

Contemporary Issues in Neuroscience Syllabus
Department of Psychology and Neuroscience
NESC 4007 Winter 2024

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 Instructor(s)

Name	Email	Office Hours
Tamara Franklin	Tamara.franklin@dal.ca	By appointment

Course Description

This seminar will focus on the neuroscience of emotions and how this is investigated using rodent models. We will explore primary research articles that use rodents to improve our understanding of basic emotions like fear and anger, love and empathy. We will also discuss neuroscience tools and techniques used to investigate these topics (e.g., rodent behavioural testing, pharmacological manipulations, engineered rodent models, and various methods for assessing and manipulating neural activity (e.g., *in vivo* electrophysiology, optogenetics)). There will be required weekly readings and evaluation will be based on student presentations and participation.

Course Prerequisites

NESC Honours student, permission of the instructor.

Course Structure

Course Delivery

This is an in-person course and sessions will not be recorded. Attendance is important and contributes to your participation mark, but if you are sick, please stay home and let me know as soon as possible.

Lectures: Monday, 9:35-11:25 C216

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 Materials

Links to course readings are provided on the course Brightspace page.

Assessment

Assignments

Component	Weight (% of grade)	Due Date
Background Presentation	22.5	According to sign-up
Research Article Presentation	22.5	According to sign-up
Research Article Presentation	22.5	According to sign-up
Research Article Presentation	22.5	According to sign-up
Participation	10	Continuous

Presentations (Slideshows of approximately ~30 minutes including discussion)

- **Background Presentation:** You will be provided a review paper on a topic as a starting point, but you are also expected to independently research the topic. The goal is to provide a well-rounded background introduction to the subject matter. Although the course is focused on research using animal models, this presentation may also include human references because it is important to understand the human behaviours on which the animal research is based. The rubric for this presentation is provided on the Brightspace.
- **Research Article Presentation:** You will present a research article. This will include a brief introduction directly related to the paper (ie not repeating what would be in a general background presentation), a summary of the methodology, a description of the KEY results, and a discussion of its relevance to the literature and its impact. You will sign-up for three of these presentations during the semester. This presentation should be structured so that it generates discussion. The rubric for these presentations is provided on the Brightspace.

Participation

- You will be graded on your participation of discussions. To get an exemplary grade, you are expected to initiate contributions, provide insightful and constructive comments and listen attentively to all presentations. The rubric is provided on the Brightspace.

Other course requirements

Attendance is required, and you are expected to read all material provided (not just the research that you are presenting). You should be prepared to discuss all readings.

Course Policies on Missed or Late Academic Requirements

If you are unable to attend class on one of your presentation days, please inform me as soon as possible. Your presentation will be re-scheduled to another day. If it is due to a critical illness you will not be penalized. If it is because you were unable to complete the presentation on time, you will be penalized 20% (e.g., the maximum you will be able to receive on the presentation is 18).

Course Policies related to Academic Integrity

All presentations should be prepared individually. The use of generative AI and large language models (e.g., ChatGPT) is not permitted.

Learning Objectives

- Summarize the major theories of emotion
- Describe various complex experimental designs found in neuroscience research papers and identify appropriate controls
- Prepare informative oral presentations in order to convey science to a scientific audience
- Create slideshows that are used to accompany oral presentations and that illustrate the main messages of scientific research publications
- Assess recent high-impact neuroscience publications studying the neural bases for emotion
- Describe contemporary neuroscience techniques used to study emotion in animal models
- Plan, organize, and lead group discussions about recent scientific research in the field of emotion

Course Content

Week 1	Jan 8, 2024	Syllabus and warm-up	
Week 2	Jan 15, 2024	What is an emotion? Brief overview of methods	<p>What is an emotion? https://ezproxy.library.dal.ca/login?url=https://www.jstor.org/stable/2246769?seq=18</p> <p>A framework for studying emotions in species. http://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.cell.2014.03.003</p> <p>Methods</p>
Week 3	Jan 22, 2024	Studying emotions in animal models	<p>RP 1 - Cardiogenic control of affective behavioural state. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1038/s41586-023-05748-8</p> <p>RP 2 - Amygdala ensembles encode behavioural states https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1126/science.aav8736</p>
Week 4	Jan 29, 2024	Snow day	
Week 5	Feb 5, 2024	Snow day	
Week 6	Feb 12, 2024	Facial Expressions	<p>Rev 1 - Body language signals for rodent social communication. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.conb.2021.01.008</p> <p>RP 3 - Facial expressions of emotion states and their neuronal correlates in mice. https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1126/science.aaz9468</p> <p>RP4 - Segmentation of body language</p>

			https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1523/ENEURO.0514-22.2023
READING WEEK			
Week 7	Feb 26, 2024	Love	<p>Rev 2 – Prairie vole bonding and plasticity of the social brain. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.tins.2022.10.009</p> <p>RP 5 – A neuronal signature for monogamous reunion. https://ezproxy.library.dal.ca/login?url=https://www.jstor.org/stable/26931171</p> <p>RP 6 – Infidelity challenge https://ezproxy.library.dal.ca/login?url=https://doi.org/10.3389/fevo.2018.00125</p>
Week 8	Mar 4, 2024	Love	<p>RP 7 - Oxytocin receptor not required for social attachment in prairie voles. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.neuron.2022.12.011</p> <p>RP 8 – Maternal care in biological and non-biological parents. https://ezproxy.library.dal.ca/login?url=https://www.proquest.com/scholarly-journals/oxytocin-neurons-enable-social-transmission/docview/2565805616/se-2?accountid=10406</p> <p>Rev 3 – Emotional contagion and prosocial behavior in rodents. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.tics.2022.05.005</p>
Week 9	Mar 11, 2024	Empathy – Emotional Contagion	<p>RP 9 – Social modulation of pain as evidence for empathy in mice. https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1126/science.1128322</p>

			<p>RP 10 – Empathy and prosocial behaviour in rats https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1126/science.1210789</p> <p>RP 11 – Anterior cingulate inputs to nucleus accumbens control the social transfer of pain and analgesia https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1126/science.abe3040</p> <p>RP 12 - Stress and emotional contagion in mice and humans https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.cub.2014.11.028</p>
Week 10	Mar 18, 2024	Empathy – Emotional Contagion	<p>Rev 4 – Can I get a Witness? Using vicarious social defeat stress to study mood-related illnesses in traditionally understudied populations. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.biopsych.2020.02.004</p> <p>RP 13 – VSIDS induces depression-related outcomes in female mice. https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1016/j.biopsych.2017.07.014</p> <p>RP 14 – Hypothalamic neurons that mirror aggression. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.cell.2023.01.022</p>
Week 11	Mar 25, 2024	Loneliness	<p>Rev 5 – Neural mechanisms of social homeostasis. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1111/nyas.14016</p>

			<p>RP 15 – Modulation of 5-HT release by dynorphin mediates social deficits during opioid withdrawal. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.neuron.2022.09.024</p> <p>RP 16 – Dorsal raphe dopamine neurons represent the experience of social isolation. https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1016/j.cell.2015.12.040</p>
Week 12	Apr 1, 2024	Happiness	<p>Rev 6 – The neuroscience of positive emotions and affect: implications for cultivating happiness and wellbeing. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.neubiorev.2020.12.002</p> <p>RP 17 - Neural correlates of ticklishness in the rat somatosensory cortex. https://ezproxy.library.dal.ca/login?url=https://dx.doi.org/10.1126/science.aah5114</p> <p>RP 18 – Self-tickling. https://ezproxy.library.dal.ca/login?url=https://doi.org/10.1016/j.cub.2019.07.085</p>

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. Additional information regarding the Indigenous Student Centre can be found at:

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

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) 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

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

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

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.