MATH2004C
Multivariable Calculus for Engineering or Physics Winter 2022

Instructor: Mathieu Lemire
Office: 5250 Herzberg Building
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E-mail: mathieul@math.carleton.ca or through Brightspace.

Lectures: This is an online course. The lectures will be in the form of short videos posted on cuLearn. Batches of videos will be posted twice a week by Tuesdays and Thursdays by 18:05 (or earlier). The first virtual class should appear on cuLearn on Tuesday January 11th.

Tutorials: Tutorials are scheduled to be on Thursdays from 20:05 to 20:55. The first tutorial is on January 20th. Tutorials should be held live and online. More details to follow.The following table give more details:

Section	TA's name	TA's connect email
C1	Janani Sivathayalan	jananisivathayalan@cmail.ca
C2	Joseph Gondek	josephgondek@cmail.carleton.ca
C3	Anna Gow	annagow@cmail.carleton.ca
C4	Noah Rubin	noahrubin@cmail.carleton.ca

Tutorials should be live on cuLearn at the indicated times. Recording of the tutorials shall then be available on cuLearn under 'Tutorials'

Office hours: To be announced later

Textbook: The ABC's of Calculus, Volume 2 by Angelo Mingarelli. You can buy access to this book for 120 days via this link: https://mingarelli.com/books/the-abcs-of-calculus-multi-variable/ There is also a free solutions manual for this book, available under https://people.math.carleton.ca/angelo/calculus/ABC2-Solutions-Apr22-2021-Pandemic.pdf.

Prerequisites: MATH1005 or MATH2007; and MATH1104 or MATH1107; or permission of the School. Precludes additional credit for BIT2005, MATH2000, and MATH2008

Evaluation: Your final grade will be calculated as:

Assignments (45 %) + 2 Tests (30 %) + Final Examination 25%

Term Mark: There will be two tests administered online around the official time of our class (18:05 to 19:25) on **Thursday February 17** and **Thursday March 24th** . Each test will be 80 minutes long. **No make up, early or delayed tests will be given.**

Final exam: This is a three (3) hour open-book exam scheduled by the University during the final exam period from April 14-28, 2022. By open-book, it means you may consult the course materials. Collaboration with another person on the solution is prohibited. When the exam is completed, you are given 20 minutes to upload your solution. It is the responsibility of each student to be available at the time of the examination. Students who missed the final examination may be eligible for a deferred exam provided that they present a doctor note or another supporting document to the Registrars Office. It is the Registrars Office and not the instructor which take decision of granting a deferred examination. After the exam is written, students may see their final examination papers. This examination review is for educational purpose only and NOT for negotiation of the grade.

Calculators: Only non-programmable and non-graphical calculators are allowed for tests and the final exam.

Practice problems lists Practice problems lists will regularly be posted on cuLearn. These problems are not to be handed in and will not be graded. However, in order to succeed in the course, it is absolutely essential to practice on a regular basis.

Assignments: They will be given regularly. You will be given sufficient time to work on them. You are advised to start your work as early as possible. Delaying your work until the last minutes is never a good idea.

Solution submission for assignments, tests and final exam: For long answers questions, you will be required to submit your work as one .pdf document (and not several separated files). No other format will be acceted for grading. If your solution is scanned, make sure to convert it into the .pdf format. Make sure that you submit the correct work. No extra time will be given for this.

Withdrawal: The last day for academic withdrawal is **April 12th**.

Students with Disabilities: Students with disabilities who require academic accommodations in this course are encouraged to contact the Paul Menton Centre for Students with Disabilities to complete the necessary Letters of Accommodation. After registering with the PMC, make an appointment to meet with me and discuss your needs in order to make the necessary arrangements as early in the term as possible. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Notes:

1. If you are in the impossibility of doing a test, please let me know as soon as possible by writing to me an email.

2. Problem lists, comments, solutions and other informations will regularly be posted on Brightspace. It is your responsibility to look on Brightspace to obtain these informations.

3. **I will not necessary follow the same order of topics as in the textbook. The best way to know where exactly we are in class is to come to class or to follow the order of topics found in the practice problems lists.**

4. Following the online virtual classes is very important and I strongly encourage you to do so.

5. **Pregnancy accommodation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services webpage.

6. **Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services webpage.

Course schedule

- Week 1

  Vectors in the Plane and Space (textbook sections 1.1-1.10; homework problem sets 1-4)

  Rotations of Axes and Translations in the Plane (textbook sections 2.1-2.6; homework problem sets 5-9).

- Week 2

  Planar Curves and Conic Sections (textbook sections 2.7 and 2.8; homework problem sets 10-16).

  Applications to Area and the Length of Curves (textbook sections 2.9-2.10; homework problem sets 17 and 18).

- Week 3

  Polar Coordinates and Applications (textbook sections 2.11-2.14; homework problem sets 19-22).

  Limits, Continuity, and Partial Derivatives (textbook sections 3.1-3.3; homework problem sets 23-25).

- Week 4

  Multivariate Differentiability, Directional Derivatives and Gradients (textbook sections 3.4-3.5; homework problem sets 26-28).

  The Chain Rule, Implicit Differentiation, Tangent Planes and Normal Lines (textbook section 3.6; homework problem sets 29 and 30).

- Week 5

  Conservative Fields, Divergence and Curl (textbook section 3.7; homework problem set 31).

  Line Integrals (textbook sections 4.1-4.3; homework problem sets 32-34).

- Week 6

  Double Integrals and Iterated Integrals (textbook sections 5.1 and 5.2; homework problem sets 35-38).

  Applications to the Volume under a Surface (textbook section 5.3; homework problem set 39).

- Week 7

  Change of Variables in Double Integrals (textbook section 5.4; homework problem set 40).

  Three-dimensional Plots (textbook section 5.5; homework problem set 41).

- Week 8

  Parametric Equations of Surfaces (textbook section 5.6; homework problem set 42).

  Surface Integrals and Some Applications (textbook sections 6.1 and 6.2; homework problem set 43).

- Week 9

  Green's Theorem (textbook section 6.3; homework problem set 44).

  Stokes' Theorem (textbook section 6.4; homework problem set 45).

- Week 10

  Triple Integrals (textbook sections 6.5 and 6.6; homework problem set 46).

  Describing Solids in Cylindrical and Spherical Coordinates (textbook section 6.7; homework problem set 47).

- Week 11

  The Divergence Theorem (textbook section 6.8; homework problem set 48).

  Taylor Polynomials, Maxima and Minima, Lagrange Multipliers (textbook sections 7.1-7.3; homework problem sets 49 and 50).

- Week 12

  Volumes of Solids of Revolution, Centroids and Centers of Mass, and the Area of a Surface (textbook sections 7.4-7.6; homework problem set 51).

Note: The above is a tentative schedule and may be subject to change depending on the progress of the course.