

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

Instructor:	L. Vojtassak	Lecture Location:	PF 110
Phone:	403 220 6550	Lecture Days/Time:	MWF 9:00 – 9:50am
Email:	lvojtass@ucalgary.ca		
Office:	SS 336		
Office Hours:	M 10:00 – 10:50 ZOOM delivery R 14:00 – 14:50 ZOOM delivery Or by appointment		Fall 2021

### 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 Learning 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.

**Books on Reserve:**

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.

Dowling E. T. (2000). *Schaum's Outline of Introduction to Mathematical Economics*. 4th Edition. McGraw-Hill.

**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.

**Tutorials:**

Students are expected to attend the weekly tutorial section to which they have been assigned. 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:**

4 Tests	15% each	60%	In class on Sept 20, Oct 8, Nov 1, and Nov 24, 2021
Final Exam		<u>40%</u>	
		100%	

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

Students must receive a passing grade on the final exam to pass the course.

If a student's letter grade on the final exam exceeds their midterm(s) letter grade, the weight of the midterm(s) is (are) 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>.

Any student work which remains undistributed after the last day of classes will be available to students through the instructor's office during the instructor's office hours.

The final examination will be comprehensive, scheduled by the Registrar, held in a classroom, and last 2 hours. 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.

Programmable calculators, cellphones, textbooks, course notes, and other electronic devices will not be allowed during the writing of tests or final examinations. Students are reminded that simply being able to access their cellphone during an exam is academic misconduct.

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:**

*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 for the course.

For information on the Student Academic Misconduct Policy, Procedure and Academic Integrity, please visit: <https://www.ucalgary.ca/pubs/calendar/current/k-3.html>

**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

<https://www.ucalgary.ca/legal-services/university-policies-procedures/accommodation-students-disabilities-procedure>

**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 <https://www.ucalgary.ca/legal-services/access-information-privacy>

**Copyright Legislation:**

See the University of Calgary policy on Acceptable Use of Material Protected by Copyright at <https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy> 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  
E-mail: [econrep@fasualgary.ca](mailto:econrep@fasualgary.ca)  
Website: [www.fasualgary.ca](http://www.fasualgary.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] or visit them in the MacKimmie Tower.

**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.