

1 Course Outline

Text: Calculus for the Life Sciences: Modelling the dynamics of life, second Canadian edition by Fredrick Adler and Miroslav Lorvić.

This course is meant to provide the basic mathematical tools required for work in the life sciences. All of the main topics from integral and differential calculus will be covered, but with an emphasis on modelling systems from the life and social sciences.

2 General Information

Instructor David Iron

Times Monday, Wednesday, Friday at 10:35 – 11:25

Location Brightspace

Web Page Dalhousie's Online Learning System

Office hours Thursday 1-2:30, Friday 11:30-1

Office Chase 322

3 Evaluation and Grading:

Homework For each module there will be multiple homework assignments found on Brightspace. There may look like there are a lot of assignments, but they're very short! The problems will be based on lecture/notes content and suggested textbook problems, and will be delivered using WeBWork via Brightspace. The lowest 3 homework assignments will be dropped.

Projects There will be two projects during the semester where you will have the opportunity to work out an application of the theory in this course to a real-life situation. You will have two-and-a-half weeks to complete each project. You will work on the projects in groups of 2 or 3.

Written Questions There will be one written question per week as practice to be submitted. The purpose of this is to practice communicating mathematics and check your understanding with written feedback beyond what WebWork can provide. This is just one single question, like you might have to do in WebWork – just you have to write out your solution to submit. Eight (of twelve) of these questions will count towards your grade.

Module Tests There will be five module tests throughout the course. The date of the final module test will be set by the registrar during the official Dalhousie exam period from April 10-23, 2021, and will be available when the exam schedule is posted in February. These tests will not be cumulative (in the sense that you will not be explicitly tested on material from previous modules), but this course scaffolds and therefore there is often knowledge that is needed to understand concepts in one module that were first addressed in a previous module. Tests will be available for a 24h window.

Your grade in the course will be the maximum of the following three marking schemes:

	Homework	Projects	Written Qs	Module Tests
Scheme 1	10%	20%	20%	50%
Scheme 2	15%	15%	20%	50%
Scheme 3	15%	20%	15%	50%

Module tests will be variable in how much they are worth – the test you do the best on will count a little extra (15% of your total grade), and your worst test will count a little less (5% of your total grade). $5\% + 10\% + 10\% + 10\% + 15\% = 50\%$ Important Dates:

Friday Jan 8	Project 1 is available
Monday January 25	Test 1 (Module 1 and 2)
Wednesday January 27	Project 1 is due
Monday February 15	Readubg Week
Monday February 22	Test 2 (Module 3)
Friday March 5	Project 2 is available
Monday March 8	Test 3 (Module 4)
Friday March 19	Project 2 is due
Friday March 26	Test 4 (Module 5)
Final exam period	Test 5 (Module 6)

4 Course Topics and Approximate Dates

- week 1** Discrete dynamical systems - sections 3.1-3.4
week 2 Rates of change, limits - sections 4.1-4.3
week 3 Differentiation - sections 4.4-4.5, 5.1
week 4 More derivatives - sections 5.2,5.3,5.4
week 5 Implicit derivatives, higher order derivatives and Taylor polynomials - sections 5.5,5.6,5.7
week 6 Max/Min, L'Hopital's rule, Stability of Discrete-time dynamical systems Graphing 6.1,6.4,6.7
week 7 Midterm Review and Graphing - section 6.5
week 8 Logistic equation, Differential equations, Anti-derivatives - sections 6.8, 7.1, 7.2
week 9 Definite Integrals, Area - sections 7.3,7.4
week 10 Techniques of Integration - section 7.5
week 11 Differential Equations, Equilibria, Stability - sections 8.1, 8.2, 8.3
week 12 Separable Differential Equations, Systems - sections 8.4, 8.5
week 13 Review for Exam

5 Course Policies

- We will be using Piazza for answering questions in this course – rather than emailing your content- or problem-related questions to the instructor or TAs, you are asked to post your questions on Piazza. The system is highly catered to getting you help fast and efficiently from classmates and the instructor. Before accessing Piazza, you will need to enroll in our course space at

<https://piazza.com/dal.ca/fall2020/math1215>

. You can find our class page at

<https://piazza.com/dal.ca/winter2021/math1215/home>

(both of these are also linked on Brightspace).

- For personal matters that warrant an email to be sent, please be aware that it could take some time for a response, depending on the issue. If your question is about something in the future (for example, you need an extension on something), you will get a response fairly quickly. If your question is about something in the past (for example, you're not sure about how you were graded on a problem you've already submitted), it may take a little longer for a response. Emails are answered as promptly as they can be, but please do not expect an immediate response every time.
- All homework assignments are to be completed on WeBWorK (via Brightspace). Homework extensions will not be granted after the due date has passed.
- Module tests will be open-book, meaning that you may use your notes, textbook, and other static (not changing) resources. Communicating with others about the test is strictly prohibited, as is the use of resources (online or offline) that can perform calculus operations for you. You will be given adequate time for module tests to complete the content as well as to account for any technical difficulties.
- In addition to TA student hours, this course is also supported by the online Math Learning Centre, which is available for assistance for the duration of the course. A link to this resource along with the Learning Centre hours can be found on Brightspace, listed with course student hours.

6 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/misssed-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

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

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/academic-advising.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/services-support/student-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>