

# Cellular Neuroscience Syllabus

## Department of Psychology and Neuroscience

### NESC / PHYL / PSYO 2570 Fall 2023

*Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledges held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.*

*Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.*

### Course Instructors

**Instructors:** Dr. L. Caceres (lucia.caceres@dal.ca)  
Dr. S. Krueger (Stefan.Krueger@dal.ca)

**Coordinator:** Dr. N. Crowder (nathan.crowder@dal.ca)

**TA:** Nicole Michaud (nicolemichaud@dal.ca)

### Course Description

[From Calendar] This course explores the brain at the neuronal level. Material covered includes: the ionic basis of resting potentials; the electrical activity of neurons; synaptic transmission and plasticity; synthesis and action of synaptic transmitters; and drug actions. Cellular phenomena relevant to healthy and neurologically-dysfunctional systems are also discussed.

#### *Course Prerequisites*

[From Calendar] Introduction to Psychology I (PSYO 1011.03 or PSYO 1021.03 or PSYO 1031.03) and Introduction to Psychology II (PSYO 1012.03 or PSYO 1022.03 or PSYO 1032.03) EACH with a grade of B- or better, or Principles of Biology I (BIOL 1010.03 or BIOL 1020.03) and Principles of Biology II (BIOL 1011.03 or BIOL 1021.03) EACH with a grade of B- or better, OR SCIE 1506.09 and SCIE 1507.09 EACH with a grade of B- or better, or SCIE 1505X/Y.18 with a grade of B- or better.

### Learning Outcomes

- Explain how electrical signals are produced and transmitted in the brain.
- Describe how neurons use chemical signals to communicate.

- Explain the mechanisms underlying neuronal plasticity.

## Student Resources

**Office hours:** Office hours will occur online via Microsoft Teams. For now, office hours are by appointment, but regular hours may be announced on Brightspace.

## Course Structure

*Course Delivery:* **BLENDDED**

See **Assessment** and **Course Content** sections for in-person meeting times. Asynchronous lecture videos will be posted on Brightspace, but in-person lectures/tutorials may not be recorded. All exams will be in-person. Quizzes will be online.

*Notes on blended course delivery:*

- Online Content will be delivered via Brightspace.
- Minimum technology: this course requires internet access, sufficient hardware to navigate Brightspace (e.g. view lecture PDFs and Panopto videos, completing computer based quizzes, etc.), and to engage in Microsoft Teams consultations during 'office hours'.
- If a student can provide evidence of power/technology malfunction during a computer-based quiz, the weight of that quiz will be transferred to the final exam.
- All exams, due dates, meetings are scheduled on Halifax Time (GMT-3).
- If students connect to online resources from outside Canada, they are responsible for ensuring awareness and compliance with any applicable laws in the country from which they are connecting.

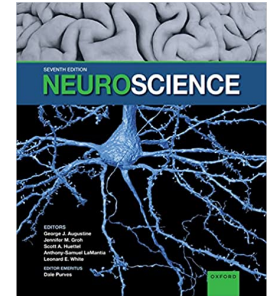
*Lectures*

Tue. / Thur.      8:35 am - 9:55 am      SIR JAMES DUNN BUILDING 117

## Course Materials

**Textbook:** Augustine et al. (2024) Neuroscience. 7th Edition. Oxford.

The Dalhousie bookstore will be supplying physical and digital versions of this textbook (ISBN-9780197616246). **Students may use second-hand textbooks.**



**Brightspace site:** This site will be used for making announcements regarding the course, posting slides and recorded lectures, writing quizzes, viewing grades, etc. You are expected to **check Brightspace regularly for new content**, announcements, and potential schedule changes. If you have difficulties accessing or using Brightspace, please contact the folks at UCIS/WebCT for help.

**Lecture Notes:** Lecture notes are **the students' responsibility**. PDF files of PowerPoint slides covering important points of each chapter will be posted on the Brightspace site, and we will provide a narrated online walk-through for each set of slides via Panopto. However, these slides are **not complete** and will need to be supplemented by notetaking.

### Assessment

Component	Weight (% of final grade)	Date	Duration / Format
Online Quiz 1 (Ch. 1+2)	1%	Sept. 7, 2023	10-20 min – computer online
Online Quiz 2 (Ch. 3)	1%	Sept. 14, 2023	10-20 min – computer online
Online Quiz 3 (Ch. 4)	1%	Sept. 21, 2023	10-20 min – computer online
Midterm 1 (Ch. 1, 2, 3, 4)	27%	Oct. 3, 2023	70 min – paper in-person
Online Quiz 4 (Ch. 7)	1%	Oct. 5, 2023	10-20 min – computer online
Online Quiz 5 (Ch. 5.1)	1%	Oct. 12, 2023	10-20 min – computer online
Online Quiz 6 (Ch. 5.2)	1%	Oct. 19, 2023	10-20 min – computer online
Midterm 2 (Ch. 5, 7)	27%	Oct. 31, 2023	70 min – paper in-person
Online Quiz 7 (Ch. 6)	1%	Nov. 2, 2023	10-20 min – computer online
Online Quiz 8 (Ch. 8)	1%	Nov. 9, 2023	10-20 min – computer online
Online Quiz 9 (Sensory Transduction)	1%	Nov. 23, 2023	10-20 min – computer online
Final Exam (cumulative)	37%	Scheduled by Registrar*	120 min – paper in-person

#### Assessment notes:

- Each COMPUTER-BASED ONLINE QUIZ is asynchronous and will open for 48 hours on the date listed on the table above. You will need an online device to access Brightspace to complete the quiz.
  - Quizzes will consist of approximately 10 questions in a variety of formats (multiple choice, multi-response, fill-in-the-blank).
  - Once the exam is initiated, students will have between 10 and 20 minutes of class time to complete all the questions. (~90-120 s per point on the test).

- An automatic 24 hour extension will be applied to online quizzes.
- In-person MIDTERMS will take place in the classroom at the regularly scheduled meeting time and will be exclusively multiple choice.
- \* The final will be *scheduled by the Registrar* during the exam period. Do not plan to leave Halifax before the end of the exam period; travel is not a valid circumstance to reschedule the final exam.

Conversion of numerical grades to final letter grades follows the [Dalhousie Grade](#)

Scale:

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (0-49)
A- (80-84)	B- (70-72)	C- (55-59)	

## Course Policies

### 1. Missed Academic Requirements

Missing an exam/quiz is unacceptable for any reason other than contagious illness or emergency. **If you are unable to write an exam or quiz**, you must inform Dr. Crowder by email, and submit a STUDENT DECLARATION OF ABSENCE (SDA) using Brightspace only (do not email SDAs or drop SDAs off in person).

- The Declaration of Absence form may only be used a maximum of **two times** throughout the term and may **only cover three consecutive days of absence**.
- If you miss a quiz/exam but do not submit proper documentation (signed Declaration of Absence) you will receive a mark of zero for that component.

**IMPORTANT:** In the event of a valid missed component (**see above**), **the weight of that item will be transferred to the final exam.**

### 2. Testing Protocol

*General* - all head coverings must be removed or adjusted so invigilators have an unobstructed view of student's gaze direction. Students may not use their own paper during an exam, nor are they permitted to take any paper with them that they were supplied during the quiz/exam. **Quizzes and exams are "closed-book", which means no information other than the questions themselves is to be accessible during the quiz/exam. You must complete all quizzes and exams alone with no consultation/collaboration with other people.**

*Computer-based quizzes* - students are expected to complete quizzes online. Only one Wi-Fi device should be available for each student, and only the Brightspace page should be accessed during quizzes (no google searches, messaging apps, etc.).

*On paper exams* - No electronic devices may be accessed or visible during paper exams. Phones must be turned off and stored *before* entering the exam room. Come prepared to examinations - bring pencils/pens, erasers, etc.

### **3. Health and Safety Statement**

All students are required to comply with health and safety requirements on campus, and should be considerate of others' health concerns. Non-compliance may be reported under the Code of Student Conduct.

### **4. Online Transition Plan**

There is a small chance that the university may require online instruction for some/all classes due to public health related restrictions during the term. For the duration of online instruction, all assessment components will be replaced with equally weighted fortnightly online tests. The weight of a valid missed test will be equally distributed among the other tests.

### **5. Distributing Course Materials**

Students will have access to lecture slides and recorded lectures throughout this course. However, under no circumstances is this material to be shared, posted online, or distributed in any other way. Personal copies of recordings must be destroyed at the end of term. Furthermore, students do not have permission to revise, modify, share, post on-line, or redistribute in any manner - electronic or otherwise - any of the lecture materials.

### **6. E-mail Etiquette**

Students often don't appreciate how many emails their professors and TAs receive in a single day, most of which require a response. This year all consultations outside of class will be scheduled by email and take place via Microsoft Teams. We will endeavor to provide a helpful response to your email within a maximum of three *working days* of receipt. You can facilitate this by making sure that you:

- Read the syllabus and Brightspace page to determine whether the information you require is already available
- Enter the course number in the subject line: 2570
- Include your FULL name and Dal student ID
- Write in full (grammatically correct) sentences, and proof-read your email message to be sure that it is clear and provides all pertinent information
- Do not write to request an exception to the syllabus
  - All students are subject to all the rules as outlined in this course syllabus and no exceptions will be made to any class policies under any circumstances

### **7. Course completion requirement**

Academic Calendar regulation 16.1 states: "In order to complete a course satisfactorily, a student must fulfill all the requirements as set down in the course outline [Syllabus]."

## **Course Content**

Date	Weekday	Topic	In-person meeting?	Assessment
Sept. 5	T	<b>Ch. 1 Intro to neurons and glia</b>	yes	
Sept. 7	Th	<b>Ch. 2 Nerve Excitability</b>	no	quiz 1
Sept. 12	T	tricky topics [ch. 1+2]	yes	
Sept. 14	Th	<b>Ch. 3 Membrane Properties</b>	no	quiz 2
Sept. 19	T	tricky topics [ch. 3]	yes	
Sept. 21	Th	<b>Ch. 4 Ion Channels</b>	no	quiz 3
Sept. 26	T	tricky topics [ch. 4]	yes	
Sept. 28	Th	pre-midterm 1 review	yes	
Oct. 3	T	Midterm 1 (Ch. 1-4)	yes	MIDTERM 1
Oct. 5	Th	<b>Ch. 7 Molecular Signaling</b>	no	quiz 4
Oct. 10	T	tricky topics [ch. 7]	yes	
Oct. 12	Th	<b>Ch. 5 Synaptic Transmission Part 1 - Electrical and Chemical Synapses</b>	no	quiz 5
Oct. 17	T	tricky topics [ch. 5a]	yes	
Oct. 19	Th	<b>Ch. 5 Synaptic Transmission Part 2 - Neurotransmitter release</b>	no	quiz 6
Oct. 24	T	tricky topics [ch. 5b]	yes	
Oct. 26	Th	pre-midterm 2 review	yes	
Oct. 31	T	Midterm 2	yes	MIDTERM 2
Nov. 2	Th	<b>Ch. 6 Neurotransmitters and Receptors</b>	no	quiz 7
Nov. 7	T	tricky topics [ch. 6]	yes	
Nov. 9	Th	<b>Ch. 8 Synaptic Plasticity</b>	no	quiz 8
Nov. 14	T	Fall study break - no class	no	
Nov. 16	Th	Fall study break - no class	no	
Nov. 21	T	tricky topics [ch. 8]	yes	
Nov. 23	Th	<b>Assorted - Sensory Transduction</b>	no	quiz 9
Nov. 28	T	tricky topics [transduction]	yes	
Nov. 30	Th	FINAL REVIEW - all	yes	
Dec. 5	T	Monday classes will be held	no	
Dec. 6	W	Monday classes will be held	no	

## University Policies and Statements

### Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or [elders@dal.ca](mailto:elders@dal.ca). Additional information regarding the Indigenous Student Centre can be found at: [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

### Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about-dal/internationalization.html>

### Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre ([https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (<https://www.dal.ca/about-dal/agricultural-campus/student-success-centre.html>)

### Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

### **Diversity and Inclusion – Culture of Respect**

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <http://www.dal.ca/cultureofrespect.html>

### **Student Code of Conduct**

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at:

[https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

### **Fair Dealing Policy**

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/fair-dealing-policy-.html](https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy-.html)

### **Originality Checking Software**



The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. Additional information regarding Originality Checking Software can be found at:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html](https://www.dal.ca/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html)

### **Student Use of Course Materials**

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.

Faculty of Science

# Student Resources and Support

## University Policies and Programs

Important Dates in the Academic Year (including add/drop dates):

[http://www.dal.ca/academics/important\\_dates.html](http://www.dal.ca/academics/important_dates.html)

Classroom Recording Protocol:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/classroom-recording-protocol.html](https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html)

Dalhousie Grading Practices Policies:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

Grade Appeal Process: [https://www.dal.ca/campus\\_life/academic-support/grades-and-student-records/appealing-a-grade.html](https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html)

Sexualized Violence Policy:

[https://www.dal.ca/dept/university\\_secretariat/policies/health-and-safety/sexualized-violence-policy.html](https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html)

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

## Learning and Support Resources

General Academic Support – Advising (Halifax):

[https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

General Academic Support – Advising (Truro): <https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html>

Student Health & Wellness Centre: [https://www.dal.ca/campus\\_life/health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness.html)

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): [https://www.dal.ca/campus\\_life/academic-support/On-track.html](https://www.dal.ca/campus_life/academic-support/On-track.html)

Indigenous Student Centre:

[https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

Indigenous Connection: <https://www.dal.ca/about-dal/indigenous-connection.html>

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at [elders@dal.ca](mailto:elders@dal.ca) or 902-494-6803:

<https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf>

Black Student Advising Centre:

[https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

International Centre: [https://www.dal.ca/campus\\_life/international-centre.html](https://www.dal.ca/campus_life/international-centre.html)

South House Sexual and Gender Resource Centre:

<https://southhousehalifax.ca/about/>

LGBTQ2SIA+ Collaborative:

<https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html>

Dalhousie Libraries: <http://libraries.dal.ca/>

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Dalhousie Student Advocacy Services:

<https://www.dsu.ca/dsas?rq=student%20advocacy>

Dalhousie Ombudsperson: [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)

Human Rights and Equity Services: <https://www.dal.ca/dept/hres.html>

Writing Centre: [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)

Study Skills/Tutoring: [http://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

Faculty of Science Advising Support: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

## **Safety**

Biosafety: <http://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <http://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Laser Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html>