

Faculty of Science Course Syllabus
Department of Psychology and Neuroscience

Research Methods in Experimental Psychology and Neuroscience
NESC/PSYO 2000: Fall 2024 edition

- Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. 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.
- 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.
- Please note that, as far as the instructors are concerned, this class is a safe space. We can all contribute to a tolerant and discrimination-free atmosphere (for race, ethnicity, gender, sexual preference, language, religion, age, disability, etc.).
- Dalhousie is a scent-free working space.

Instructors: Dr Erin Sparks (erin.sparks@dal.ca) for general course coordination and the labs;
Dr Simon Gadbois (sgadbois@dal.ca) for the lectures and exams.

Office hours: **Erin Sparks:** Tuesday, 1:30 to 2:30 in LSC Psychology, Room 2324 (or by appointment; see Brightspace for booking link)

Simon Gadbois: Monday and Wednesday, 3:00 to 4:00 in LSC Psychology, Room 3326
Office hours include midterm viewing except the week before an exam when I will be focussing on answering questions pertaining to the upcoming exam.

Emails: When sending an email to the instructors or TAs, please add “2000” to the subject line.

Lectures: Monday & Wednesday, 1:05 to 2:25, Rowe Building, Room 1028 (Potter)

Delivery format: In-person only; lectures are not recorded, but you are allowed to audio record them.

Laboratories: Lab days & times vary depending on the lab section you have registered for. Please check DalOnline to confirm your lab section, and check the course Brightspace page for information on lab scheduling.

Labs will begin the week of September 9.

Delivery format: In-person labs will be in **LSC Psychology, Room 4207** (4 throughout the semester). Online synchronous labs will be held on **Microsoft Teams**. See the lab schedule for the format of specific labs.

Course Description (from academic calendar) This course provides a thorough grounding in scientific research methods used by experimental psychologists and neuroscientists. Lectures explore concepts, methods, and analytic tools employed to investigate human and animal behaviour and neurophysiology. Students also complete assignments and write reports on a series of supervised laboratory experiments to illustrate concepts presented in lectures.

Prerequisites PSYO 1011.03 (or PSYO 1021.03 or PSYO 1031.03) and PSYO 1012.03 (or PSYO 1022.03 or PSYO 1032.03); OR SCIE 1506.09/1507.09 (or SCIE1505X/Y.18). All prerequisite courses must have a grade of B- or better.

Animal Behaviour Certificate This course is one of the Animal Behaviour Certificate (ANBH) mandatory courses for NESC or PSYO students: Click [here](#) for information.

Course Objectives/Learning Outcomes

We favour an integrative and synthetic approach to research methods and principles. The course uses a problem-based learning approach with a mix of inquiry-based learning/instruction and anchored instruction. At the end of this course, you will be able to:

- Explain how the scientific process and research methodologies work.
- Explain the different scientific cultures, ideologies, biases and methodologies in the behavioural sciences and neurosciences. Be able to avoid disciplinary biases and understand specific disciplinary constraints.
- Discuss and explain the epistemological and historical foundations of the behavioural sciences and neurosciences.
- Identify, explain, and justify experimental, quasi-experimental and observational research designs.
- Identify and explain methods to increase validity, reliability, sensitivity, and specificity.
- Discuss and explain the concepts of methodological induction, deduction (hypothetico-deduction), diagnosis, systematic and naturalistic observations, experimentation and quasi-experimentation.
- Discuss and explain the different methods of inquiry and inferential strategies (e.g., Popperian/Fisherian/frequentist vs. some of the alternatives (Bayesian, case-study and small-n research, etc.).
- Describe and discuss the challenges of studying dynamic patterns and processes in the study of behaviour and the brain.
- Develop a research question and all the steps to obtain the best answers and data considering the constraints you face.
- Assess and evaluate the soundness of research designs and research projects.
- Assess and evaluate the ethical soundness and ethical challenges surrounding research studies.
- Discuss and explain the challenges in studying covert processes, intervening variables and hypothetical constructs. Appreciate the theoretical approaches to the behavioural sciences and neurosciences.
- Communicate research through written proposals, papers, reviews, etc.

Course Materials

- **There is no required textbook for this course.** If you really want a text to read, Dr Gadbois suggests:
 - Passer, M.W. (2021). *Research Methods: Concepts and Connections*. MacMillan Learning. (<https://store.macmillanlearning.com/ca/product/Research-Methods/p/1319184510>)
 - Privitera, G. J. (2022). *Research Methods for the Behavioral Sciences*. SAGE Publications (<https://collegepublishing.sagepub.com/products/research-methods-for-the-behavioral-sciences-3-283911>)
- **Other material:** Scientific papers on specific topics may be suggested at any time during the term. Labs will require reading scientific papers, including assigned papers (provided in Brightspace before the corresponding lab or assignment), plus additional sources that students identify through literature searches. All papers will be available for free through Dalhousie Libraries.
- The course is on **Brightspace**; all registered students should have access at dal.brightspace.com. Check Brightspace regularly, as we will use it to share lecture notes (PDF), lab instructions, announcements, and grades.
- Note that:
 - Lecture notes are typically posted once a week, before class, but updates can be uploaded after class as well.
 - Lecture notes are organized by theme, i.e., the sections are more like chapters, and not organized by lecture.
 - You should be annotating the lecture notes provided (these notes provide an outline), or taking your own to supplement the material presented. Dr. Gadbois does not use “slides” as if they were a

teleprompter. This means that missing lecture material translates into missing crucial information for an exam. You should be annotating the outline provided, or taking your own notes to supplement the material presented. For copyright reasons, some material will not be showing on the uploaded slides.

- A note taker is required to assist one of your peers. If you are interested, please contact the Student Accessibility Centre, notetaking@dal.ca

Course Assessments

Assessment	% of final grade	Date	Location, time, duration
Midterm	20%	Wednesday, Oct. 16	Regular class time/location, 80 mins.
Final exam: Cumulative	30%	Scheduled exam period	TBD by the Registrar's Office (RO). Do not make travel plans until the schedule has been published by the RO. 3 hours.
Evaluating scientific writing lab assignment	5%	Friday, Sept. 27	Due by 11:59pm. Submit via Brightspace
Lab Report 1	22%	Friday, Oct. 25	Due by 11:59pm. Submit via Brightspace
Lab Report 2	22%	Friday, Nov. 29	Due by 11:59pm. Submit via Brightspace
Lab activities	1% total (0.2% each)	Throughout term (5 total activities)	Completed during lab session

Exams (50% of grade). Both exams (midterm and final) have a mixed format and will contain multiple choice questions, and true/false questions. Material is fully *cumulative* for the final exam.

Note that you will be tested on:

- Material from available lecture notes.
- Material presented in class not fully developed in the lecture notes: Your personal notes will matter.
- Remember: Lecture notes are only an outline. Your own notes will be important here as well.

Lab assignments. Students will complete three lab assignments throughout the term:

1. **Evaluating scientific writing (6% of grade).** For this assignment, you will be provided with an example lab report, written by AI, and will evaluate it according to criteria we provide. You will compare it to a published scientific paper on a similar topic. Evaluating these examples will familiarize you with foundations that you'll need to write your own lab reports, including: The structure of scientific papers, mechanics of scientific writing (e.g., clarity & precision; reference formatting), types of sources (e.g., peer reviewed vs. not; empirical paper vs. review article), and effective use of scientific evidence to support the rationale for/interpretation of a study's findings. You will write a commentary evaluating the quality of the AI-written report. Details will be shared in Brightspace.

2. **Lab Report 1 (22% of grade):** Your first lab report will be based on survey data we collect as a class. A brief survey will be posted to Brightspace in Week 1 of the course. You will write a lab report on this study, including an abstract, introduction, method, results, and discussion sections, appendices, and references in APA7 format. Details of the study, and instructions for the assignment, will be shared after data collection ends.
3. **Lab Report 2 (22% of grade):** In your second lab report, you will propose a (hypothetical) follow-up study that builds on the findings of the survey we used for Lab Report 1. This assignment will follow a structure similar to Lab Report 1, except that you will not have real data to report in your results section. Further details, instructions, and resources will be posted to Brightspace after data collection for our survey study.

Lab activities (1% of grade). Students are expected to attend and participate in their lab sessions. Throughout the term, students will participate in 5 activities during their lab sessions. These will be graded for completion (pass/fail), and each is worth 0.2% of the final grade.

In order to pass this course you need to:

1. Obtain a final grade of 50% or more (minimum D)
 2. Complete the laboratories, write the midterms and the final exam*. Please refer to the course policy on missed tests/exams and assignments in the section below.
- Note: Any missed exams that are not resolved according to course policy will result in an INC (incomplete) final grade for the course. An INC that is not addressed within a month of the end of a class will result in an F for the course.

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

Other course requirements

Although not a course requirement per se, attendance may be taken intermittently, and randomly.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

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

Course Policies on Missed or Late Academic Requirements

Missed lectures:

Although there is no direct penalty for missing lectures, it is particularly important that you realize you will be accountable for material covered during the lectures. As noted above, the slides decks provided are only an outline of what is discussed in class.

Missed labs:

We expect students to attend their scheduled lab sessions. **If you can't attend a specific session due to illness or extenuating circumstances, contact Dr. Sparks;** she will arrange for you to attend another section's lab

(when possible) or will arrange an alternate way for you to make up the material. When such alternate arrangements are made, students must submit the corresponding lab activity within 1 week of getting access to the material to receive credit for that activity.

Missed tests/exams:

- No need for an SDA (student declaration of absence) in this class.
- *There are no actual make-ups for a missed midterm in this course:* Your final exam adds the value of the missed midterm. In other words, your final will weigh more (value of the final + the value of the missed midterm).
 - Note that in this class, **if you miss the midterm, your final exam will be worth 50% of your grade.**
- If you miss the final, only students with a valid excuse will have the following option (following consultation with the Assistant Dean of Student Affairs): You write an essay question exam.
 - For logistical reasons, final exam make-ups will take place in January 2025. As such, late final exams delay submission of your final grade. **This could mean losing your spot in Winter courses that require PSYO/NESC 2000 as a prerequisite**, as the registrar's office conducts prerequisite checks before Winter term. Given this, it's important that you write the exam as scheduled unless doing so is not possible. Students who cannot write the final exam on its scheduled date should contact Dr. Sparks right away to discuss potential impacts on their progress & Winter semester.
- For long-term or chronic absences please speak with either:
 - An advisor at the Student Advising and Access Services if you have accommodations.
 - The Assistant Dean of Student Affairs (at the Faculty of Science): Patricia Laws, scieasst@dal.ca.
- Remember that the final exam is fully **cumulative**, and therefore **will be covering the material of the full term.**

Cancelled midterms

If a midterm is cancelled due to weather or other force majeure events, the new date and time for the midterm will be announced on Brightspace, otherwise, by default, the exam is re-scheduled to the next planned (regular) class.

Late assignments:

- A late penalty of **5% per day** will be deducted from late lab assignments, up to a maximum of **7 days late**. Lab reports more than 7 days late will be given a zero.
- However, **students may claim ONE “free pass” extension** on lab reports. Students claiming their free pass will receive an additional 3 days from the original due date to submit their lab assignment. We will NOT require SDAs or other documentation for these extensions; students simply need to **notify their TA** that they wish to use their free pass.
 - The free pass can only be used on assignments, not exams or lab activities.
- Students with assignment extensions in their accommodation plan may use this extension on all assignments; **contact Dr. Sparks to claim an accommodation extension.**
- If an assignment is submitted after an extended deadline, late penalties will begin from the extended deadline.
- Given the logistics of managing the grading timeline in a class this size, **free pass and accommodation extensions CANNOT be “stacked” on top of each other** (i.e., you can't claim a 6-day extension using a free pass plus accommodations; it's one or the other).

- Be aware that late assignment submissions may delay you getting feedback. We have structured the course to minimize this (e.g., claiming a 3-day “free pass” or accommodation-related extension will still allow timely feedback). However, we may not be able to grade later submissions with those submitted on time.
- Students experiencing long-term extenuating circumstances that prevent them from completing an assignment should contact Dr. Sparks to discuss options. They must do so **within two weeks of the original assignment due date**. Documentation may be required to support requests for alternate arrangements.

Course Policies related to Academic Integrity

Please see the Dalhousie regulations provided on the last page of this document. A plagiarism detection system may be used in this course if relevant or appropriate.

Although you are encouraged to discuss course concepts, assignments, and activities with your peers, you must complete all assessments individually. You may use AI-driven tools to assist you in studying (though interpret the output with caution—it’s often wrong!). Some activities in labs may involve evaluating AI output. But remember, the objective is for you to acquire the competencies and outcomes in this course. **Unless an assessment explicitly says otherwise, specific assessments in this course disallow the use of AI-driven tools.** You are responsible for the accuracy of all work you submit. Where AI tools are explicitly allowed, you must acknowledge all tools used to assist you. If applicable, you must provide links to chat logs. **Using AI-driven tools where prohibited constitutes an academic offense.**

Content of lectures:

The course will present the following topics in 10 sections (§): Each topic is covered for about a week (plus or minus) depending on the flow and dynamic of the class.

- §0 Generalities: The point of thinking about research and science (the primordial egg metaphor); studying, note-taking, and other essential skills for this course and others.
- §1 What is science? Why do we need a method or methodologies? A quick venture into epistemology (the pursuit of knowledge). The different ways of asking questions and different modes of inquiry: Deduction, induction, abduction.
- §2 Theories and questions: Variables, biases, and basic steps in experimental research.
- §3 Measures and measurements.
- §4 Issues of validity, reliability, accuracy (sensitivity and specificity), and precision.
- §5 Detection, Decision, Diagnosis and an exploration of Signal Detection Theory.
- §6 Basic designs for research in behaviour, the mind, and the brain: Between-subject designs, within-subject designs, factorial designs.
- §7 Idiographic research, case studies, and small n designs.
- §8 Specialized designs: Basic overview of non-experimental designs, quasi-experimental designs, ex post facto designs, developmental designs, and time-series designs.
- §9 Systematic and naturalistic observations in the lab and the field.

Content of labs:

Labs will include a mix of **in-person** sessions, **online** sessions via Microsoft Teams, and **asynchronous** material posted to Brightspace. Students' weekly lab schedules will vary depending on the section they have registered for. See Brightspace for information on your lab schedule. Here is a broad outline of what labs will cover:

Week of Sept. 3:

- No labs. Data collection begins for Lab Report 1 (via Brightspace)

Week of Sept. 9:

- Lab 1 (Microsoft Teams): Introduction to scientific writing

Weeks of Sept 16 and Sept. 23:

- Lab 2 (LSC P4207): Reading scientific papers
- Brightspace tutorial (asynchronous): Developing hypotheses

Week of Sept. 30

- Brightspace tutorial (asynchronous): Synthesizing research

Weeks of Oct. 7 and Oct. 14:

- Lab 3 (LSC P4207): Lab Report Q&A; data coding
- Online check-in (Microsoft Teams): Guidance on lab reports

Week of Oct. 21:

- Brightspace tutorial (asynchronous): Research ethics

Weeks of Nov. 4 and Nov. 11:

- Lab 4 (LSC P4207): Literature searches

Weeks of Nov. 18 and Nov. 25:

- Lab 5 (LSC P4207): Evaluating research claims
- Online check-in (Microsoft Teams): Guidance on lab reports

Week of Dec. 2:

- No labs

University Policies and Statements

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

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

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

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html