

**MATH1009C**  
**Calculus with Applications to Business and Economics Winter 2021**

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**Lectures:** This is an online course. The lectures will be in the form of short videos posted on cuLearn. Batches of Videos shall be posted twice a week on Wednesdays and Fridays before 13:05 (or earlier). The first virtual class should appear on cuLearn by January 13th.

**Tutorials:** Tutorials are scheduled to be on Fridays from 14:35 to 15:25. The first tutorial is on January 22nd. The following table give more details:

| Section | Room | TA's name | TA's connect email |
|---------|------|-----------|--------------------|
| C1      | -    | TBA       | -                  |

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

**Office hours:** By appointment on Zoom or FaceTime or in virtual room on cuLearn. Please write to me at mathieul@math.carleton.ca to schedule an appointment.

**Textbook:** "Elementary Calculus with Applications", by E. Devdariani . Any edition may be used. The textbook is available at the Campus Bookstore <https://www.bkstr.com/carletonstore/home> and at Haven Books, (613) 730-9888.

**Prerequisites:** MATH1004 or a grade of C- or higher in MATH1007; or permission of the school.

**Evaluation:** Your final grade will be calculated as:

$$\text{Term Mark } 60 \% (\text{best } 3 \text{ tests among } 4) + \text{Final Examination } 40\%$$

**Term Mark:** There will be four 'open book' tests administered online around the time of tutorials on **February 5th, February 26th, March 12th** and **March 26th** . **No make up, early or delayed tests will be given.**

**Final exam:** The final exam is a cumulative 'open book' three hours closed book exam scheduled by the university. The exam period runs from April 16 to April 27th (including Saturdays). It is student's responsibility to be available at the time of the examination. Naturally, the final examination will take place online. 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. The practice questions will be taken from the textbook for the course.

**Withdrawal:** The last day for academic withdrawal is **April 14th**.

**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. The best three tests out of four will be used to determine the test component of your final mark. If you are in the impossibility of doing a test, please let me know as soon as possible by writing to me an email. In the case that you miss more than one test, then the procedure during this different term is to first fill up the Student Declaration Form: <https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf> and then send it to me (the professor and only the professor) by email. In the declaration form, you must write the reasons of your absence. Due to the current situation, you do not need to obtain and send a medical note. Once you do this (and only then) then the weight of your missed tests may be moved to the final exam.
2. Problem lists, comments, solutions and other informations will regularly be posted on cuLearn. It is your responsibility to look on cuLearn 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.

List of topics:

### Elementary Functions (Ch 1)

1.1. Definition, domain range. 1.2 Algebra of functions. 1.3 Transformation of graphs.  
1.4 Polynomial, rational, power functions. 1.5 Exponential functions. 1.6 Logarithmic functions.

### Limits (Ch 2)

2.1 The limit of a function at a point. 2.2 Properties of limits. 2.3 Limits at infinity.  
2.4 Continuous functions. The Intermediate Value Theorem.

### The Derivative and Rules of Differentiations (Ch 3)

3.1 The derivative as the rate of change and as the slope of the graph of a function.  
3.2 Basic rules of differentiation. Power Rule. Product and Quotient Rules. Chain Rule. Implicit differentiation. 3.3. Higher order derivatives.

### Applications of the Derivative (Ch 4)

4.1 Determining the intervals where a function is increasing/decreasing. 4.2 Marginal Concepts in Economics.  
4.3 Elasticity of Demand. 4.5 Maximum and minimum values. 4.6 Second derivative. 4.7 Curve sketching.  
4.8 Optimization problems. 4.9 Exponential models (continuously compounded interest, exponential growth and decay, learning curves).

### Functions of Several Variables (Ch 5)

5.1 Examples of Functions of Two and Three Variables. 5.2 Partial Derivatives.  
5.3 Maxima and Minima of Functions of Two Variables. 5.4 Lagrange Multipliers. Constrained Optimization.

### Integration (Ch 6)

6.1 Antiderivative. Basic rules of integration. 6.2 Integration by substitution.  
6.3 The definite integral. 6.4 The Fundamental Theorem of Calculus. 6.5 Evaluation of definite integrals.