

# Neuroanatomy Laboratory Syllabus (tentative)

## NROB60H3 Summer 2022

Professor/Lecturer: Dr. Janelle LeBoutillier  
Office Hours: By appointment before and after lecture  
Course E-mail: [nrob60.utsc@gmail.com](mailto:nrob60.utsc@gmail.com)

Textbook: **Neuroscience: Exploring the Brain. 4<sup>th</sup> edition by Bear, Connors and Paradiso.** We will be covering the first 7 chapters and the appendix in this text. Several options are available to purchase the text (e.g., you may purchase an electronic version of the required chapter readings through the bookstore: ISBN number to be confirmed). Used copies should also be available through different sources.

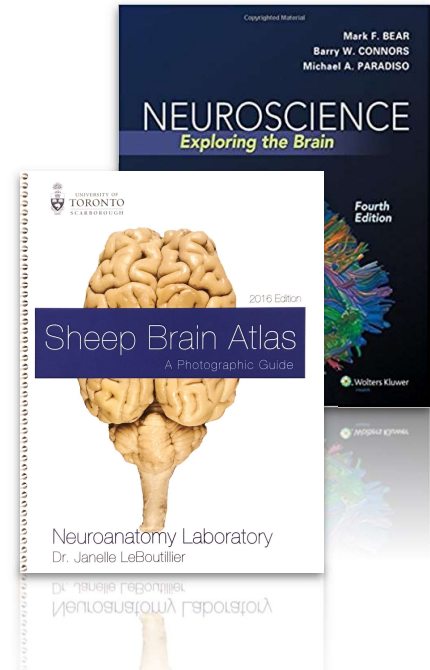
Lab Text: Sheep Brain Atlas: A Photographic Guide, 2022 Edition. Posted online and printed copies can be ordered through the bookstore.

Course Material: **Quercus (<https://q.utoronto.ca/>)** Please monitor the home page announcements for course updates regularly.

Lectures: **Mon 11:00 AM to 1:00 PM in MW160**  
**Notice of video recording and sharing (Download and re-use prohibited)**<sup>[1][SEP]</sup>  
Lectures, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor.

The aim is to have recordings available in Kaltura Media Gallery in Quercus within 24 hours.



Labs: You are expected to attend your scheduled lab section each week.  
Any lab section changes must be made through ACORN/ROSI.  
Labs start Monday May 9 and are conducted in SW237.

### **COURSE DESCRIPTION:**

Neuroscience is the scientific study of nervous systems. It is the study of the nature and functioning of the nervous system at all levels, from the molecules that make up individual nerve cells and the transfer of information from one nerve cell to another, to the complexities of how thoughts, emotions, and behaviours are produced.

Neuroscience is at the interface between biology and psychology. It is unique in that it makes use of a variety of methods and investigations from a wide range of traditional disciplines. To understand the nervous system and how it works requires knowledge of anatomy, molecular biology, biochemistry, pathology, physiology, pharmacology, psychology and zoology.

The lecture part of this course deals with the anatomy of the nervous system. In this component, you will learn about the anatomy of the brain, as well as the structure and function of the cells of the nervous system. You will also develop an understanding of how neurons communicate, with a focus on their physiological properties. We will examine specific brain regions which you will also identify in the lab component of this course and discuss their functions and connections.

Learning neuroanatomy is like learning both a new language and a map of a new world, so be patient, practice the nomenclature, and your hard work will be rewarded. Weekly lab sessions will cover gross and systems anatomy of the nervous system. Students will dissect sheep brains to examine a wide variety of nervous system structures in 3D. Basic dissecting equipment will be provided, but if you plan to continue in other science labs you may wish to purchase a dissecting kit. Lab coats are required to be worn at all times when in the lab and safety glasses are also required for the dissections. Disposable gloves will be provided. Proper safety procedures, as discussed within the first lab must be followed at all times.

Altogether, this course lays the framework for understanding subsequent neuroscience courses. We will begin to understand how the activity of even small groups of neurons can lead to the activity of circuits specialized for all our sensations, movements, specific goal-directed behaviours, emotions, and ultimately, we hope, cognition.

### Learning Outcomes:

By the end of the course students should be able to:

1. Demonstrate a basic understanding of the techniques used to investigate morphology and connections of neurons to provide the basis for further research into the nervous system
2. Understand the structural features that make neurons and their supporting cells unique, emphasizing the correlation of structure and function.
3. Summarize the topography and structural organization of the brain, reinforced through laboratory exercises.

4. Explain the essential chemical, physical and molecular properties that enable neurons to conduct electrical signals.
5. Describe specific neurotransmitter chemistry and transmitter-gated channels and receptors.
6. Demonstrate the ability to work effectively and respectfully with peers in the laboratory and when providing and responding to constructive feedback.

#### GRADING SCHEME:

#### Lecture Component – Total 46%

##### *Midterm Test (13%)*

- TBA by Registrar's Office (45 minutes)
- Tests lecture material and textbook chapters 1, 2, 3, plus the content of chapter 7 + Appendix that has been covered in lecture to date.

##### *Final Exam (33%)*

- Held during final exam period (100 minutes); date TBA by Registrar's Office.
- The final exam is cumulative on all content covered and assigned during the lectures. More emphasis will be placed on content covered since the midterm test.

*Note: Lecture tests may include multiple choice, short answer, diagrams/labelling, and matching questions. Dates for the midterm test and the final exam will be assigned by the Office of the Registrar. When this information is available it will be posted to Quercus. All tests/exams are planned for in-person.*

#### Lab Component – Total 54%

##### *Midterm Bell Ringer Test (15%)*

##### *Final Bell Ringer Test (25%)*

##### *Cranial Nerves Assignment (5%)*

##### *Written Bell Ringer Test (5%)*

##### *Dissection Protocol Quizzes (4%)*

##### *Bonus Lab Participation Marks (up to 2%)*

#### COURSE SCHEDULE:

#### LECTURE SCHEDULE:

The topics and readings **highlighted in yellow** will be included on your first lecture midterm exam. You are responsible for all content in the assigned text readings, unless otherwise noted during lectures.

WEEK	DATE	TOPIC	CHAPTER(S)
1	May 9	<b>Course Introduction</b>	Ch 1

		<i>Neuroscience: Past, Present and Future</i>	
2	May 16	<b>Structure of the Nervous System</b> <i>Gross Organization</i> <i>Anatomical References</i> <i>CNS/PNS</i> <i>Video</i>	Ch 7 (partial) and Appendix (partial)
3	May 30	<b>Development of the Nervous System</b> <i>Meninges</i> <i>BBB &amp; Ventricular system</i> <i>Cranial nerves</i>	Ch 7 (partial) and Appendix (partial)
4	June 6	<b>Cortical Function &amp; Brain Cells</b> <i>The prototypical neuron</i> <i>Glia</i>	Ch 7 (partial) and Appendix (partial) Ch 2
5	June 13	<b>Resting Membrane Potential</b>	Ch 3
6	June 20	<b>Midterm Requested (TBA)</b> Lab Test Tentative June 20 during lecture	
		<b>Reading Week June 21-25. No Classes</b>	
7	June 27	<b>Action Potential</b>	Ch 4
8	July 4	<b>Principals of Synaptic Integration and Chemical Synaptic Transmission</b>	Ch 5
9	July 11	<b>Neurotransmitter Systems</b> <i>Cholinergic neurons</i> <i>Catecholamine neurons</i> <i>Dopaminergic neurons</i>	Ch 6
10	July 18	<b>Hippocampus</b>	7 and Appendix
11	July 25	<b>Cerebellum &amp; Basal Ganglia</b>	7 and Appendix
12	Aug 8	<b>Tying it all Together</b>	7 and Appendix

**LABORATORY COMPONENT:**

The lab schedule will be discussed in the first week of labs which start the week of May 9. Any changes in your assigned lab section may only be made through ROSI/ACORN. The instructor and TAs cannot make such changes.

Colour or black and white printed copies of the *Sheep Brain Atlas: A Photographic Guide* will be available for purchase through the bookstore (**the 2022 edition of the atlas is required**).

During the lab, students are required to wear a lab coat at all times, wear closed toed shoes and to follow all lab rules and regulations, which will be discussed at your first lab. You will not be permitted to attend labs if you do not adhere to these rules. Safety goggles are recommended and as per the current UTSC guidelines masks are required.

### **Bellringer Test Format**

Your TA will give a demonstration of the bellringer format during the first lab. In brief, specimen samples will be set up in dissection trays with 2 neuroanatomical structures pinned per tray. You will be given **1 minute** to identify both pins at each tray. Practice bellringers will be set up during most labs.

Monitor Quercus regularly for announcements. Dates and times of lab tests will be confirmed via Quercus.

- The midterm bellringer will cover all content **highlighted in purple** on the lab schedule and will consist of 15 dissecting trays with 2 pins each.
- The final bellringer test will consist of 25 trays with 2 pins each and will be ***cumulative on all lab content (Photoseries 1-6)***.

The use of cell phones and computers will not be permitted during bellringer tests. All you will need to complete your lab test is a pen and your lab coat. Specific details regarding the bell ringer will be posted to Quercus. Students may bring an 11 x 14 cm paper with them to the midterm lab and final lab exam with a list of anatomical terms **only** on one side of the paper. This can be used to help you with the spelling of any terms you find difficult. You should write your name on the other side of the paper and turn it in at the end of the test.

### **Written Bell Ringer Test**

This test will be based on the content of PS 5 and 6 only and will be held in Week 8.

### **Dissection Protocol Quizzes**

Quizzes will be given at the start of some labs, with a total of 6 administered over the term. Quizzes will be given in **Week 2, 3, 4, 6, 7 and 9**. These will be based on the study guides for the weekly lab and the dissection videos for each lab with the exception of the Week 9 quiz. Week 9 will be based on PS6. The purpose of these quizzes is to encourage you to be prepared for the weekly labs and keep up with the term work. There will be no lab quiz during the first lab. There are no make-up quizzes. Only your best 4 quiz grades will count.

### **Bonus Lab Participation Marks**

You can earn up to 2% bonus marks in the lab. Explained below are 3 options to earn these 2 bonus marks.

Up to 2% can be achieved by full attendance and full participation in the 2 review labs. These labs will be held in the week before your mid-term bellringer test (maximum 1% in Week 5) and your final bellringer test (maximum 1% in Week 9). These are bonus marks and there will be no make ups to receive these points if you miss either lab. These marks are offered as incentive for you to participate fully in the review session with the goal of improving you performance on the actual tests.

Up to 1% can be earned by participating in 2 “Need help, Get help, Have help, Share Help” sessions. For credit in this activity you must work with a person other than you regular lab partner. The goal is to share knowledge with your peers and learn from each other. During our labs, each of you will find some structures more challenging to learn and remember than others. In these informal sessions that can be conducted during the labs at any time you will share how you remember structures with another person. You are responsible for keeping a list of the labs and persons you worked with for this credit to demonstrate you have completed the assignment.

### **Cranial Nerve Assignment**

Each student shall prepare and submit to Quercus a test question on cranial nerves. You should assume that you are a clinician and an individual has presented to you with a nerve problem that you need to diagnose based on the information discussed with you at their appointment. You may be as creative as you wish in designing your scenario but should include damage to 2 nerves in the answer.

An example... Your patient was away on a summer canoe trip and fell while on a portage. Upon recovery she noticed she had difficulty with her balance when walking. In addition, she continues to experience a brief but excruciating pain at the base of the tongue that radiates toward the neck. The pain is intermittent but often occurs after eating and swallowing. With these problems which nerves could contribute to these behavioural outcomes.

Answer: Vestibulocochlear and Glossopharyngeal nerves

Only the course instructor will be grading this assignment. For full credit on this assignment you must 1. submit your first draft of the cranial nerve on time, 2. provide feedback for your 2 peer-reviewed cranial nerve assignments and comment on the difficulty of each question by the due date, and 3. submit a well written cranial nerve question through Ouriginal by the due date. Be sure to review the details below before submitting your assignment.

- 1.** Your cranial nerve assignment is due no later than **June 6 at 9 am.** Submit this on Quercus to the column labelled “Draft Cranial nerve”. **Do not include your answer at this time.**
- 2.** On June 6 you will randomly be assigned 2 cranial nerve assignments to peer review. For each nerve assignment you receive you should 1. indicate the nerves involved based on the information provided in the question 2. rate each question as to its difficulty using a likert scale (1 = very easy, 5 = very difficult) 3. provide brief feedback to the author. For example, if you found any part of the nerve question confusing this should be shared with the author and constructive suggestions on how to improve the question should be provided. If the question is well written you can also share this with the author. You will be evaluated

on the feedback you provide but your comments do not impact the mark of the author. The feedback on your 2 nerve questions is due no later than June 13 at 9 am.

- Students should submit their final nerve question and answer through Ouriginal on Quercus no later than June 20 at 9 am. Note, you do not need to take any extra steps to use Ouriginal. Submit this to the column in the gradebook marked “Final Cranial Nerve”. Students may elect to use or not use any of the feedback received by their peers to in their final submission. **Remember to include your answer with the question for this submission.** Also include a value from the likert scale above indicating the level of difficulty you rate your questions as. Please note, the dates highlighted in yellow are the deadlines to submit your assignment without penalty. You will have the information to complete these assignments ahead of these deadlines and are encouraged to do so as it the final nerve assignment will be due around the time when many tests are typically held in courses mid way through the semester. Be mindful to manage your time well.

### LAB SCHEDULE:

The content **highlighted in purple** in the following table will be included on your midterm bellringer lab test. The final bellringer test is cumulative, testing the content of Photoseries 1-6. You are responsible for knowing all neuroanatomical structures as presented in the Sheep Brain Atlas: A Photographic Guide, 2022 edition. Note: there will be a short lab in Week 6 following the bellringer test. Details will be posted on Quercus.

LAB DATE	TOPIC	PHOTOSERIES
Week 1: May 9	<ol style="list-style-type: none"> <li>Lab rules</li> <li>Basic Terminology</li> <li>Demo of lab test format</li> <li>Gross Anatomy</li> <li>Removal of Meninges</li> <li>Major sulci and gyri</li> </ol>	1
Week 2: May 16	<ol style="list-style-type: none"> <li>Ventral surface structures</li> <li>Cranial nerves and functions</li> </ol>	1 and 2
Week 3: May 30	<ol style="list-style-type: none"> <li>Mid-sagittal sectioning</li> <li>Identification of mid-sagittal structures</li> </ol>	3
Week 4: June 6	<ol style="list-style-type: none"> <li>Dorsal and lateral dissections</li> <li>Hippocampal dissection</li> </ol>	4
Week 5: June 13	Review and Practice Quiz	1,2,3,4

<b>Week 6: June 20</b>	<b>Lab Test (June 20 during lecture time)</b>	
June 21-25	READING WEEK No labs	
Week 7 June 27	1. Identification of Horizontal Structures	5
Week 8: July 4	1. Rostral coronal sections 2. Caudal coronal sections 3. Bell ringer test returned	6
Week 9: July 11	1. Cerebellar coronal sections 2. Written Bell Ringer Test	All
Week 10: July 18	Practice Bell Ringer test	All
Week 11: July 25	Lab Test (Tentative July 25 during lecture time) Details to be posted to Quercus	
Week 12: Aug 8	1. Pick-up Lab Test 2. Confirm final lab grade 3. Office hours for final lecture exam	

**IMPORTANT POLICY NOTES:**

**Department of Psychology Missed Term Work Policy, SUMMER 2022**

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

Note:

- 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.
- Instructors cannot accept term work any later than five business days after the last day of class. Beyond this date, accommodations are only possible via the Registrar's Office petition process.

The email address to submit missed term work accommodation requests in NROB60 is:  
**nrob60.utsc@gmail.com**

**ILLNESS OR EMERGENCY accommodations:**



For missed work due to ILLNESS OR EMERGENCY, complete the following process:

1. Complete the Request for Missed Term Work Accommodations Form.
2. Declare your absence on ACORN (Profile & Settings > Absence Declaration)
3. Email **both** of the following items to the course email **WITHIN 2 BUSINESS DAYS** of the missed work:
  - the Request for Missed Term Work Accommodations Form
  - \*AND\***
  - a screenshot of your Self-Declared Absence on ACORN

Note:

- *If you are unable to submit your request within 2 business days, you must still email your instructor within the 2 business day window to explain the nature of the delay. Exceptions to the 2 business day deadline will only be made under exceptional circumstances.*
- *If your absence is declared on ACORN, we do not require any additional supporting documentation (e.g. medical notes) to support your missed term work accommodation request.*

**ACADEMIC CONFLICT accommodations:**

For missed term work due to an ACADEMIC CONFLICT (e.g. two midterms at the same time):

1. Complete the Request for Missed Term Work Accommodations Form.
2. Take screenshots of your course Quercus pages that demonstrate the conflict.
3. Email the form and screenshots to the course email **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. Requests sent after the activity deadline may not be accommodated.

Note:

- *Multiple assignments due on the same day are not considered conflicts. Students are expected to manage their time effectively to meet assignment deadlines.*
- *Back-to-back tests/quizzes are not considered conflicts. Only overlapping activities are conflicts.*
- *Students are responsible for keeping their course timetables conflict-free. Students who register in two courses with overlapping lecture/tutorial/lab schedules will not be accommodated.*

**RELIGIOUS CONFLICT accommodations:**

For missed term work due to a RELIGIOUS CONFLICT:

1. Complete the Request for Missed Term Work Accommodations Form.
2. Email the form to the course email **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. Requests sent after the activity deadline may not be accommodated.

**ACCESSABILITY SERVICES accommodations:**

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

- **Contact your AccessAbility consultant** and have them email the course email detailing accommodations required.

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

- If your desired accommodation is **within the scope** of your Accommodation Letter (e.g. your letter includes “extensions of up to 7 days” and you need 3 days):
  1. Complete the Request for Missed Term Work Accommodations Form.

2. Email the form **\*AND\*** your **Accommodation Letter** to the course email specifying how many days extension you are requesting.
- If your desired accommodation is **outside the scope** of your Accommodation Letter (e.g. 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 the course email detailing the accommodations required.

### **Accommodation Procedure:**

After submitting your documentation, you will receive a response from your instructor or TA. This form does not guarantee that you will be accommodated. 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. **You are responsible for checking your official U of T email and Quercus course announcements daily**, as accommodations may be time-critical.

For missed assignments, **do not wait for the instructor’s response to resume work on your assignment**. Extensions may be as short as one business day, depending on the nature of the illness/emergency. Complete your assignment as soon as you’re able, and email it to your instructor.

For an **anticipated absence** (e.g. a scheduled surgery or an illness with a prolonged recovery period), if you would like to request accommodations in advance, submit a Verification of Illness Form completed by your doctor AND the Request for Missed Term Work Accommodations Form to the course email. Absences can be declared up to 14 days into the future on ACORN.

### **Missed Accommodations**

If an accommodation is granted but a continued illness/emergency prevents you from meeting its requirements, you must repeat the missed term work procedure to request additional accommodations. **Please make it clear in your subject line that you are requesting a second accommodation**. E.g. If you are given an extension but are still sick and need more time, or if you miss a make-up term test, you must submit *another* Request for Missed Term Work Accommodations Form and declare your extended absence on ACORN. \*Note: In the case of a missed make-up test, an opportunity to write a second make-up test may not necessarily be provided.

***If the procedure outlined above is followed, the instructor may permit the following accommodations:***

#### **Missed Midterm Lecture Test**

There will be no make-up test. Your final lecture exam will be cumulative and count for 46% of your final grade in the course instead of 33%.

#### **Missed Midterm Bell Ringer Lab Test**

There will be no make-up test. Your final lab test will be valued at 40%.

#### **Missed Written Bell Ringer Test**

There will be no make-up test. The value of this quiz will be added to your final bell ringer ie: Your final bell ringer test will be valued at 30% instead of 25% of your final grade in the course.

### **Missed Final Bell Ringer Lab Test**

A make-up test will be scheduled. Make-up tests may not follow the same format. The date and time of the make-up test will be posted to Quercus and will be conducted in Week 12. Your final Bellringer will be valued at 25% of your final grade in the course.

### **Missed Dissection Protocol Quizzes**

- There are no make-up quizzes. If you miss a quiz for any reason or arrive late to the lab a mark of zero will be assigned. The goal of these quizzes is to encourage you to be prepared for the weekly lab. You may only write the quiz in your assigned lab. All quizzes will be given at the start of the lab. Only your best 4 of 6 quiz marks will count towards your final grade in the course.

### **Missed Bonus Marks**

There are no make ups for missed bonus marks. Options are available to earn this extra credit in 3 ways during the term.

### **General information which you should be aware of:**

The University of Toronto is dedicated to fostering an academic community in which the learning and scholarship of every member may flourish, with vigilant protection for individual human rights, and a resolute commitment to the principles of equal opportunity, equity and justice.

### **AccessAbility:**

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 Office as soon as possible.

AccessAbility Services staff (located in Rm AA142, Arts and Administration Building) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. Please contact 416-287-7560 or email [ability.utsc@utoronto.ca](mailto:ability.utsc@utoronto.ca) for more information. 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.