

MATH 1009* A (Winter 2020)

Calculus with Applications to Business and Economics

Instructor: Professor B. Szyszkowicz **Office:** 5249 HP (Herzberg) **Phone:** (613) 520 -2600, ext. 2140
Email: bszyszko@math.carleton.ca Students may see the instructor in the instructor's office during the office hour: **Monday, 3:00-4:00.** If this is not possible, email the instructor to schedule an appointment.

Textbook: *Elementary Calculus with Applications (Lecture Notes)*, by **E. Devdariani** The textbook is available at the Campus Bookstore and at Haven Books, 43 Seneca Street, (613) 730-9888 (5-min walk from campus, two blocks from Bronson Avenue along Sunnyside Avenue). There are four editions; any may be used.

Prerequisites: Ontario Grade 12 Mathematics: Advanced Functions and Introductory Calculus, or an OAC in Calculus; or MATH 0007; or equivalent.

Lectures: every **Tuesday and Thursday 2:35- 3:55**, in TB 340. Lectures begin on Monday, January 6 and end on Tuesday, April 7 (so our first lecture is on Tuesday, January 7).

Tutorials: Thursday 4:35 – 5:25. Tutorials start on Monday, January 13 (so our first tutorial is on January 16). For the location, please check Carleton Central website. On the tutorial sessions (when there is no tests) students are expected to work in small groups or individually on specific problems. A Teaching Assistant (TA) will be present, to answer questions and to administer the tests.

Final Mark: (1) **Term Mark 40%** (2) **Final Examination 60%**.

Term Mark

There will be four tests held in the regular tutorial hours on **January 30, February 13, March 5 and March 19**. Students are expected to take all 4 tests. The best 3 tests will be counted. There will be **no make-up tests** as we do not have the resources to provide such tests. This is the reason why the students are allowed to miss one test without penalty. The instructor reserves the right not to answer individual e-mails concerning make-up tests. In the case when a student **misses more than one test** due to illness (supported by a doctor's note), jury duty or extreme personal misfortune, the term mark may be pro-rated. Please contact the instructor should such a case arise. It is each student's responsibility to pick up the marked test from the TA. Usually the test papers are distributed in the tutorial session following the date of the test.

Final Examination

This is a 3- hour exam scheduled by the University. **It is each student's responsibility** to be available at the time of the examination. In particular, no travel plans should be made until the examination schedule is published. **It is each student's responsibility** to find out the correct date and time of the exam and the room where it takes place.

Note: to pass this course, a student must obtain at least 50% of total **and** at least 30% of the final exam mark.

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!) that 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: ONLY non-programmable calculators are allowed for tests and for the final 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, to succeed in the course it is **absolutely essential** to do the exercises on a regular basis.

Tutorial Centre (3422 HP) <http://carleton.ca/math/math-tutorial-centre/> This is a drop-in centre providing a one-to-one tutorial service, free of charge, for Q-year and first year students on a "first come first serve" 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.

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 website 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.