

# Huron University College

Department of Economics

**Economics 2210 A- Section 550**

**Mathematical Economics I**

Fall 2021

---

## Course Information

Instructor: Samira Hasanzadeh

Office: V124

E-mail: [shasanz@uwo.ca](mailto:shasanz@uwo.ca)

Phone: (519)438-7224 ext. 246

### Office Hours:

- Tuesdays 11:00 am - 12:00 pm (In person)
- Thursdays 11:30 am - 12:30 pm (Online)

**Lectures:** Mondays 11:30 am- 12:30 pm, Wednesdays 11:30 am - 1:30 pm

**Classroom:** H112

## Course Description

This course is designed to provide students with a knowledge of some of the basic mathematical tools used in economic theory. The topics covered are multivariate calculus (focusing on the tools used in economics), concavity and convexity, constrained optimization with more than one choice variable, optimization with inequality constraints, implicit functions and implicit differentiation. Illustrative examples are taken from economics, but the purpose of the course is to teach mathematical methods, not economic theory.

## Course Objectives

By the end of the course students are expected to be able to:

- present several economic functions using graphs, including linear and non-linear functions, rational functions, exponential functions, logarithmic functions, and level curves.
- solve simultaneous linear equation systems in economics using matrix inversion and Cramer's rule.
- set up optimal timing problems and solve them using the appropriate techniques
- understand the concepts related to the derivative of implicit functions, slopes of the level curves, homogeneous functions and Euler's theorem, concavity of functions of several variables, properties of Cobb-Douglas and CES functions including elasticity of substitution

- formulate optimization problems in microeconomics, macroeconomics, and business economics.
- formulate constrained optimization problems with equality constraint, inequality constraints, and several constraints.
- interpret the second-order sufficient conditions for optimization techniques using the Hessian and Bordered-Hessian.
- generate comparative statics from optimization problems using various techniques

## Prerequisite(s)

Economics 1021A/B and Economics 1022A/B; and 0.5 from Mathematics 1225A/B, Mathematics 1230A/B, Calculus 1000A/B, and 0.5 from Mathematics 1229A/B, Mathematics 1600A/B, Calculus 1301A/B, or Calculus 1501A/B.

## Antirequisite(s)

Economics 2141A/B

## Class Methods

Classes will be primarily lecture based with some time devoted to discussion and other learning activities.

## Course Website

A website on OWL will be used to post materials relating to the course. Any content in the textbook that you will not be tested on is noted in the weekly schedules. It is your responsibility to check OWL daily for class announcements.

## Time-zones

Times for all activity, e.g. quizzes, tests, and due dates for assignments will be posted in local London time (EDT). If you are in a different time zone, please make sure you know how London time converts to where you are. Errors in calculations are not an acceptable reason to miss deadlines.

## Textbooks

- **Required Textbook:**
  - Mathematics for Economists, by C. P. Simon and L. E. Blume. W. W. Norton & Company, 1994. Available at: <https://bookstore.uwo.ca/product/0393957330>
- **Supplementary Reference Textbook:**
  - Mathematics for Economics, by M. Hoy, J. Livernois, C. McKenna, R. Rees, and T. Stengos. The MIT Press, 3rd edition, 2011.
  - Essential Mathematics for Economic Analysis, by K. Sydsæter and P. Hammond. FT Prentice Hall, 3rd edition, 2008.
  - “Fundamental Methods of Mathematical Economics”, by A.C. Chiang and K. Wainwright. McGraw-Hill, 4th edition, 2004.

- Economist’s Mathematical Manual, by K. Sydsæter, P. Berck, and A. Strøm. Springer, 4th edition, 2005.

**Note:** Additional readings may be assigned.

## Course Outline

The outline below lists the topics that we will cover, and the related readings in the text. Where there are exclusions to the chapter readings, I will note them during the term on OWL.

- Part I: Introduction
  - Introduction (Ch. 1)
  - One Variable Calculus: Foundations (Ch. 2)
  - One Variable Calculus: Applications (Ch. 3)
  - One Variable Calculus: Chain Rule (Ch. 4)
  - Exponents and Logarithms (Ch. 5)
- Part II: Linear Algebra
  - Introduction to Linear Algebra (Ch. 6)
  - Systems of Linear Equations (Ch. 7)
  - Matrix Algebra (Ch. 8)
  - Determinants: An Overview (Ch. 9)
- Part III: Calculus of Several Variables
  - Calculus of Several Variables (Ch. 14)
  - Implicit Functions and Their Derivatives (Ch. 15)
- Part IV: Optimization
  - Unconstrained Optimization (Ch. 17)
  - Constrained Optimization I: First Order Conditions (Ch. 18)
  - Constrained Optimization II (Ch. 19)
- Part V: Eigenvalues and Dynamics
  - Ordinary Differential Equations: Scalar Equations
  - Ordinary Differential Equations: Systems of Equations

**Please note that I reserve the right to make modifications to the list of contents as the term proceeds.**

## Course Evaluation

The assessment in this course will be based on the following:

3 Assignments (10% each)	30%
Assignment 1 (Sep 22–Sep 29)	
Assignment 2 (Oct 13–Oct 20)	
Assignment 3 (Nov 24–Dec 1)	
Midterm Examination (Nov 10)	25%
Final Examination	45%
	<hr/> 100%

- Each assignment will consist of various analytical questions intended to support and reinforce students' comprehension of the course material, and to provide an indication of the type of questions that will be on the exams. As such, students are encouraged to treat each assignment as a critical learning opportunity. While students are permitted to discuss the assignment material with classmates, each student must ensure that their submitted work is their own. Please see the statement on plagiarism below.
- There will be no make-up tests for the missed assignments and mid-term examinations. Failure to write the midterm exams will result in a grade of zero without proper documentation. A student who misses a test or assignment must provide documentation to the counseling office (not the professor) and if this documentation is accepted as a valid reason for missing a test then (and only then) the weight of the missed test will be reallocated to the final exam. This is the only method of accommodation for missed tests and assignments that will be used in this course.
- The final exam covers all material. It will be held during the December Examination Period as scheduled by the University.

## Communication:

- All course materials and announcements will be posted on OWL. Please visit the portal often.
- Office hours are a perfect opportunity to approach me and discuss course material. Think of my office hours as an opportunity to receive free tutoring each week. If you cannot attend office hours due to a course conflict, you can email me and we schedule a mutually agreeable time to meet.
- I will usually respond to email within a day (except on weekends and holidays). However, I will only read emails sent through a UWO account for record-keeping and identification purposes. Please put "ECON2210A" in the message title or your email may be caught by my spam filter.
- I will only respond to email posing questions that can be answered in a sentence or two; otherwise you should see me during my office hours.

## Satisfactory Performance Criteria:

Students must fulfill all of the preceding course requirements in order to achieve a passing grade. No course grades are final until approved by the Faculty Dean. Application to write a deferred final examination must be made to the Registrars Office. Students must fulfill all of the preceding course requirements in order to achieve a passing grade.

## Regrading:

Students seeking reappraisal of their graded assignment or mid-term examination should contact the instructor within a week after they receive their grades. Students are required to send e-mail to the instructor with the subject "ECON2210A-REQUEST FOR REGRADING" explaining the reason(s) for requesting a reappraisal of their graded work.

Note: Reappraisals that do not conform to this standard will not be considered.

## Treatment of Course Materials

Student, teaching, assignment or professor materials created for this course (including but not limited to lecture slides, presentations and posted notes, labs, case studies, assignments, exams and solutions to assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and **may not be reproduced or redistributed without prior written consent of the author(s).**

## **Appendix to Course Outlines: Academic Policies & Regulations 2021 - 2022**

### **Prerequisite and Antirequisite Information**

Students are responsible for ensuring that they have successfully completed all course prerequisites and that they have not completed any course antirequisites. Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

### **Pandemic Contingency**

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, typically using a combination of synchronous instruction (i.e., at the times indicated in the timetable) and asynchronous material (e.g., posted on OWL for students to view at their convenience). Any remaining assessments will also be conducted online at the discretion of the course instructor. In the unlikely event that changes to the grading scheme are necessary, these changes will be clearly communicated as soon as possible.

### **Student Code of Conduct**

Membership in the community of Huron University College and Western University implies acceptance by every student of the principle of respect for the rights, responsibilities, dignity and well-being of others and a readiness to support an environment conducive to the intellectual and personal growth of all who study, work and live within it. Upon registration, students assume the responsibilities that such registration entails. While in the physical or online classroom, students are expected to behave in a manner that supports the learning environment of others. Please review the Student Code of Conduct at: <https://huronatwestern.ca/sites/default/files/Res%20Life/Student%20Code%20of%20Conduct%20-%20Revised%20September%202019.pdf>.

### **Attendance Regulations for Examinations**

A student is entitled to be examined in courses in which registration is maintained, subject to the following limitations:

- 1) A student may be debarred from writing the final examination for failure to maintain satisfactory academic standing throughout the year.
- 2) Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course will be reported to the Dean of the Faculty offering the course (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean of that Faculty, the student will be debarred from taking the regular examination in the course. The Dean of the Faculty offering the course will communicate that decision to the Dean of the Faculty of registration.

Review the policy on Attendance Regulations for Examinations here:  
[https://www.uwo.ca/univsec/pdf/academic\\_policies/exam/attendance.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/exam/attendance.pdf).

### **Statement on Academic Offences**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following website: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf). The appeals process is also outlined in this policy as well as more generally at the following website: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/appealsundergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/appealsundergrad.pdf).

### **Turnitin.com**

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

### **Statement on Use of Electronic Devices**

It is not appropriate to use electronic devices (such as, but not limited to, laptops, cell phones) in the classroom for non-classroom activities. Such activity is disruptive and distracting to other students and to the instructor, and can inhibit learning. Students are expected to respect the classroom environment and to refrain from inappropriate use of technology and other electronic devices in class.

### **Statement on Use of Personal Response Systems (“Clickers”)**

Personal Response Systems (“clickers”) may be used in some classes. If clickers are to be used in a class, it is the responsibility of the student to ensure that the device is activated and functional. Students must see their instructor if they have any concerns about whether the clicker is malfunctioning. Students must use only their own clicker. If clicker records are used to compute a portion of the course grade:

- the use of somebody else’s clicker in class constitutes a scholastic offence
- the possession of a clicker belonging to another student will be interpreted as an attempt to commit a scholastic offence.

### **Academic Consideration for Missed Work**

Students who are seeking academic consideration for missed work during the semester may submit a self-reported absence form online provided that the absence is **48 hours or less** and the other conditions specified in the Senate policy at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf) are met.

Students whose absences are expected to last **longer than 48 hours**, or where the other conditions detailed in the policy are not met (e.g., work is worth more than 30% of the final grade, the student has already used 2 self-reported absences, the absence is during the final exam period), may receive academic consideration by submitting a Student Medical Certificate (for illness) or other appropriate documentation (for compassionate grounds). The Student Medical Certificate is available online at [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

All students pursuing academic consideration, regardless of type, must contact their instructors no less than 24 hours following the end of the period of absence to clarify how they will be expected to fulfill the academic responsibilities missed during their absence. **Students are reminded that they should consider carefully the implications of postponing tests or midterm exams or delaying submission of work, and are encouraged to make appropriate decisions based on their specific circumstances.**

Students who have conditions for which academic accommodation is appropriate, such as disabilities or ongoing or chronic health conditions, should work with Accessible Education Services to determine appropriate forms of accommodation. Further details concerning policies and procedures may be found at: <http://academicsupport.uwo.ca/>.

### **Policy on Academic Consideration for a Medical/ Non-Medical Absence**

#### **(a) Consideration on Medical Grounds for assignments worth *less than 10%* of final grade: Consult Instructor Directly and Contact Academic Advising**

When seeking consideration on **medical grounds** for assignments worth *less than 10%* of the final course grade, and if the student has exceeded the maximum number of permissible Self-Reported absences, the student should contact the instructor directly. The student need only share broad outlines of the medical situation. The instructor **may** require the student to submit documentation to the academic advisors, in which case she or he will advise the student and inform the academic advisors to expect documentation. If documentation is requested, the student will need to complete and submit the [Student Medical Certificate](#). The instructor may **not** collect medical documentation. The advisors will contact the instructor when the medical documentation is received, and will outline the severity and duration of the medical challenge as expressed on the Student Medical Certificate and in any other supporting documentation. The student will be informed that the instructor has been notified of the presence of medical documentation, and will be instructed to work as quickly as possible with the instructor on an agreement for accommodation.

#### **(b) Consideration on Non-Medical Grounds: Consult Huron Support Services/Academic Advising, or email [huronsss@uwo.ca](mailto:huronsss@uwo.ca).**

Students seeking academic consideration for a **non-medical** absence (e.g. varsity sports, religious, compassionate, or bereavement) will be required to provide appropriate documentation where the conditions for a Self-Reported Absence have not been met, including where the student has exceeded the maximum number of permissible Self-Reported. All consideration requests must include a completed [Consideration Request Form](#). Late penalties may apply at the discretion of the instructor.

Please review the full policy on Academic Consideration for medical and non-medical absence at: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf). Consult [Huron Academic Advising](#) at [huronsss@uwo.ca](mailto:huronsss@uwo.ca) for any further questions or information.

### **Support Services**

For advice on course selections, degree requirements, and for assistance with requests for medical accommodation, students should email an Academic Advisor in Huron's Student Support Services at [huronsss@uwo.ca](mailto:huronsss@uwo.ca). An outline of the range of services offered is found on the Huron website at: <https://huronatwestern.ca/student-life/student-services/>.

Department Chairs, Program Directors and Coordinators are also able to answer questions about individual programs. Contact information can be found on the Huron website at: <https://huronatwestern.ca/contact/faculty-staff-directory/>.

If you think that you are too far behind to catch up or that your workload is not manageable, you should consult your Academic Advisor. If you are considering reducing your workload by dropping one or more courses, this must be done by the appropriate deadlines. Please refer to the Advising website, <https://huronatwestern.ca/student-life/student-services/academic-advising/> or review the list of official Sessional Dates on the Academic Calendar, available here: <http://www.westerncalendar.uwo.ca/SessionalDates.cfm>.

You should consult with the course instructor and the Academic Advisor who can help you consider alternatives to dropping one or more courses. Note that dropping a course may affect OSAP and/or Scholarship/Bursary eligibility.

Huron Student Support Services: <https://huronatwestern.ca/student-life/student-services/>

Office of the Registrar: <https://registrar.uwo.ca/>

Student Quick Reference Guide: <https://huronatwestern.ca/student-life/student-services/#1>

Academic Support & Engagement: <http://academicsupport.uwo.ca/>

Huron University College Student Council: <https://huronatwestern.ca/student-life/beyond-classroom/hucsc/>

Western USC: <http://westernusc.ca/your-services/#studentservices>

### **Mental Health & Wellness Support at Huron and Western**

University students may encounter setbacks from time to time that can impact academic performance. Huron offers a variety of services that are here to support your success and wellbeing. Please visit <https://huronatwestern.ca/student-life-campus/student-services/wellness-safety> for more information or contact staff directly:

Wellness Services: [huronwellness@huron.uwo.ca](mailto:huronwellness@huron.uwo.ca)

Community Safety Office: [safety@huron.uwo.ca](mailto:safety@huron.uwo.ca)

Chaplaincy: [gthorne@huron.uwo.ca](mailto:gthorne@huron.uwo.ca)

Additional supports for Health and Wellness may be found and accessed at Western through, <https://www.uwo.ca/health/>.