3 - 3:30pm	Group B	Group B	Group B		Group B	
3:30 - 4pm				Group B		
4 - 4:30pm						
4:30 - 5pm	Group C	Group C	Group C		Group C	
5 - 5:30pm				Group C		
5:30 - 6pm						

- o ***NO operant testing on 19th and 26th September**

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 of the University for students working with animals. **Missing the module and training will mean that you will not be able to continue in the course. There will be no make up or catch up training available.**

Missed quiz

You are expected to make every effort to take the required quiz. Absence from a quiz will only be granted for genuine, legitimate reasons, including a documented family emergency, or a documented severe illness. **There will be <u>one make-up test session only </u>for those who can supply legitimate documents via the official route described below.** *Quizzes that are missed without a genuine, legitimate reason will receive a 0% mark.*

Missed Term Work due to Medical Illness or Other Emergency:

All students citing a documented reason for missed term work must submit their request for accommodations **within three (3) business days** of the deadline for the missed work.

Students must submit **<u>BOTH</u>** of the following:
- (1.) A completed **Request for Missed Term Work Accommodations form** (http://uoft.me/PSY-MTW), and
- (2.) **Appropriate documentation** to verify your illness or emergency, as described below.

Appropriate documentation:

For missed **TERM TESTS** due to **ILLNESS**:
- Submit the Request for Missed Term Work Accommodations form (http://uoft.me/PSY-MTW), along with an **original** copy of the official UTSC Verification of Illness Form (uoft.me/UTSC-Verification-Of-Illness-Form) or an **original** copy of the record of visitation to a hospital emergency room.   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.
- Note: If an end date of "ongoing" is specified, the medical note will be assumed to cover a period of two weeks. If no end date / an "unknown" end date is specified, the note will be assumed to cover a period of three business days (starting from illness start date.)

For missed **TERM TESTS** due to **ACCESSABILITY REASONS**:
- Meet with your **AccessAbility consultant** and have them email Keely (keely.hicks@utoronto.ca) detailing the accommodations required.

For missed **ASSIGNMENTS** due to **ILLNESS**:
- Submit the Request for Missed Term Work Accommodations form (http://uoft.me/PSY-MTW), along with a **hardcopy** of the Self-Declaration of Student Illness Form (uoft.me/PSY-self-declare-form).

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), submit the Request for Missed Term Work Accommodations form (http://uoft.me/PSY-MTW) and attach a copy of your letter. **Specify how many days extension you are requesting** on the request form.
- 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) you will need to meet with your **AccessAbility consultant** and have them email Keely (keely.hicks@utoronto.ca) detailing the accommodations required.

For missed term tests or assignments in **OTHER CIRCUMSTANCES**:
   Submit the Request for Missed Term Work Accommodations form (http://uoft.me/PSY-MTW), along with:
- In the case of a **death of a family member or friend**, please provide a copy of a death certificate.
- For U of T varsity-level or professional **athletic commitments**, an email from your coach or varsity administrator should be sent directly to Keely Hicks (keely.hicks@utoronto.ca) **well in advance** of the missed work, detailing the dates and nature of the commitment.
- For **religious accommodations**, please email (keely.hicks@utoronto.ca) **well in advance** of the missed work.
- For circumstances **outside of these guidelines**, please email Keely (keely.hicks@utoronto.ca) on or before the date of the test / assignment deadline to describe your circumstances and ask what documentation would be appropriate

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

Procedure:

Submit your (1.) request form and (2.) medical/self-declaration/other documents in person **WITHIN 3 BUSINESS DAYS** of the missed term test or assignment.

Submit to: Keely Hicks, Room SW420B, Monday – Friday, 9 AM – 4 PM. (Slide forms under door if out of office.)

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. If your original medical note / documentation included the date of the make-up midterm, then only the Request form is required. If the date of the make-up midterm fell outside of the dates indicated on your original medical note/other documentation, then a new medical note/other appropriate documentation must also be submitted.

Importance of Three Business Day window:

If you are unable to submit your documents in-person within the three business day window, **you must email Keely** (keely.hicks@utoronto.ca) **within the three business day window** to explain when you will be able to bring your documents in person. Exceptions to the documentation deadline will only be made under **exceptional circumstances**. Attach scans of your documentation, and be prepared to bring your documents to Keely in-person as soon as you are well. Late documents may not be accepted.

NOTE: Assignments due at end of term

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.utsc.utoronto.ca/registrar/term-work).

NOTE: Final Exams

This policy applies only to missed assignments and term tests. Missed final exams are handled by the Registrar's Office (http://www.utsc.utoronto.ca/registrar/missing-examination).

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 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 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 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 <u>must</u> keep a draft of your work and any notes you made before you got help and <u>be prepared to give it to your instructor on request.</u>

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.