

Faculty of Science Course Syllabus (Section A)**Department of Mathematics and Statistics**

MATH 1215

Calculus for the Life Sciences

Summer (A) 2024

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

| | |
|-------------------------|---|
| Instructor: | Robert Morissette (He/Him) (robert.morissette@dal.ca) |
| Office Hours: | Monday (6:00PM – 7:00PM) Tuesday (9:00AM – 10:00AM and 6:00PM-7:00PM) Wednesday (2:00PM – 3:00PM) Thursday (9:00AM – 10:00AM) Friday (12:00PM – 1:00PM) |
| Lecture Times: | Monday (9:05AM – 10:55AM) Wednesday (9:05AM – 10:55AM) Friday (9:05AM – 10:55AM) |
| TA: | Scott Wesley (scott.wesley@dal.ca) |
| TA Office Hours: | Monday (1:00PM – 2:00PM) Wednesday (6:00PM – 7:00PM) Thursday (6:00PM – 7:00PM) |
| Course Delivery: | Online (<i>synchronous</i>), lectures will be recorded |
| Website: | Brightspace (<i>and Piazza as a discussion board, see Brightspace</i>) |

Academic Information and Course Overview

Course Description

This course emphasizes the application of calculus to the life sciences. The concepts and content studied include derivatives, techniques of differentiation, logarithmic and exponential functions, optimization, basic ordinary differential equations, integration, and techniques and applications of integration.

Course Prerequisites

Nova Scotia Mathematics 11 and 12 or pre-calculus is highly recommended.

Course Exclusion

MATH 1000, MATH 1280, MATH 1500

Learning Objectives

By the end of this course, you will be able to:



- Use discrete-time dynamical systems to model simple problems from the life sciences, such as population model.
- Analyze information gathered from a function and its first and second derivatives to sketch a graph of the function.
- Interpret the derivative as a rate of change and use this to solve problems about relationships between quantities.
- Interpret the definite integral as area under the curve and calculate this quantity using approximations and exactly.
- Classify different types of differential equations and apply appropriate techniques to solve problems involving these equations.
- Develop an appreciation of how calculus, and mathematics more generally, can be used to understand and solve problems in the world beyond the classroom.
- Reflect on your study progress to grow as an effective learner.

Course Materials (Textbook):

Calculus for the life sciences: Modelling the dynamics of life, 2nd Cnd. ed. by F. Adler and M. Lovric.

For online/blended course delivery:

- The final exam will take place in-person. See course assessment section for details.
- All components will be delivered synchronously through Collaborate Ultra on Brightspace.
- To attend lectures, you will require a device with internet access. A microphone and camera are recommended for in-class engagement, but the meeting chat will also be monitored.
- All online classes will be recorded to improve accessibility. If you do not consent to being recorded, then it is fine to attend classes with your microphone and camera turned off.
- Please be aware that not all countries have the same laws for online content. If you are accessing this course from outside of Canada, then you are responsible for compliance with any applicable laws in your country.

Assessment Components and Grading

Evaluation and Grading:

- **Self-Reflection:** In a previous offering of this course, Dr. Asmita Sodhi integrated a metacognition component to great success. Metacognition is understanding how you think and learn and is an essential part of your success as a student. Throughout this semester, you will be given the opportunity to complete a short, guided reflection on your learning for each module, as designed by Dr. Sodhi. This is intended to help you identify areas of the course in which you are strong and areas where you could use additional practice. Ideally, this reflective practice will also help you to identify which study skills work for you, and which are not effective. If you would like to learn more about metacognition, then there are many great articles available for free online, such as: <https://cft.vanderbilt.edu/guides-sub-pages/metacognition/>
- **Homework:** Each module will have multiple homework assignments on Brightspace. It may look as if there are many assignments (28 in total), but each assignment is very short! You should think of each assignment as a checkpoint, to see if you have understood the key concepts. The questions will be based on the lectures and suggested textbook problems, with each assignment delivered through WeBWorK on Brightspace. The lowest 3 homework assignments will be dropped.

- **Written Assignments:** There will be five written assignments that ask you to submit full solutions. Often, the assignments will ask you to apply knowledge you have learned in the module to a different context than what has been covered in the lectures or homework. The goal of each assignment is to help you practice writing full solutions (to the final), and to help you integrate the course material with real-world applications. Each assignment will be submitted through Brightspace. The lowest written assignment mark will be dropped.
- **Midterm Exam:** There will be an optional midterm exam, which will become available on Friday, May 31. The midterm will not count for any marks, but if submitted to Brightspace by Friday, June 7 you will receive detailed feedback on your work (submissions after this date may receive feedback, but it is not guaranteed). You are highly encouraged to attempt the midterm to have practice with exam-type questions, and to receive feedback on your written work.
- **Final Exam:** There will be a cumulative final exam held in-person on Friday, June 21 from 9:00AM – 12:00PM. You will be permitted a study aid for this exam, in the form of one letter-sized (8.5" × 11") sheet of paper with writing allowed on both sides. No other materials (*e.g., textbooks, notes, calculators*) will be permitted. There will be no option to write the final exam online. For those students who cannot attend an in-person final exam on June 21, there is an option to write an in-person make-up final on Monday, August 26 from 12:30PM – 3:30PM.

Course Assessment:

Summary of assessments and their grade worth:

| | | |
|---------------------|-----|--|
| Self-reflection | 5% | |
| Homework | 15% | <i>28 total, 3 dropped</i> |
| Written Assignments | 20% | <i>5 total, 1 dropped</i> |
| Midterm Exam | 0% | <i>Optional, marked but ungraded</i> |
| Final Exam | 60% | <i>In-person on June 21 (make-up date available)</i> |

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

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

Assignment Submission Details:

Homework will be submitted through WeBWork via Brightspace. See Brightspace for more details. For written assignments, please submit a single PDF to the appropriate drop box on Brightspace. Please ensure that your solutions are presented in ascending order (*e.g., question 1, followed by question 2, followed by question 3*). If this is your first time submitting an assignment as a PDF, then the following links may prove helpful!

- To convert photos to PDF's: <https://smallpdf.com/jpg-to-pdf>.
- To combine multiple PDF files into a single PDF: <https://smallpdf.com/merge-pdf>.
- Many phones also have "scanning apps" which allow you to merge multiple photos into one PDF.

Details on Seeking Help:

- If you have a general question about the course content or assignments, then you are encouraged to ask either on Piazza, or during office hours.
- In addition to office hours, this course is also supported by the online Math Learning Centre, which is available for assistance for the duration of the course. Information on accessing the Math Learning Centre can be found on the course Brightspace page.

- If you would like to discuss private matters, or request an extension, email the instructor with MATH1215 at the start of your subject line. You are encouraged to sign off with your preferred name and pronouns, so that the instructor knows how to address you.

Course Policies on Missed or Late Academic Requirements:

- Student Absence Declarations are authorized for use in this course. This takes the place of a sicknote for absences of three or fewer consecutive days. Student Absence Declarations are accepted through the corresponding drop box on Brightspace. For more information on how to use a Student Absence Declaration, and an explanation for why sicknotes are no longer in use, visit: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/academic-policies/student-absence.html.
- If a valid Student Absence Declaration is not submitted, then extensions on assessments will not be granted after the due date for the assessment has passed. However, it is understood that you have a life outside of university, and that sometimes conflicts will come up. If you need a short extension and contact the instructor ahead of time, then an extension will almost always be given. When a request is made ahead of time, you do not need to submit a Student Absence Declaration.
- Late assessments (without an extension) will receive a penalty of 50%.
- Missing assessments will receive a grade of 0%.

Course Policies related to Academic Integrity

- As is the case in most of your classes, you must write your assignments independently. As outlined in section B of the syllabus, plagiarism (including excessive collaboration) are serious violations of academic integrity. However, social ties in university STEM classes are also known to be a major indicator of academic success (<https://www.science.org/doi/10.1126/sciadv.aba9221>). Therefore, you are encouraged to discuss course material with your classmates (this is the point of Piazza, after all). However, the assignments you submit must be written independently.
- Academic integrity is valued in our virtual classroom space. Your instructor is firm in his belief that a classroom where students understand that they are trusted and respected is a more positive learning environment than one in which students are kept under surveillance, and that fostering a culture of trust and mutual respect encourages academic honesty. Academic dishonesty – such as posting questions on Chegg – not only hurts yourself, but other students in the course, as the submission of academic integrity allegations takes a lot of the instructor's time that could be otherwise used to serve the whole class. By maintaining academic integrity throughout the course, you contribute to a positive and respectful learning environment for all students.
- Plagiarism detection software is not used in this course.

Course Content

Summary of course modules with textbook references:

- **Module 1:** Discrete-time Dynamical Systems (§3.1 – §3.4)
- **Module 2:** Limits, Continuity, and Derivatives (§4.1 – §4.5)
- **Module 3:** Working with Derivatives (§5.1 – §5.7)
- **Module 4:** Applications of Derivatives (§6.1 and §6.4 – §6.8)
- **Module 5:** Integrals and Applications (§7.1 – §7.5)
- **Module 6:** Differential Equations (§8.1 – §8.4)

Module schedule and deadlines:

The following schedule is tentative. All deadlines are fixed. However, modules may become available earlier than the stated dates. In this case, students will have slightly longer to work on homework and written assignments. Students will not lose time to work on their assignments.

| Module: | 1 | 2 | 3 | 4 | 5 | 6 |
|------------------------|--------|--------|--------|---------|---------|---------|
| Module available | May 6 | May 10 | May 15 | May 29 | June 3 | June 12 |
| Homework due | May 12 | May 21 | June 2 | June 9 | June 16 | June 20 |
| Written assignment due | May 16 | May 23 | June 4 | June 13 | June 19 | N/A |
| Module reflection due | May 12 | May 21 | June 2 | June 9 | June 16 | June 20 |

Faculty of Science Course Syllabus (Section B)**Summer (A) 2024**

MATH 1215

Calculus for the Life Sciences

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://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=1&topicgroupid=31821&loadusercredits=False>

University Grading Practices

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

Faculty of Science Course Syllabus (Section C)**Summer (A) 2024**

MATH 1215

Calculus for the Life Sciences

Student Resources and Support**Advising****General Advising** https://www.dal.ca/campus_life/academic-support/advising.html**Science Program Advisors:** <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>**Indigenous Student Centre:** https://www.dal.ca/campus_life/communities/indigenous.html**Black Students Advising Centre:** https://www.dal.ca/campus_life/communities/black-student-advising.html**International Centre:** https://www.dal.ca/campus_life/international-centre/current-students.html**Academic supports****Library:** <https://libraries.dal.ca/>**Writing Centre:** https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html**Studying for Success:** https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html**Copyright Office:** <https://libraries.dal.ca/services/copyright-office.html>**Fair Dealing Guidelines** <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>**Other supports and services****Student Health & Wellness Centre:** https://www.dal.ca/campus_life/health-and-wellness.html**Student Advocacy:** <https://dsu.ca/dsas>**Ombudsperson:** https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html**Safety****Biosafety:** <https://www.dal.ca/dept/safety/programs-services/biosafety.html>**Chemical Safety:** <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>**Radiation Safety:** <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>**Scent-Free Program:** <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>**Dalhousie COVID-19 information and updates:** <https://www.dal.ca/covid-19-information-and-updates.html>