Psychology
UNIVERSITY OF TORONTO
SCARBOROUGH

NROC36: Molecular Neuroscience

Winter 2024 Syllabus

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Instructor Information

Debra Bercovici (she/her)

Email: d.bercovici@utoronto.ca
- Please put course code (NROC36) in the subject line for prioritized responding
- Replies within ~24 business day hours.

Office Hours:
- One-on-one
- By appointment
- Book via my Calendly page
- Access my Zoom office

I'm available to discuss course content, address concerns about the course or your UTSC experience, talk about grad school and non-academic career paths, and find ways to connect you with resources to better support you as a student.

TA Information

Hanista Premachandran (she/her)
What are they responsible for?
- Grading discussion submissions
- Email: hanista.premachandran@mail.utoronto.ca

Kylie Lau (she/her)
What are they responsible for?
- Grading exams
- Email: kylie.lau@mail.utoronto.ca

Course Description

This course will provide students with a thorough background in the molecular and cellular mechanisms underlying neuronal communication in the central nervous system. We will start with the building blocks of synaptic communication, by learning about intracellular signalling, modulation of neuronal DNA and protein expression, and neurotransmitter systems. We will then use this knowledge to understand the specific molecular and cellular steps necessary for enabling neuronal communication. This will serve as a base for our understanding of how these mechanisms can be used in the brain to encode information in the form of synaptic plasticity in learning and memory. We will further examine how these same mechanisms are altered in neurodivergent populations with varying cognitive and emotional functioning.

Learning Objectives

By the end of this course, I hope that you're able to:

1. Understand the core principles underlying synaptic communication and how these mechanisms contribute to synaptic plasticity and learning.

2. Draw conclusions about concepts in molecular neuroscience based on reading and evaluating primary literature.
3. Apply molecular and cellular experimental tools and methods to address research questions in the field of molecular neuroscience.
4. Synthesize findings through various scientific communication skills: in-class discussions, written assignments, and short-answer questions.
5. Evaluate experimental design, analysis, and data interpretation of studies within the field of molecular neuroscience.

Course Logistics

Class Meetings

You are invited to attend and contribute to classes on Wednesdays from 9-11 am (classroom details on Quercus). If you cannot attend in person (e.g., you are sick), a Zoom option is available. You can access the weekly Zoom classroom by going to the Zoom Tab on Quercus.

Since I will be recording our lectures on Zoom, your classroom participation will also be recorded and will be available to students in the course for viewing remotely. Course videos and materials belong to your instructor/University and are protected by copyright. You are permitted to download lecture recordings and materials for your own *academic* use, but you are not permitted to copy, share, or use them for any other purpose without the explicit permission of the instructor.

Small-group Discussions:

To enhance your learning experience and increase classroom accessibility, you are invited to contribute to the weekly **discussion boards** (link found in each weekly module). Discussion boards are available 1 week before class and posting will be closed at the end of class (11 am). We will be using this tool ***during*** class to promote small-group (~3-4 people) discussions. You have the choice to complete the discussion questions alone if you wish, however, this is not recommended. Our course is designed to be heavily application-based (see learning objectives) and your discussion contributions will be graded based on the accompanying rubric. Importantly, these in-class discussions serve as practice for exams and assignments. *No additional practice questions will be given out*.

Quercus Modules:

You can find each weekly module on Quercus. At the top, there is a Student Resource tab with links to various campus supports available. Subsequent weekly modules contain the **required readings** and any **assignments/discussions** for each given week. Looking at the weekly module ahead of class time is recommended for optimal planning, keeping up with the material, and taking note of upcoming deadlines, administrative updates, and helpful links.

The module page is also where you will find the base of the weekly lecture content. In addition, you will have access to lecture recordings and lecture transcripts immediately after class has ended through the Zoom Tab. The uploaded content is already fairly comprehensive. My

intention is to support students who benefit from having note-taking accommodations. *However, this content does not include answers to in-class discussion work.*

All weekly content is available at least one week prior to each class.

Course Readings:
Each week you will be assigned **1 required journal article to read *before* class**. You will need to be familiar with the article to effectively participate in the class discussions. The articles can be found in the weekly Quercus modules. In addition, you may choose to supplement the lecture with recommended textbook readings. You can find the relevant chapters in the course schedule below. Textbooks are available online through the UofT Library. The relevant chapters have also already been uploaded to the respective weekly modules.

All supplemental readings come from:

MTN: Byrne, Heidelberger, & Waxham (2014). *From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience* (3rd Edition.). Elsevier. http://www.sciencedirect.com.myaccess.library.utoronto.ca/science/book/9780123971791

PON: Kandel & Schwartz (2012). *Principles of Neural Science* (5th Edition). McGraw-Hill. https://ebookcentral-proquest-com.myaccess.library.utoronto.ca/lib/utoronto/detail.action?pq-origsite=primo&docID=4959346

Course Schedule:

Week	Date	Topic	Required Reading	Optional Reading
1	Jan 10	Introduction	Palmer (2007)	N/A
2	Jan 17	Protein synthesis: Transcription and Transcription Factors	Flexner et al. (1963)	MTN Ch 5
3	**Jan 24**	***ZOOM CLASS* Protein synthesis: Epigenetics and Translation**	**Strekalova et al. (2003)**	**MTN Ch 5**
4	Jan 31	Neurotransmitter Synthesis and Removal	Ansorge et al. (2004)	MTN Ch 7
5	Feb 7	MIDTERM I		
6	Feb 14	Neurotransmitter Release	Feng et al. (2001)	MTN Ch 15
	Feb 21	READING WEEK		
7	Feb 28	Neurotransmitter Binding	Levin (2002)	MTN Ch 10; PON Ch 11
8	Mar 6	Molecular Basis of Implicit Memory	Bourtchuladze et al. (1994)	PON Ch 66
9	Mar 13	MIDTERM II		
10	Mar 20	Molecular Basis of Synaptic Plasticity I	Nabavi et al. (2014)	PON Ch 67
11	Mar 27	Molecular Basis of Synaptic Plasticity II	Han et al. (2007)	MTN Ch 18
12	Apr 3	Atypical Molecular Mechanisms	N/A	MTN Ch 21
	TBD	FINAL EXAM		

Evaluation Scheme

For a detailed description of each graded component, please click on an individual item to go to the associated page on Quercus.

- Discussion submissions (15%)
- Midterm I (25%)
  - In-class exam
  - Alternate take-home format
- Midterm II (25%)
  - In-class exam
  - Alternate take-home format
- Final Exam (35%)

Submitting work

Discussion submissions are intended to be in-class posts on the weekly Quercus discussion boards. Your group is required to submit responses to the discussion prompts by the end of each class (11 am). Discussion boards open one week in advance and asynchronous contributions are permitted for students who are unable to attend class live.

In-class exams are 1.5 hour closed-book paper/pen exams during class time except for the final exam, which is scheduled by the university and is 2 hours long. These exams are made up of short-answer questions. If you choose to write your exams in pencil, you will not be able to request a regrade if needed. For this reason, **I strongly advise writing in pen**.

If you miss your in-person exam for any reason, you will automatically be expected to complete the alternate take-home exam.

Alternate format exams are take-home exams. Instead of writing the in-person midterms, you have the choice to complete the at-home exam. These exams are APA-formatted essays. You will have a 24-hour window from the time you open the exam to submit. **The take-home exams are available on Quercus from Thursday to Sunday during the weeks of the in-class midterm**.

All deadlines have been input into Quercus and should automatically appear in your Quercus calendars. If we do not have an arrangement, late/missed work will not be accepted and will receive a score of 0%. Please see the Accessibility section of this syllabus for more information.

Departmental Position on Grade Norms

The Department of Psychology at UTSC is committed to providing fair, consistent, and uniform delivery of its courses from year to year. As part of this commitment, the Department mandates that all C-level courses' final course averages are around 72%. **You can expect that the final class average for this course will be ~72%.**

Our Classroom Community

Inclusivity, Belonging, and Safe Classrooms

Our classroom is a community where students should feel included and are treated equitably. This refers to identities including, but not limited to, gender identity, gender expression, sex, race, ethnicity, socioeconomic background, sexual orientation, political and religious affiliation, disability, neurodivergence, health, and age. If controversial and/or sensitive issues arise, discussion is encouraged. However, students should feel safe to explore ideas without fear of being judged. If a statement or behaviour is likely to offend/alienate/discriminate against others, it should not be shared with the class. Instead, please share it with me after class or during office hours. Any behaviour that compromises the safety of our environment or the belonging of a community member will not be tolerated, and you will be asked to leave the space (Zoom or in-person). If at any point during the semester you feel offended, threatened, or alienated by anything that happens during our class (including by me or a TA), please feel welcome to let me know.

One thing to keep in mind is that we are bound to make mistakes in this space, as does anyone when approaching complex topics. Strive to see your mistakes and others' as valuable elements of the learning process. I am also constantly learning from my mistakes.

A note on masking: I view masking as an example of accessibility, inclusivity, and classroom safety. While it is not a requirement, I encourage wearing a mask in class.

Accessibility

If you have accessibility needs, you are welcome in our classroom community. Here are some ways I am committed to increasing classroom accessibility:

- Offering online and asynchronous ways of engaging with the course.
- Wearing a mask during all student interactions.
- Accommodating flexibility around missed exams.
- Upholding classroom safety.
- Creating unambiguous instructions/expectations and grading rubrics.
- Sharing classroom content ahead of lectures.
- Honouring accommodations for all students, regardless of diagnosis, disability status, or affiliation with AccessAbility Services.
- Virtual one-on-one office hours are available on most days of the week with a flexible online booking system.

Seeking accommodations for your needs shouldn't be burdensome. **Accessibility and flexibility are directly built into the course and are available when needs arise. However, if you require an accommodation that is not automatically available to you, please contact me as soon as possible to work out a suitable arrangement.** You can reach out to me at the start of the semester and as needs arise/change, expected or unexpected. There is no expectation to

divulge personal health information. I will advocate for you if you have a need that isn't being met.

Additionally, if there is anything else you can think of that would make this course more accessible to you and your peers, please let me know!

Academic Integrity

Academic integrity is what all members of the UTSC community, from first-year undergraduates to publishing professors, aspire to when they do research. Having academic integrity means taking responsibility for and having pride in your work, especially when it connects through practices such as crediting the work of others.

Having strong academic integrity is a qualifying behaviour that welcomes you as a scholar to the academic community.

Academic Integrity is about being loyal and respectful to those who have created content and about encouraging you to create work independently that you can feel proud of. Working with academic integrity means:

- **Doing your own work**: everything you submit should be completed by you.
- **Avoiding collusion**: this involves working too closely with your peers without authorization.
- **Not sharing materials** provided to you in this course. Please respect the copyright surrounding the work I've put in to offer you this course. If you'd like to share the content I've created, please speak with me first.
- **Engaging** with the ideas of others, both past and present, in a variety of scholarly platforms such as research journals, books by academics, lectures, etc. But also…
- **Explicitly acknowledging** the sources of your knowledge, especially through accurate citation practices

As members of our learning community, I want to invite you to spend some time thinking about what academic integrity means to you. What behaviours can you and your classmates engage in to make sure you are achieving your learning objectives and that your work is something you can be proud to represent.

If you are at risk of breaching academic integrity due to external and extenuating circumstances or a lack of accessibility, please come talk to me about how we can make the classroom a place where these coping mechanisms aren't necessary.

University Code of Behaviour on Academic Matters

If there is a breach of academic integrity, you may face consequences as per the university policy. The Code of Behaviour on Academic Matters outlines what constitutes academic dishonesty, and the processes U of T takes for addressing academic offences.

My Teaching Values

Transparency

My intention is never to conceal my motives. If something is unclear, that's my mistake. Please point it out and I'll clarify. Your success in our class should not depend on your ability to "read between the lines" or correctly guess/assume what I am (or the university is) asking of you.

Non-hierarchical learning

I don't like to pretend that I am the expert. I may know more about certain topics than you, but I am confident that in other domains, you hold more knowledge and experience than I do. I invite you to share when I've said something wrong or when you have a better idea than me.

Student/Community-driven learning

If something I'm doing isn't conducive to your learning, I'm open to altering course. You are the ones paying for this education, and you deserve to learn in a way that is best for you.

Acknowledgement of Traditional Land

The University of Toronto is located on land belonging to the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. The Scarborough campus is also located on land belonging to the Anichnabeg, the Chippewa, and the Haudenosaunee peoples. In addition to settling on stolen traditional and ancestral land, we are occupying it for the purpose of participating in an educational system that was built on and continues to uphold colonial frameworks.

Many non-Indigenous folks have settled on this land for comfort, safety, and opportunity. This is especially true for non-Indigenous people of colour like me. It is important to me that I reflect on how being here offers me certain privileges and opportunities, like being a member of a world-renowned university, that come at the expense of the Indigenous communities we perpetually displace and exclude. I invite you to reflect on your own positionality and what it means for you to be on this land.

To learn more about the land which we are occupying, as well as about land acknowledgements, visit Native Land.ca

If you have ideas on how we can incorporate Indigenous ways of knowing into our classroom, I would be eager to learn.