DALHOUSIE UNIVERSITY

# Faculty of Science Course Syllabus
# Department of Mathematics and Statistics
# Math 1010
# Differential & Integral Calculus II
# Winter 2025

**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 Instructors

| Section | Instructor | E-mail Address | Office Hours |
|---|---|---|---|
| 01 | Rob Noble | rnoble@dal.ca | MWF 9:15 AM – 10:15 AM in Chase 205 |
| 02 | Alan Surovell | alan.surovell@dal.ca | MWF 10:30 AM – 11:30 AM in Chase 116 |
| 03 | Rob Noble | rnoble@dal.ca | MWF 9:15 AM – 10:15 AM in Chase 205 |

## Course Description

A continuation of the study of calculus with topics including: Riemann sums, techniques of integration, elementary differential equations and applications, parametric equations and polar coordinates, sequences and series, Taylor series.

### Course Prerequisites

MATH 1000.03, or MATH 1215.03 with a grade of B or better.

## Student Resources

- The **MATH/STAT Learning Centre** is located in Chase 119 and will be operating in-person and remotely. It opens on January 6, 2025 and support is available Monday through Friday from 11:30 AM – 4:30 PM and Monday through Friday evenings from 6:30 PM – 7:30 PM, until April 26, 2025. Register for the Brightspace "course" at https://www.dal.ca/faculty/science/math-stats/about/learning-centre.html to access the online support and see the latest schedule.

# Course Structure

## Course Delivery

In person (not recorded).

## Lectures

| Section | Days | Time | Location |
|---|---|---|---|
| 01 | MWF | 1:35 PM – 2:25 PM | LSC-COMMON AREA C240 |
| 02 | MWF | 8:35 AM – 9:25 AM | LSC-COMMON AREA C236 |
| 03 | MWF | 12:35 PM – 1:25 PM | CHEMISTRY 226 |

## Tutorials

| Section | Day | Time | Location |
|---|---|---|---|
| T02 | M | 5:35 PM – 6:25 PM | SIR JAMES DUNN BUILDING 304 |
| T03 | W | 2:35 PM – 3:25 PM | CHEMISTRY 223 |
| T04 | W | 3:35 PM – 4:25 PM | LSC-COMMON AREA C332 |
| T05 | M | 1:35 PM – 2:25 PM | LSC-COMMON AREA C208 |
| T06 | F | 10:35 AM – 11:25 AM | SIR JAMES DUNN BUILDING 304 |
| T07 | R | 1:35 PM – 2:25 PM | SIR JAMES DUNN BUILDING 304 |

- Tutorials begin the week of January 13, 2025.
- Tutorials will not be held during study break or during weeks in which there is a scheduled university closure: There will be no tutorials held during the following weeks: February 3 – 7, February 17 – 21.

# Course Materials

- The primary source of material is Dr. Noble's complete set of course notes, which will be available under **Content** on Brightspace.
- Additional resources for material or practice problems:
  - J. Stewart, "Calculus - Early Transcendentals" (any edition).
  - G. Strang and E. Herman, "Calculus Volume 2", OpenStax. Available from https://openstax.org/details/books/calculus-volume-2.
- Brightspace: This course has a major presence on Brightspace. To access your Math 1010 course on Brightspace you may login to: https://dal.brightspace.com/d2l/login. It is important that you familiarize yourself with the systems requirement for proper access to Brightspace.

  You will need at various times to gain information from different areas of Brightspace. Most importantly:

  1. The course syllabus as well as links to the online assignments can be found under **Content**.
  2. Your grades can be found under **Assessments**.
- Webwork: Your online assignments will appear in webwork, accessed through links appearing under **Content** in Brightspace.

## Assessment

The final grade will be computed as the maximum of the grades obtained from the following two schemes:

**Scheme I:**

| Component | Weight (% of final grade) | Date |
|---|---|---|
| Tutorial Quizzes | 5% | Weekly |
| Midterm Exam | 25% | February 26, 2025 (6:30 PM – 8:30 PM) |
| Final Exam | 50% | (Scheduled exam period) |
| Online Assignments | 20% | ∼3 per week |

**Scheme II:**

| Component | Weight (% of final grade) | Date |
|---|---|---|
| Tutorial Quizzes | 5% | Weekly |
| Final Exam | 75% | (Scheduled exam period) |
| Online Assignments | 20% | ∼3 per week |

**Note: It is strongly recommended that you prepare yourself to be graded on the first scheme; the second scheme is included in order to accommodate students who fail to perform up to their ability on the midterm due to circumstances beyond their control.**

Conversion of numerical grades to final letter grades follows the Dalhousie Grade Scale.

| | | |
|---|---|---|
| A+: (90–100) | A: (85–89) | A-: (80–84) |
| B+: (77–79) | B: (73–76) | B-: (70–72) |
| C+: (65–69) | C: (60–64) | C-: (55–59) |
| D: (50–54) | F: (0–49) | |

## General Course Policies

- On exams, we recommend that answers be left in unsimplified form.
- Calculators will NOT be allowed during tutorial quizzes, the midterm or the final examination. In fact, only writing utensils (pencils, lead, erasers, pens, white-out) will be allowed.
- Information about the course may be given during class. It is the responsibility of the students to ensure that they are made aware of what occurs during classes.

## Course Policies on Missed or Late Academic Requirements

- Missed midterms or final exams can be made up, at the discretion of the course instructor for illness or equivalent official inability to write at the scheduled time and place. Please contact your instructor for more information or to request permission to write the scheduled make-up midterm or final exam.
- Missed tutorial quizzes **cannot be made up** under any circumstances. However, Student Declaration of Absence forms (maximum of 2) will be accepted for missed tutorial quizzes. SDAs should be completed, signed and e-mailed to Dr. Noble (rnoble@dal.ca) within 3 days of the missed tutorial.

## Course Policies related to Academic Integrity

- Students are permitted to work together on the online assignments.
- No collaboration is permitted on tutorial quizzes, the midterm nor the final exam.

## Learning Objectives

- Understand the significance and various methods of evaluation of integrals.
- Understand how to utilize parametric representations of plane curves.
- Be able to compute areas and arc lengths associated with general parametric curves and specifically for curves defined by both cartesian and polar coordinates.
- Understand the significance of sequences, series and their associated convergence behaviour.
- Understand power series as well as the extent to which functions can be represented by Taylor/MacLaurin series.

## Course Content

The material to be covered consists of Chapters 6 – 8, 10, and 11 from Dr. Noble's Math 1010 course notes (based off of a previous textbook). An approximate week-by-week breakdown is as follows:

| Date | Topic | Tutorial |
|---|---|---|
| January 6 – 10 | Introduction<br>§6.1 Areas between curves | No tutorials |
| January 13 – 17 | §7.1 Integration by parts<br>§7.2 Trigonometric integrals | Tutorial 1 |
| January 20 – 24 | §7.3 Trigonometric substitution<br>§7.4 Integration of rational functions by partial fractions | Tutorial 2 |
| January 27 – 31 | §7.4 Integration of rational functions by partial fractions (continued)<br>§7.5 Strategy for integration | Tutorial 3 |
| February 3, 5 | §7.8 Improper integrals<br>§8.1 Arc length | No tutorials |
| **February 7** | **Munro Day – No Class** | |
| February 10 – 14 | §10.1 Curves defined by parametric equations<br>§10.2 Calculus with parametric curves<br>§10.3 Polar coordinates | Tutorial 4 |
| **February 17 – 21** | **Study Break – No Classes** | No tutorials |
| February 24 – 28 | §10.3 Polar coordinates (continued)<br>§10.4 Areas and lengths in polar coordinates<br>§11.1 Sequences | Tutorial 5 |
| **February 26** | **Midterm: 6:30 PM – 8:30 PM** | |
| March 3 – 7 | §11.1 Sequences (continued)<br>§11.2 Series | Tutorial 6 |
| March 10 – 14 | §11.3 The integral test and estimates of sums<br>§11.4 The comparison tests<br>§11.5 Alternating series | Tutorial 7 |
| March 17 – 21 | §11.6 Absolute convergence and the ratio and root tests<br>§11.7 Strategies for testing series | Tutorial 8 |
| March 24 – 28 | §11.8 Power series<br>§11.9 Representations of functions as power series | Tutorial 9 |
| March 31 – April 4 | §11.10 Taylor and Maclaurin series | Tutorial 10 |
| April 7 | Final exam review / "Catch-up" time | |

*Classes on April 7 follow a Friday schedule.

# 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.

## Student Resources and Support

### University Policies and Programs

Important Dates in the Academic Year (including add/drop dates): http://www.dal.ca/academics/important_dates.html

Classroom Recording Protocol: https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html

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

Grade Appeal Process: https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html

Sexualized Violence Policy: https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html

Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html

### Learning and Support Resources

General Academic Support - Advising (Halifax): https://www.dal.ca/campus_life/academic-support/advising.html

General Academic Support - Advising (Truro): https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): https://www.dal.ca/campus_life/academic-support/On-track.html

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Indigenous Connection: https://www.dal.ca/about-dal/indigenous-connection.html

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803: https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf

Black Student Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre.html

South House Sexual and Gender Resource Centre: https://southhousehalifax.ca/about/

LGBTQ2SIA+ Collaborative: https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html

Dalhousie Libraries: http://libraries.dal.ca/

Copyright Office: https://libraries.dal.ca/services/copyright-office.html

Dalhousie Student Advocacy Services: https://www.dsu.ca/dsas?rq=student%20advocacy

Dalhousie Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Human Rights and Equity Services: https://www.dal.ca/dept/hres.html

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Study Skills/Tutoring: http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Faculty of Science Advising Support: https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html

## Safety

Biosafety: http://www.dal.ca/dept/safety/programs-services/biosafety.html

Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html

Radiation Safety: http://www.dal.ca/dept/safety/programs-services/radiation-safety.html

Laser Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html