



**PLEASE NOTE THAT CHANGES COULD BE MADE TO THIS COURSE OUTLINE
UP TO JANUARY 16, 2026**

ECON 1402 B

Elementary Mathematics for Economics II

Professor M. Demers

Winter 2026

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Office Hours: Wednesday 10:30 a.m.-11:30 a.m and online by appointment.

TA:

Email :

TA office hours : TBA

TA office location : TBA

Lecture Time: Wednesday 11:35 a.m. – 2:25 p.m.

Course location and delivery mode : ME3380 In person

Brightspace Course Page: <https://brightspace.carleton.ca/d2l/home/365072>

Course Objectives:

- Learn how to find derivatives of univariate functions and partial derivatives of multivariate functions.
- Learn concavity and convexity of functions and their importance in optimization problems.
- Apply these concepts in economic optimization problems without constraints.
- Apply these concepts in economic optimization problems with constraints.
- Emphasize in class participation in solving practice problems.

Prerequisite(s): ECON 1001 or ECON 1000 or FYSM 1003 with a grade of C- or higher,
and ECON 1401 or MATH 1401 with a grade of C- or higher.

Precludes additional credit for BIT 1000, BIT 1001, BIT 1100, BIT 1101, BIT 1201, BIT 1200, MATH 1007, MATH 1009, MATH 1104, MATH 1107, MATH 1119, MATH 1052, MATH 1152.

Required textbook for the course:

Geoff Renshaw, *Maths for Economics*. Oxford: Oxford University Press, 5th edition. ISBN: 978-0-19-883950-7 Available from Carleton University Bookstore. Rent for 180 days: \$53.99; for 365 days \$62.30. Buy New \$105.75 Digital \$83.06.

COURSE OUTLINE

Every week part of the lecture time will be devoted to solving practice problems in class.

Required readings are indicated with a star (*). The coverage of some topics will be determined in class and on Brightspace.

1. Optimization with one independent variable

1.1. Derivatives and differentiation

*Textbook chapter 6

1.2. Applications of derivatives:

Optimization: maximum, minimum, point of inflection

*Textbook chapter 7

1.3. Economic applications of functions and derivatives:

Profit maximization, revenue maximization and cost minimization

*Textbook chapter 8

1.4. Elasticity of supply, demand and other applications

*Textbook chapter 9

1.5. Derivatives of exponential and logarithmic functions and applications

*Textbook chapter 13

2. Optimization with two or more independent variables

2.1. Partial derivatives of functions of two or more independent variables

*Textbook chapter 14

2.2. Maximum and minimum values, saddle points, the total differential

Economic applications: profit maximization, cost minimization

*Textbook chapter 15

2.3. Constrained maximum and minimum and applications

The substitution method

The Lagrange method

Utility maximization or output maximization subject to a cost constraint

Cost minimization subject to an output constraint

*Textbook chapter 16

2.4. Returns to scale, homogeneous functions and the proportionate differential

*Textbook chapter 17

3. Integration with applications

Deriving the total cost function from the marginal cost function

Deriving the total revenue function from the marginal revenue function

The consumer surplus and producer surplus

*Textbook chapter 18

Practice Problems:

Each week, students will be assigned Progress exercises and other exercises. Students are encouraged to work through as many problems as possible, since this is the best way to learn the course material and prepare for the assignments and exams.

Tutorials:

There will be a weekly tutorial given by the TA. The tutorial will review solutions to specific problems assigned in class on a weekly basis. Attendance is highly recommended. There will also be an opportunity for you to ask questions to the TA about solutions to specific problems.

Tutorial time:

Friday section B01 11:35-12:25 PM

Tutorial location:

Friday section B01
SA 518

Course Evaluation:

The basis for determining your final grade in this course is as follows:

Assignment/Exam	Date		% of grade
Assignment 1	Given on January 28 and due on February 4	Submit on paper in class or online in the drop box.	10
Midterm 1	February 11	In person	20
Assignment 2	Given on March 4 and due on March 11	Submit on paper in class or online in the drop box.	10
Midterm 2	March 18	In person	20
Final exam	Final exam period		40
Total			100

Information About Assignments

There will be 2 Assignments. They will be due at the beginning of class. You may submit in person on paper. Alternatively, you may submit electronically on Brightspace. Your answers must be clearly written and all steps to a solution must be given.

Assignments will consist of solving problems on material covered in class and in the textbook.

Assignments should be done individually as the purpose is to learn the material.

The answers to the assignment will be discussed in class or during the tutorial.

Generative Artificial Intelligence tools such as ChatGPT may not be used.

Late assignments will not be accepted because the solutions will be discussed in class on the due date.

Students who miss an assignment for a valid reason (illness, family emergency, etc..) will have the associated weight added to that of the final exam. Please get in touch with me by email to let me know that you will not be able to give an assignment.

Information About Exams

The midterms and the final exam are closed book examinations.

Unless otherwise specified, Midterm 1 will focus on topics 1.1, 1.2, 1.3, 1.4 and 1.5

Unless otherwise specified, Midterm 2 will cover topics 2.1, 2.2 and 2.3

The final exam is comprehensive (it will cover the whole material unless specified otherwise).

The final exam will be in-person as scheduled by the University during the exam period. Students are not to make travel plans during the exam period as that is not a valid reason for missing a final exam.

Students who miss a midterm exam for a valid reason (illness, family emergency, etc..) will have the associated weight added to that of the final exam. If you are absent for a midterm, please email me as soon as possible. I reserve the right to request a Self-Declaration form or PMC letter of accommodation depending on the length of incapacitation.

Should the final exam be missed for any reason, a grade of F will be assigned, and the student must arrange for the possibility of a deferred examination through the Registrar's Office within 3 working days of the exam. If granted by the Registrar's Office, this exam will take place during the time designated in the Calendar. Special final exams (or mid-terms) will not be given.

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean. Application to write a deferred final examination must be made at the Registrar's Office.

Satisfactory Performance Criteria

Students must fulfill all of the course requirements, including the final exam, in order to achieve a passing grade (D- or higher).

Deferred Finals

Students who do not write the final examination because of illness or other circumstances beyond their control may apply for to write a deferred final examination by contacting the Registrar's Office (RO) no later than three working days after the original final examination was scheduled. If a student writes a deferred examination, the deferred examination will carry the same weight as the final examination in determining the course grade. Any deferred examination will not be identical to the original final examination.

Deferred finals (which must be applied for at the RO) are only available if the student is in good standing in the course, so if there is a minimum standard a student must meet in order to be in good standing, and entitled to write a deferred final exam, this standard must be stipulated here.

Brightspace and e-mail:

This course will make use of Brightspace.

Lecture notes, review questions, problems, references to additional readings and any other material will be posted on Brightspace. Class announcements will be sent by e-mail using Brightspace.

It is each student's responsibility to check this website for posted material as well as the Carleton University email system for correspondence. If you do not have a Brightspace account, visit <https://carleton.ca/brightspace/>

Re-marking:

Any request for the remarking of exams or assignments must be submitted in writing within two weeks of that assignment or exam first being returned to the class. The request should contain a detailed explanation of why you feel you should receive a higher mark. Please note that remarking will apply to the entire assignment or exam, and not just to the contentious question. As a result, the revised mark may be higher than, lower than or the same as the original mark.

Intellectual Property Rights Regarding Course Material:

Please note: "Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copy protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s). Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s)." (See <https://carleton.ca/provost/2015/calendar-dates-and-course-materials-sharing-website/>)

PLAGIARISM, RESOURCES AND MENTAL HEALTH, ACADEMIC ACCOMODATIONS

Plagiarism

The University [Academic Integrity Policy](#) defines plagiarism as “*presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.*” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, artworks, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to:

- any submission prepared in whole or in part, by someone else, including the unauthorized use of generative AI tools (e.g., ChatGPT);
- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another’s data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one’s own; and
- failing to acknowledge sources through the use of proper citations when using another’s work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course’s instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of “F” for the course.

For the full policy please refer to the [Academic Integrity Policy](#).

Resources and Mental Health

Statement on Student Mental Health: As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. Here is a list that may be helpful:

Emergency Resources (on and off campus): <https://carleton.ca/health/emergencies-and-crisis/emergency-numbers/>

Carleton Resources:

- Mental Health and Wellbeing: <https://carleton.ca/wellness/>
- Health & Counselling Services: <https://carleton.ca/health/>
- Paul Menton Centre: <https://carleton.ca/pmc/>
- Academic Advising Centre (AAC): <https://carleton.ca/academicadvising/>
- Centre for Student Academic Support (CSAS): <https://carleton.ca/csas/>
- Equity & Inclusivity Communities: <https://carleton.ca/equity/>

Off Campus Resources:

- Distress Centre of Ottawa and Region: (613) 238-3311 or TEXT: 343-306-5550, <https://www.dcottawa.on.ca/>
- Mental Health Crisis Service: (613) 722-6914, 1-866-996-0991, <http://www.crisisline.ca/>
- Empower Me: 1-844-741-6389, <https://students.carleton.ca/services/empower-me-counselling-services/>
- Good2Talk: 1-866-925-5454, <https://good2talk.ca/>
- The Walk-In Counselling Clinic: <https://walkincounselling.com>

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy 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 accommodation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form ([click here](#)).

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 [click here](#).

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). After requesting accommodation from PMC, meet with

me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: <https://carleton.ca/equity/sexual-assault-support-services>

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. 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. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

Share: [Twitter](#), [Facebook](#)

Short URL: <https://carleton.ca/economics/?p=4467>