ECON 3001 A: Mathematical Methods of Economics
Fall 2023
Carleton University
Department of Economics
Instructor: Eric Stephens
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Meeting Times:

Lectures: Fridays, 8:35-11:25am. Log into Carleton Central to view the location on your timetable.

Tutorial: Fridays, 1:05-2:25pm. Log into Carleton Central to view the location on your timetable.

Office hours: Fridays, 11:35-12:55 p.m, Loeb D-898.

Website: Accessible at `https://brightspace.carleton.ca`

T.A office hours: TBA

Required Textbook:

The course will follow *Fundamental Methods of Mathematical Economics*, 4th edition,McGraw Hill, by A.C. Chiang and K. Wainwright, ISBN-13 9780070109100. All other course materials will be provided on the web-page at `https://brightspace.carleton.ca`.

Course Objectives:

This course is designed to provide students with a knowledge of some of the basic mathematical tools used in economic theory. Topics include: Concave and convex functions, homogeneous and homothetic functions, equilibrium analysis, implicit functions and implicit differentiation. We also study constrained optimization and the envelope theorem, as well as comparative static methods applied to models such as utility maximization and least-cost production. If time permits, we shall provide some coverage of economic models involving integration and differential equations.

Prerequisites:

ECON 1001 or ECON 1000 or FYSM 1003 with a grade of C- or higher; and ECON 1401 and ECON 1402 (or equivalent) with a grade of C- or higher in each and a combined grade point average in ECON 1401 and ECON 1402 of 6.50 or higher. Students who believe they have taken a similar background course or courses from another university must provide appropriate documentation to the Department of Economics Undergraduate Administrator. A grade of C+ or higher is required to qualify for ECON 4001, ECON 4020, ECON 4021, ECON 4025, ECON 4026 and a grade of C- or higher for ECON 4053. DEF(erred final grade) status at the end of this course precludes (continued) registration in any other course for which the former is a prerequisite. This class precludes additional credit for ECON 2400 (no longer offered).

Statement of Expectations:

It is assumed that students who have the prerequisites for this course and are therefore allowed to remain enrolled, have in fact learned all of the associated materials. In particular, students are expected to know fairly well the materials covered in MATH/ECON 1401 and MATH/ECON 1402

as outlined in the official Calendar descriptions for these courses:

1. Functional relations: including functional forms and error terms.

2. Graphing economic magnitudes: scatter diagrams, time-series graphs, and functional relationships.

3. Applied calculus: the mechanics of differentiation and integration, elasticity, and consumer/producer surplus.

4. Applied algebra: solving systems of linear equations and Keynesian national-income analysis.

5. Approaches to (mathematical) problem solving.

6. Calculus: including partial differentiation, definite and indefinite integrals, techniques of integration, and unconstrained optimization.

7. Vectors and matrices: scalar multiplication, inner product, linear dependence, matrix operations, rank, invertible matrix theorem, and determinants.

8. Economic applications such as profit maximization, comparative statics, and the Leontief input-output model.

No explicit review of the foregoing will be undertaken. Students should refer back to their notes and/or textbooks from prerequisite courses if they believe they need to refresh their knowledge of associated materials.

Topics:

The following outlines the list of major topics to be discussed throughout the semester. The amount of time devoted to each will vary.

Introductory material	Chapters 1-3 (covered very briefly)
Linear models and Matrix Algebra	Chapters 4,5
Derivatives and Comparative Statics	Chapters 6,7,8
Optimization	Chapter 9
Exponential and Logarithmic Functions	Chapter 10
Multivariable Optimization	Chapter 11
Constrained Optimization	Chapters 12,13
Integration and Economic Dynamics	Chapters 14,15

Grading:

Marks are based on two midterm exams and one final exam. All exams are in person and are cumulative. Tentative dates for midterm exams are October 13th and November 24th, in class, and the final examination will be scheduled by the University. Weights are as follows:

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Grading Scheme 1

Midterm I	20 %
Midterm II	30 %
Final	50 %

Grading Scheme 2

Midterm II	40 %
Final	60 %

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Grades for the first midterm exam will be counted only if they increase the student's grade. In other words, I will calculate each students final grade using both schemes and take the highest of the two.

Assignments will be posted on the course website with solutions. Though not for credit, it is assumed that students will complete all the assignments. Students are also encouraged to work through as many textbook problems as possible, since working through problems is the best way to learn the course material.

There will be no make-up midterm exams. Students who can document a compelling reason for missing a midterm examination will be excused. Students must inform the instructor of such an absence in advance if possible. The weight of an examination missed for valid reasons will be evenly distributed between the remaining examinations. Should the final exam be missed for any reason, a grade of 0 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 will not be given.

See Academic Regulation 3.2 for the official meanings of final grades, and note that regulations stipulate that no course grades are final until approved by the Faculty Dean. Further, course grades may be scaled upwards or downwards in a rank-preserving manner to better fit the relevant departmental distributional norm.

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.

Online Etiquette

See the following statement regarding etiquette at Carleton:
carleton.ca/online/online-learning-resources/netiquette/

Course Copyright

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright 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).

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:

- 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

Accomodation Statements:

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

Pregnancy obligation: Please contact your instructor 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 website.

Religious obligation: Please contact your instructor 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 website.

Academic Accommodations for Students with Disabilities:If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC 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 your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the Paul Menton Centre website.

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: `carleton.ca/sexual-violence-support`.

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 must be provided to students who compete or perform at the national or international level. Please contact your instructor 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.