CHEMICAL NEUROBIOLOGY (NESC 4070)
Winter Term 2024-25
Thursdays 14:35-16:25; Room L10 Tupper Link

OBJECTIVES: The primary objectives of this course are: 1) to introduce the student to contemporary concepts and methodologies in research on neurotransmitters, and 2) to provide the student with experience in evaluating the current literature pertaining to neurotransmitters.

REFERENCES: The current literature (original papers and reviews) will be the primary source of information. Basic concepts will be covered from textbooks such as "*Basic Neurochemistry. Principles of Molecular, Cellular, and Medical Neurobiology*" Eighth Ed. by G.J. Siegel (2012); and *Fundamental Neuroscience,* 4th edition edited by L. Squire et al. (2013). Principles of Neural Science, 6th edition edited by Kandel, Koester, Mack and Siegelbaum (2021).

EVALUATION: One or two presentations (35%), two take-home assignments (15% x 2), and a term paper (35%).

INSTRUCTORS:

Dr. Kazue Semba (Medical Neuroscience) – Primary Instructor
Email: k.semba@dal.ca; Phone: 494-2008. Office: Room 13MN, Tupper Building.

Dr. Angelo Iulianella (Medical Neuroscience) – Assisting Instructor
Email: angelo.iulianella@dal.ca; Phone: 494-7738. Office: Third floor, LSRI

SCHEDULE: See attachment

GUIDELINES FOR ASSGINMENTS

There will be two take-home assignments, each based on the materials covered in 5 preceding sessions.

Each assignment will include 3-4 questions, and the student is to choose 1 or 2 questions to answer. The length of each answer is expected to be 1000-1500 words (1000 words minimum), and no more than 2000 words.

Answers should not be limited to class materials but cover additional information the student judges to be relevant.

Answers must represent the student's own work. Plagiarism will not be tolerated (see below).

Questions are emailed. Answers are to be submitted by email within 10 days.

GUIDELINES FOR PRESENTATIONS

Each student is expected to give at least one PowerPoint presentation. The goal of the presentation is to assimilate the primary literature and learn how to present scientific results. Each presentation will discuss one original experimental paper that was published within the past few years. Each student should select a paper based on his or her interests, and consult with the instructor for approval, at least two weeks before the presentation. The target paper should be of general interest (as you will be engaging the entire class for your presentation) and represent a significant contribution to the research field.

The presentation should include no more than 15 slides and last for approximately 30 minutes, leaving 10 minutes for a class discussion (40 minutes total time). Within these 15 slides, you must include introductory slides (background information on the subject), 1-2 slides explaining the methodologies employed, no more than 10 slides describing the data of the study (these should be presented as simple figures reflecting a research question being asked; e.g. break down complex panels into multiple slides instead of presenting one large figure), and 2-3 conclusion/future direction slides. You should attempt to engage the audience in discussions as you go along.

Each presentation should include the following:

- Summarize the main point of the paper first. What did the authors do? Why did you choose the article?
- Discuss the importance of the question asked, referring to the background and rationale.
- Describe the methods and the results. Work through the figures and tables in order. Make sure that your figures are large enough for the class to see details comfortably (use an enlarged portion of a figure if necessary).
- State the implications of the findings. What contributions did the paper make to the field?
- If there are weaknesses with the paper, state them. For example, do the data support the conclusions? Was each experiment necessary? Were appropriate controls included? Are the methods appropriate for the experiment? Are the statistics solid? What would make the study better? What would you have done differently or in addition to strengthen the conclusions?
- You may suggest future studies or predict the next step, and discuss where the research might ultimately go.

GUIDELINES FOR TERM PAPERS

A term paper is a critical review of an article published in a highly-rated journal in neuroscience (e.g., Journal of Neuroscience, Neuron, Nature Neuroscience, etc.) that reports either recent discoveries published within the last two years, or pioneering or paradigm-shifting studies of historical importance to neuroscience. A list of 4 to 6 such articles selected by the course instructors will be provided to the students, and the

student will select one of them for their term paper. The student may not select a paper in their research area if applicable (e.g., topic of honours or MSc/PhD thesis).

A critical review should consist of the following three components (the balance among the three components, as well as the organization, may vary):

1) An overview of the background (including the rationale, i.e., why the study was conducted; what were the important questions the paper was trying to answer and why those questions are important; what was the hypothesis).

2) A summary and a critical review of the key findings (Are methodologies used sound? Are the data analyses valid? Are all the necessary controls included? Are there alternative explanations of the results that the authors did not discuss?)

3) A summary of the significance of the paper (i.e., put the findings into a perspective; how did these findings advance the field? Are there any more recent findings that offer an alternative interpretation of the results? What would be the next step? Suggest additional experiments that were lacking in the article that help resolve outstanding issues/questions). [Adapted from: http://www.jneurosci.org/misc/ifa_features.shtml]

The review must offer more than a summary of what was stated in the original article. For example, it might provide a more in-depth explanation of a new technique used in the paper, important caveats or interpretations that the author did not mention, or a distinct interpretation of the results in the context of work that the author did not discuss (e.g., relative to important findings published more recently after the target paper was published).

The review should be written in a style that is understandable to the general audience in neuroscience. Avoid using jargon and unnecessary abbreviations. Comments must be accurate, well-reasoned, and diplomatic. Avoid inappropriately harsh or glowing comments.

The review must be readable on its own without the knowledge of the target article.

The review should be between 1500 and 2000 words in length. However, there is no penalty on longer answers.

You may use figure(s) and table(s) as you wish; these will not be included in the word count.

Provide a title that is informative.

The first (title) page should include: the title of your critique, word count (should be between 1500-2000 words), the citation of the target paper [i.e., author(s), date, title of the article, journal, volume, and page numbers], and your name.

Use a one-inch margin, and double-space the text except for the title page and the references, which should be single-spaced.

References should be in the style of the Journal of Neuroscience.

Please submit your term paper by email.

Due Date: Friday, April 11, 2025, 11:59 PM

COURSE POLICIES ON LATE OR MISSED ACADEMIC REQUIREMENTS

For a late academic requirement (i.e., assignment, term paper), a penalty of 5% will per each subsequent day of delay will be applied. Late penalties will not apply if a Student Declaration of Absence (SDA) is submitted prior to due date. Maximum 2 uses of the SDA are allowed.

A missed academic requirement (i.e., assignment, presentation, or term paper) without notification to the instructor will result in a zero mark on the requirement**.**

What is plagiarism?

https://www.dal.ca/dept/university_secretariat/academic-integrity/plagiarism-cheating.html

Dalhousie University defines plagiarism as "the submission or presentation of the work of another as if it were one's own." **This includes using AI-linked software such as ChatGPT to write parts or the entirety of your assignment or term paper. Learning how to write scientifically is part of your training. While AI can be useful for finding information, it can generate ethical issues and compromise your ability to develop your own voice, scholarly abilities, and fundamental skills that would be important for you to be well-trained in your chosen career.**

Using AI-linked software like ChatGPT to generate text in assignments also runs counter to the course's objective to foster development of critical thinking skills in science and learn the latest findings in neuroscience. It is important to reflect that the product of a university education is you, not your grades. Find your voice, be creative.

Plagiarism is a serious academic offence. A finding of plagiarism may result in a **failing grade** of an assignment or course or, if very serious, **suspension** or **expulsion** from the university. In fact, if plagiarism is discovered after a student has completed his or her studies, and the penalty results in that student no longer meeting the requirements of a degree that has been awarded, the university may **rescind** that degree.

Some examples of plagiarism:

• **Failure to attribute authorship** when using sources such as written or oral work, computer codes/programs, artistic or architectural works, scientific projects, performances, web page designs, graphical representations, diagrams, videos, and images.
• Downloading all or part of the work of another from the Internet and **submitting as one's own**. ADDITION BY THE INSTRUCTORS: This includes the use of artificial intelligence software to generate text.
• **The use of a paper** prepared by any person other than the individual claiming to be the author.

Plagiarism is committed when you do not acknowledge using someone else's:
words or phrases
ideas or thoughts
term paper
recording
images
computer code
experiment results
lecture content
falsified data, citations or other text

OR your own previously submitted work

Plagiarized materials can come from:

- books
- journal articles
- CD's
- encyclopedias
- web pages
- online term papers
- email or listservs
- talks or lecture

DESCRIPTORS FOR EVALUATION: A REFERENCE

PRESENTATIONS:

F: Student does not give a presentation.

D: A presentation which indicates that the student has not done adequate preparation.

C: A presentation that covers the bare minimum and/or does not have suitable overheads.

B-: A presentation which covers most of the question but has some gaps in the answer and/or poor use of overheads.

B: A presentation that answers the question with acceptable overheads.

B+: A good presentation which covers the question with carefully selected overheads.

A-: Supplements the basic question with extra questions or overheads and develops own ideas.

A: Answers the question and develops some of the problems associated with the question. Animated presentations, not read, a good introduction and summary. Goes beyond the question.

A+: Truly exceptional. Adds own material above and beyond the question, ties question to other issues and gives a performance which grabs our attention.

TERM PAPERS

F: No paper submitted.

D: Minimal effort.

C: Covers bare essentials. Little effort to review relevant literature, or provides little or no critical discussion. Poorly defined main questions. No hypotheses stated. The paper contains errors.

B-: Reads like a list of facts. Minimal critical discussion. Poorly stated questions and hypotheses.

B: Covers the question and shows that you understand the issues with some appropriate discussion.

B+: Good review and criticisms- with additional depth in discussion.

A-: Adds extra discussion and criticisms. Shows a good amount of critical thinking that goes beyond a standard answer to the question and ask new questions, or suggest new experiments.

A: Well integrated up-to-date discussion of the question and critical evaluation of the literature. Points out problems or confusion or contradiction in the field of the topic.

A+: Truly exceptional. Up-to-date critical review which develops question in a new and insightful way, integrating material from other disciplines to shed new light on the question.

University Policies and Statements This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Missed or Late Academic Requirements due to Student Absence

As per Senate decision instructors may not require medical notes of students who must miss an academic requirement**, including the final exam**, for courses offered during fall or winter 2020-21 (until April 30, 2021). Information on regular policy, including the use of the Student Declaration of Absence can be found here:
https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html.

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of 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.
Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).
Information: https://www.dal.ca/campus_life/academic-support/accessibility.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.
Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

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
Statement: http://www.dal.ca/cultureofrespect.html

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 (1321 Edward St) (elders@dal.ca). **Information:** https://www.dal.ca/campus_life/communities/indigenous.html

NESC 4070 Chemical Neurobiology
Winter Term 2024-2025

LOCATION: Tupper Link L10

TIME: Thursdays 14:35-16:25

INSTRUCTORS: Dr. Kazue Semba (KS) & Dr. Angelo Iulianella (AI)

Session #	Date	Topic	Lecturers	Presentations
1	Jan 9	Organizational meeting (assignment) Introduction to neurotransmitters Glutamate I	 KS KS	
2	Jan 16	Glutamate II	KS	
3	Jan 23	Student presentation (glutamate)		
		Glutamate III	KS	
4	Jan 30	GABA	AI	
5	Feb 6	Student presentation (GABA)		
		Student presentation (GABA)		
	Feb 7	*FIRST ASSIGNMENT: Due Feb 17*		
6	Feb 13	Catecholamines (DA&NA)	KS	
		SPRING BREAK (Feb 17-21)		
7	Feb 27	Student presentation (DA/NA)		
		Student presentation (DA/NA)		
8	Mar 6	Acetylcholine	AI	
9	Mar 13	Student presentation (ACh)		
		Student presentation (ACh)		
	Mar 14	*SECOND ASSIGNMENT: Due Mar 24*		
10	Mar 20	TBA		
11	Mar 27	Graduate student 1 (MNSC 5070-crosslisted)		
		TBA		
12	Apr 3	Invited lecture by Dr. Turgay Akay: Roles of acetylcholine and serotonin in motor control.		
	Apr 11	*Term paper due*		

Jan 6: Classes begin
Feb 7: Munro Day (university closed)
Feb 19: NS heritage day (university closed)
Feb 17-21: Winter Study Break
Apr 7 (Mon): FRIDAY CLASSES WILL BE HELD
Apr 7 (Mon): Classes end
Apr 18: Good Friday (university closed)