

Faculty of Science Course Syllabus
Department of MATHEMATICS
MATH1215
Calculus for the Life and Social Sciences
Fall 2017

Instructor(s):	Dorette Pronk	pronk@mathstat.dal.ca	Chase 302
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Lectures:	Section 1 8:35-9:25	MCCAIN ARTS SS AUD-1 (Scotiabank Auditorium)	
	Section 2 9:35-10:25	Killam Library Macme (next to the atrium)	
Office Hours:	Section 1	Monday 10-11 AM, Wednesday 4-5 PM, Thursday 11:30-12:30	
	Section 2	MWF 12-1 PM	
Tutorials:	<i>1 hour weekly</i>		

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 Objectives/Learning Outcomes

- Determine equilibrium points of discrete dynamical systems and determine their stability using cobwebbing and derivatives.
- Determine limits and one-sided limits using limit laws and L'Hopital's rule.
- Interpret infinite limits and limits at infinity as asymptotes for a function.
- Calculate derivatives (and interpret them as rates of change) of all standard functions used in calculus except for inverse trig functions.
- Find the absolute and relative extremes of a function and determine the intervals where it is increasing and decreasing.
- Use implicit differentiation to determine related rates.
- Use the second derivative to determine inflection points and concavity of a function.
- Use Taylor polynomials to approximate a function.
- Evaluate indefinite and definite integrals

- *Find the equilibria of continuous dynamical systems and determine their stability.*
- *Determine the solutions to separable differential equations.*

Course Materials

- *Calculus for the Life Sciences: Modelling the dynamics of life, second Canadian edition by Fredrick Adler and Miroslav Lovrić*
- *Brightspace*

Course Assessment

Component	Weight (% of final grade)	Date
Tests/quizzes		
Midterm	25%	Friday October 20, 7 – 9 PM
Quizzes	10%	Online and occasionally in the tutorial
Final exam	40%	(Scheduled by Registrar)
Assignments		
Three Projects	25%	Due Oct 6, Nov 3, Dec 4
		Will be posted on September 20, October 21, November 17

Other course requirements

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)		

Course Policies

Basic or scientific calculators are allowed for tests and exams, however they will not be needed. Answers may be left in unsimplified form. No phones, tablets, graphing or programmable calculators are allowed for the test or exam. We will allow a hand-written crib sheet.

Course Content

week 1 Discrete dynamical systems - sections 3.1-3.3 (only caffeine model)
 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 Autonomous Differential Equations, Equilibria, Stability - sections 8.1, 8.2, 8.3
week 10 Techniques of Integration - section 7.5
week 11 Definite Integrals, Area - sections 7.3,7.4
week 12 Separable Differential Equations, Systems - sections 8.4, 8.5
week 13 Review for Exam

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

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 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**Research Lab Safety**

https://www.dal.ca/content/dam/dalhousie/pdf/dept/safety/lab_policy_manual_2007.pdf

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>

(Note that Professor Pronk is allergic to scented products such as perfumes and aftershaves; please refrain from wearing these products to class or when coming to office hours.)