

## Economics 387 (L01) (Introduction to Mathematical Economics I)

Instructor:	Lucia Vojtassak	Lecture Location:	ZOOM Delivery
Email:	<a href="mailto:lvojtass@ucalgary.ca">lvojtass@ucalgary.ca</a>	Lecture Days/Time:	MWF 14:00 – 14:50
Office:	ZOOM Delivery <a href="https://ucalgary.zoom.us/my/luciavojtassak">https://ucalgary.zoom.us/my/luciavojtassak</a>		
Office Hours:	MW 11:00 – 11:50 T 13:00 – 13:50	Fall 2020	

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### Course Description:

Essential mathematical background for studying Economics: economic models and equilibrium analysis, basic techniques of calculus including application in comparative statics, unconstrained and constrained optimization, and their applications to resource allocation problems.

### Course Outcomes:

This course introduces students to the application of mathematical methods in economic theory. By the end of the course students are supposed to be able to

1. use and understand economics models;
2. to perform static equilibrium analysis in linear and nonlinear partial and general market equilibrium models;
3. to perform comparative statics analysis, and thus use concept of derivative, and rules of differentiation;
4. to perform comparative static analysis of general-function models;
5. to perform single-variable optimization, with extension in Maclauring and Taylor Series and  $N$ th derivative test for relative extremum;
6. to perform two-variable optimization and comparative statics of this type of goal equilibrium;
7. to perform constrained optimization using substitution and Lagrangian methods.

### Course Outline:

#### Part I

1. **Introduction to Mathematical Economics and Review**
  - The Nature of Mathematical Economics
2. **Economic Models**
  - Mathematical Models; Algebra; Types and Properties of Functions (including exponential and Logarithmic function); Functions of Two or More Independent Variables

#### Part II

3. **Equilibrium Analysis in Economics**
  - Partial Market Equilibrium (linear, nonlinear); General Market Equilibrium; Applications

Part III

4. **Comparative Statics and the Concept of Derivative**
5. **Rules of Differentiation and their Uses in Comparative Statics**
  - Differentiation; Partial Differentiation; Applications to Comparative – Statics Analysis
6. **Comparative Static Analysis of General Function Models**
  - Differentials, Total differentials; Total Derivatives; Derivatives of Implicit Functions; Comparative Statics of General Function Models

Part IV

7. **Single-Variable Optimization**
  - Relative Maximum and Minimum; Second and Higher Derivatives; Maclaurin and Taylor Series, *N*th- Derivative Test for Relative extremum, Applications
8. **Multi-Variable Optimization**
  - Two-choice Variables: necessary and sufficient conditions; Linear Models with Quadratic Objectives; Comparative Statics and the Envelope Theorem
9. **Constrained Optimization**
  - The Lagrange Multiplier Method; Interpreting the Lagrange Multiplier

**Prerequisites:** Economics 201 and 203; and one of Mathematics 249, 265 or 275.

**Corequisites:** Economics 301 and 303.

**Required Textbook(s):**

Chiang, A., and K. Wainwright (2005). *Fundamental Methods of Mathematical Economics*. 4<sup>th</sup> Edition. McGraw-Hill.

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Chiang, A., and K. Wainwright (2005). *Fundamental Methods of Mathematical Economics*. 4<sup>th</sup> Edition. McGraw-Hill.

Hands D.W. (2004). *Introductory Mathematical Economics*. Oxford Press.

Hess, P. N. (2001). *Using Mathematics in Economic Analysis*. Oxford Press.

Hoy et al (2011). *Mathematics for Economics*. MIT.

Sydsaeter et al (2012). *Essential Mathematics for Economic Analysis*. 4<sup>th</sup> Edition. Pearson.

**Online Delivery:**

This course will be delivered online. Students are expected to be able to participate online in accordance with this Course Outline. Lectures, assignments, office hours, exams, readings and other course material, etc. all require online access and this access is the responsibility of the student.

In order to remotely participate in online courses, students will need to have: computer with a current and updated operating system (macOS or Windows will work with all university-supported online learning technologies), a current and updated web browser installed – the latest versions of Firefox, Safari, Chrome or Edge will help to avoid compatibility issues, secure and reliable internet, microphone / headphones, webcam (optional), scanner (or camera to scan your work).

**Desire2Learn:**

This course will make use of the Desire2Learn (D2L) platform. Students who are registered in the course can log on at <http://d2l.ucalgary.ca> through their student centre. Please note that D2L features a class e-

mail list that may be used to distribute course-related information. These e-mails go to your University of Calgary e-mail addresses only.

**Lectures:**

Lectures will be delivered online at the Registrar scheduled times and delivered using ZOOM. The lectures will be recorded and subsequently posted to D2L.

**Tutorials:**

Students are expected to attend “virtually” the tutorial sections to which they have been assigned. Tutorials will be offered online, typically using ZOOM, but can involve moderated discussion boards and curated delivery of alternative online resources. During the tutorials, the TA will discuss pre-assigned questions and additional material relevant to the course that is not covered in lectures. Tutorials are on Wednesdays, 15:00 – 15:50.

**Grade Determination and Final Examination Details:**

5 assignments				
4 best count	5% each	<b>20%</b>	Due dates: Sept 18, Oct 7, Oct 23, Nov 20, Dec 7, 2020.	
4 Tests				
3 best count	15% each	<b>45%</b>	50 minutes within 24-hour period ending on Sept 21, Oct 9, Oct 26, Nov 23, 2020 at 14:50.	
Final Examination		<b>35%</b>		
		<b>100%</b>		

The official grading system will be used. See <http://www.ucalgary.ca/pubs/calendar/current/f-1-1.html>.

A passing grade on minimum of 50% of the course work is required for a student to pass the course as a whole.

If a student’s letter grade on the final exam exceeds their midterm(s) letter grade, the weight of the midterm(s) may be transferred to the final exam at the discretion of the instructor. The student must have written the midterm(s) or provided supporting documentation for the absence(s) such as a medical note or statutory declaration.

As per the Writing Across the Curriculum Statement in the Calendar, writing and grading thereof will be a factor in the evaluation of student work. [See https://www.ucalgary.ca/pubs/calendar/current/e-2.html](https://www.ucalgary.ca/pubs/calendar/current/e-2.html).

Course material dealing with a particular assignment will typically be covered in class at least 5 days before the assignment is due; thus, assignments can be completed at any time up to and including the due date. Given these factors, only situations where someone can document illness or domestic affliction for an extended period (i.e., the entire 5 days prior to the due date) would possibly warrant shifting the assignment weight to the final exam. Furthermore, technical problems can be expected to occur with computer systems (and internet availability) so it may be a good idea to not wait until the last minute to submit your assignment.

The midterm exam(s) is take-home exam(s) designed and intended to be completed in 50 minutes. The exam(s) will be OPEN book. The exam(s) will be available on D2L. Student will download the exam from

D2L, complete the exam, scan it, and submit using Dropbox in D2L. Student will have 50% time extension to complete the exam, at a time of their choosing, within a 24-hour period determined by the instructor.

The final examination will be take-home, comprehensive, and scheduled by the Registrar. Students will download the exam from D2L, complete the exam, scan it, and submit using Dropbox in D2L. Student will have 50% more time to complete the exam, at a time of their choosing, within the 24-hour period that begins 24 hours before the end date of the Registrar's scheduled final exam for this course. The exam is designed and intended to be completed in two hours. The exam will be OPEN book.

All other course components will also be accessed, submitted, and returned through D2L.

If a student cannot write their final exam on the date assigned by the Registrar's Office, they need to apply for a deferred exam <https://www.ucalgary.ca/pubs/calendar/current/g-6.html>. Under no circumstance will this be accommodated by the Department.

Tests and exams WILL NOT involve multiple choice questions.

THERE WILL BE NO MAKEUP OR DEFERRED QUIZZES/TESTS/EXAMS under any circumstances, nor may the quizzes/tests/exams be written early. Students unable to write the quizzes/tests/exams because of documented illness, family emergency, religious observance, or university-sanctioned event will have the weight shifted to the final examination; otherwise a grade of zero will be assigned.

#### **Reappraisal of Grades and Intellectual Honesty:**

*For reappraisal of graded term work, see Calendar I.2*

<http://www.ucalgary.ca/pubs/calendar/current/i-2.html>

*For reappraisal of final grade, see Calendar I.3*

<http://www.ucalgary.ca/pubs/calendar/current/i-3.html>

#### **ACADEMIC MISCONDUCT**

Academic Misconduct refers to student behavior that compromises proper assessment of students' academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

Student committing academic misconduct during the final exam will not receive a passing grade on the course.

For information on the Student Academic Misconduct Policy and Procedure please visit:

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity Website at <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

**Academic Accommodations:**

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

**Freedom of Information and Protection of Privacy (FOIP) Act:**

Personal information is collected in accordance with FOIP. Assignments can only be returned to the student and will be accessible only to authorized faculty and staff. For more information, see <http://www.ucalgary.ca/legalservices/files/legalservices/faq-students.pdf> and [http://www.ucalgary.ca/legalservices/files/legalservices/faq-faculty\\_0.pdf](http://www.ucalgary.ca/legalservices/files/legalservices/faq-faculty_0.pdf).

**Copyright Legislation:**

See the University of Calgary policy on Acceptable Use of Material Protected by Copyright at [www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf](http://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

**Recording of Lectures:**

Recording of lectures is prohibited, except for audio recordings authorized as an accommodation by SAS or an audio recording for individual private study and only with the written permission of the instructor. Any unauthorized electronic or mechanical recording of lectures, their transcription, copying, or distribution, constitutes academic misconduct. See <https://www.ucalgary.ca/pubs/calendar/current/e-6.html>.

**Important Dates:**

Please check: <http://www.ucalgary.ca/pubs/calendar/current/academic-schedule.html>

**Student Organizations:**

Faculty of Arts Students' Association (F.A.S.A.):

Economics Department Representative

Office: SS 803, E-mail: [econrep@fasaucalgary.ca](mailto:econrep@fasaucalgary.ca) and Web: [www.fasaucalgary.ca](http://www.fasaucalgary.ca).

Society of Undergraduates in Economics:

<https://www.ucalgarysue.com/>.

Society of Undergraduates in Economics is a student run organization whose main purpose is to assist undergraduate economics students to succeed both academically and socially at the University of Calgary.

Services include access to the exam bank, career events such as Industry Night and information sessions, mentorship programs, and social events for members. They invite you to join by contacting SUE at [societyofundergradsineconomics@gmail.com](mailto:societyofundergradsineconomics@gmail.com).

**Faculty of Arts Program Advising and Student Information Resources:**

- Have a question, but not sure where to start? The Arts Students' Centre is your information resource for everything in Arts! Drop in at SS102, call them at 403-220-3580, or email them at [artsads@ucalgary.ca](mailto:artsads@ucalgary.ca). You can also visit the Faculty of Arts website at <http://arts.ucalgary.ca/undergraduate>, which has detailed information on common academic concerns, including program planning and advice.
- For registration (add/drop/swap), paying fees and assistance with your Student Centre, contact Enrolment Services at 403-210-ROCK [7625].

**Student Support and Resources:**

- See <https://www.ucalgary.ca/registrar/registration/course-outlines> for information on campus mental health resources, the Student Ombuds' Office, Student Success Centre, Safewalk, and Emergency Evacuation and Assembly.
- Online writing resources are available at <https://ucalgary.ca/student-services/student-success/writing-support>.

**Notes:**

1. Students are responsible for all assigned material, e.g., supplementary material posted on D2L, regardless of whether or not the material was covered in class.
2. Please note that the following types of emails will receive no response: emails not addressed to anyone in particular; emails where the recipient's name is not spelled correctly; anonymous emails; emails in which the sender has not identified which course and section he/she is taking; and, emails involving questions that are specifically addressed on this course outline.

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2020-08-05