

MATH 1009* A (Winter 2021)

Calculus with Applications to Business and Economics

NOTE: The whole course will be delivered online using CULearn

Instructor: Professor B. Szyszkowicz

Contact: Email: bszyszko@math.carleton.ca

Office hours: online by appointment. Please email the instructor to schedule.

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](https://www.bkstr.com/carletonstore/home) and at Haven Books, (613)730-9888.

Lectures: Asynchronous, posted on CULearn, beginning on January 12, every Tuesday & Thursday. All lectures end on April 14.

Tutorials: Live online (using BBB on CULearn), beginning January 21, Thursdays 16:35 - 17:25. On the tutorial sessions the students are expected to work individually on specific problems. A Teaching Assistant (TA) will be present, to answer questions and to administer the tests. The class will be subdivided into tutorial groups alphabetically, according to the last names. The subdivision and the names of the TAs will be posted later.

Evaluation:

(1) Term Mark 60% (4 tests, 3 best count)

(2) Final Examination 40%.

Term mark : There will be four "open book" tests online in the regular tutorial hours: on February 4, February 25, March 11, March 25. Further instructions will be provided before tests.

Students are expected to take all four tests. The best three will be counted. There will be **ABSOLUTELY NO** make-up tests as we do not have the resources to provide such tests. This lack of resources is the reason why the students are allowed to miss one test without penalty. The instructor **will not answer any emails from the students asking about the possibilities of make-up tests**. In case when a student misses more than one test due to illness (supported by a doctor note) jury duty or extreme personal misfortune, the term mark may be pro-rated.

Final Examination: This is a 2-hour "open book" exam scheduled by the University. The exam is taking place during the period of April 16 to 27 (including Saturdays and Sundays). It is each student's responsibility to be available at the time of the examination. It is each student's responsibility to find out the correct date and time of the exam. Students who missed the examination may be eligible for a deferred exam, provided that they present a doctor note or another supporting document to the Registrar's Office. It is the Registrar's Office (not the course Instructor!) which makes the decision of granting a deferred examination. After the deferred exam is written, all questions should be directed to the School of Mathematics and Statistics and not to the Instructor.

Calculators: Calculators are allowed for tests and the exam.

Homework: Students are expected to do every exercise from the textbook. These exercises are not to be handed in and will not be graded. However, in order to succeed in the course, it is absolutely essential to do the exercises on a regular basis.

Online help: Math & Statistics Learning Assistance Program (**MS-LAP**) supports first year mathematics and statistics courses. This free of charge program provides learning support and solutions to homework questions through assistance videos. These services are available on **CULearn**.

MS-LAP gives students tools to succeed while explaining step-by-step particular problem strategies and associated theory. The program is for anyone who wants to deepen their understanding at their own pace, and in the comfort and privacy of their home.

Academic Accommodation: You may need special arrangements to meet your academic obligations during the term because of disability, pregnancy or religious obligations. You can visit the Equity Services web site to view the policies and to obtain more detailed information on academic accommodation at <http://carleton.ca/equity/accommodation>.

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Please consult the PMC website for the deadline to request accommodations for the formally scheduled exam (if applicable).

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. 4.4 Related Rates. 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.

NOTE: The above is a very approximate outline only. Students are responsible for checking **CULearn** regularly, where all course material, additional information (and any changes, if needed) will be posted.