

MATHEMATICAL ECONOMICS I  
ECONOMICS 2210A 001  
Department of Economics  
Western University

September 2019

**General Information:**

**Instructor:** Mohammad Iftekher Hossain

**Office:** 4082 SSC

**Phone:** 519-661-2111 ext. 47963

**E-mail:** mhossa87@uwo.ca

**Office hours:** Thursday 12:30 pm - 2:30 pm

**Classroom meeting time(s) & location:** M, W, F, 9:30 am – 10:30 am, UC 2105

**Course website:** <https://owl.uwo.ca/portal>

**Undergraduate inquiries:** 519-661-3507 or SSC Room 4075 or [econugrd@uwo.ca](mailto:econugrd@uwo.ca)

**Registration:**

You are responsible for ensuring you are registered in the correct courses. If you are not registered in this course, the Department will not release any of your marks until your registration is corrected. You may check your timetable by using the Login on the Student Services website at <https://student.uwo.ca>. If you notice a problem, please contact your home Faculty Academic Counsellor immediately.

**Prerequisite Note:**

**Antirequisite(s):** Economics 2141A/B.

**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. *Prerequisite(s) for your course can be found in the Western Calendar at:*

<http://westerncalendar.uwo.ca/Courses.cfm?Subject=ECONOMIC&SelectedCalendar=Live&ArchiveID>

You are responsible for ensuring that you have successfully completed all course prerequisites, and that you have not taken any anti-requisite courses. Lack of prerequisites may not be used as a basis for appeal. If you are found to be ineligible for a course, you may be removed from it at any time and you will receive no adjustment to your fees. This decision cannot be appealed.

If you find that you do not have the course prerequisites, it is in your best interest to drop the course well before the end of the add/drop period. Your prompt attention to this matter will not only help protect your academic record, but will ensure that spaces become available for students who require the course in question for graduation.

## **Course Objectives:**

The aims of this course are

- to introduce some basic mathematical tools which are frequently used in economics.
- to discuss using examples how these mathematical tools can be applied in economic analysis.

The course will cover calculus and matrix algebra, unconstrained optimization, constrained optimization techniques with equality and inequality constraints, and difference and differential equations. Using these mathematical tools, the course will discuss and explain several examples from consumer and producer theory, equilibrium in competitive and non-competitive markets, comparative statics, and national income accounting etc.

## **Course Learning Outcomes:**

After successful completion 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
- 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.
- understand and apply the techniques of integral calculus, differential equation, and difference equation in economic theories.

## **Textbook(s):**

Simon, Carl P. and Blume, Lawrence. 1994. Mathematics for Economists. Norton & Company

## **Recommended:**

Dowling, Edward T. 2001. Introduction to Mathematical Economics: 3rd Edition. McGraw-Hill

## **Web Materials:**

[http://economics.uwo.ca/undergraduate/undergraduate\\_resources/math\\_resources\\_for\\_ec\\_220\\_0\\_required\\_courses.html](http://economics.uwo.ca/undergraduate/undergraduate_resources/math_resources_for_ec_220_0_required_courses.html)

## **Class Format:**

### **Combination of lecture, problem solving and discussion**

Class format will allow individual and group problem solving. During sessions, students will be encouraged to ask and answer questions. They will spend a considerable amount of class time to formulate and solve problems by themselves and in groups. Please remember that to do well in this course, Textbook, lecture notes and lectures must be treated as complements instead of substitutes. Several topics and examples will be covered during the sessions that may not be available in the Textbook and posted lecture notes.

## **Grading:**

Grading will be based on the total points earned by the end of the semester. Assignments/ Quizzes will contribute 20%, a Midterm exam will contribute 30%, and a cumulative final exam will contribute 50% of the points possible. University and Departmental guidelines for grading will be strictly followed.

## **Evaluation:**

<b>Evaluation Type</b>	<b>Weight</b>	<b>Date, Time and Room</b>
Assignments/ Online Quiz	20 % (Best 4 out of 6)	Assignment / Quiz 1: September 20, 2019 Assignment / Quiz 2: September 27, 2019 Assignment / Quiz 3: October 11, 2019 Assignment / Quiz 4: October 18, 2019 Assignment / Quiz 5: November 22, 2019 Assignment / Quiz 6: November 29, 2019
Mid-Term	30 %	Date: October 23, 2019 Time: TBA Exam duration: 90 Minutes Syllabus: Chapter 1- Chapter 5 from the Textbook Location: TBA Method: Closed book examination
Final Examination	50 %	Set by the Registrar Exam duration: 150 Minutes Syllabus: Cumulative Method: Closed book examination

## Topics Covered and Readings:

	<b>Topics</b>	<b>Tentative Schedule</b>
I	Introduction	Week 1
II	One Variable Calculus, Graphing Economic Functions, Maxima and Minima, Comparative Statics, Implicit functions and Inverse Functions, Sketching Cost, Production, and Profit Functions	Week 2-4
III	Exponential and Logarithmic Functions, The Number $e$ , Graphing Exponential and Logarithmic Functions, Computing Present Value, Discounting, Optimal Timing, and Annuities	Week 5
IV	Linear Algebra Gaussian and Gauss-Jordan Elimination, Elementary Row Operations, Algebra of Square Matrix, Determinant of a Matrix, Linear Independence, Inverse Matrix, Cramer's Rule	Week 6
V	Calculus of Several Variables and Unconstrained Optimization, Marginal Concepts, Finding Profit-Maximizing Output for Competitive Firms and Monopolists, Use of Hessian to Check the Second-order Conditions for Unconstrained Optimizations	Week 7-9
VI	Constrained Optimization with Equality Constraints, Graphing Level Curves, Utility Maximization, Cost Minimization, Output Maximization, Cobb-Douglas and CES Production Functions, Marginal Impact of the Constraint, Using Bordered-Hessian Matrix to Check the Second-Order Conditions for Constrained Optimizations, Constrained Optimization with Inequality Constraints, Constrained Optimization with Several Constraints	Week 9-12
VII	Integral Calculus, Differential Equation and Difference Equation, Cobweb Model	Week 12-13

## Copyright:

Lectures and course materials, including power point presentations, outlines, and similar materials, are protected by copyright. Students may take notes and make copies of course materials for their own educational purposes. Students may not record lectures, reproduce (or allow others to reproduce), post or distribute lecture notes, wiki material, and other course materials publicly and/or for commercial purposes without written consent.

**Please Note**  
**Department Policies for 2019-2020**

Remember that the University expects all students to take responsibility for their own Academic Programs. Students should also check their registration to ensure they are enrolled in the correct courses.

1. Guidelines and policies for the Faculty of Social Science and the Department of Economics are posted online in the current Western Academic Calendar at:  
<http://westerncalendar.uwo.ca>.
2. Students must familiarize themselves with the “Rules of Conduct for Examinations”  
[http://www.uwo.ca/univsec/pdf/academic\\_policies/exam/administration.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/exam/administration.pdf).
3. **Cheating as an academic offence:** Students are responsible for understanding what it means to “cheat”. The Department of Economics treats cheating incidents very seriously and will investigate any suspect behavior. Students found guilty will incur penalties that could include a failing grade or being barred from future registration in other Economics courses or programs. The University may impose further penalties such as a notation on an official academic transcript, suspension or expulsion.
4. **Plagiarism:** Students must write their essays and assignments in their own words. When taking an idea/passage from another author, it must be acknowledged with quotation marks where appropriate and referenced with footnotes or citations. Plagiarism is an academic offence (see Scholastic Discipline for Undergraduate Students in the Western Calendar at [http://westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page\\_20](http://westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20)).

Western University uses software to check for plagiarism and students may be required to electronically submit their work. Those found guilty will be penalized as noted in point 3.

5. It is a Department of Economics policy that **NO** assignments be dated, stamped or accepted by staff. Students must submit assignments in class or to the instructor during office hours.
6. When appealing a mark, students should refer to the Student Academic Appeals section in the current Western Academic Calendar at:  
[http://westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page\\_14](http://westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_14)

Please note the relevant deadlines.

The Department will not consider an appeal unless an attempt has been made to settle the matter with the instructor first. Students who remain dissatisfied with the outcome may proceed with a written appeal (e-mails are not acceptable) to the Undergraduate Director in Economics, stating the reasons for their appeal. A checklist is provided at:  
[http://economics.uwo.ca/undergraduate/program\\_counselling/responsibilities\\_policies.html#appeals](http://economics.uwo.ca/undergraduate/program_counselling/responsibilities_policies.html#appeals).

7. Systematic adjustments of a class grade distribution (either up or down) can occur in Economics courses. The fact that grades have been adjusted is **not** grounds for an appeal.
8. Note the following add and drop deadlines:  

Deadline to <u>add</u> a first term half course:	<b>Friday September 13, 2019</b>
Deadline to <u>drop</u> a first term half course:	<b>Tuesday November 12, 2019</b>
9. Faculty of Social Science policy states that oversleeping or misreading an exam schedule is NOT grounds for a makeup. This rule applies to midterm and final exams in the Department of Economics.

### **Policy on Tests, Final Exams and on Missed Academic Responsibilities**

Students who proceed to write a test or examination must be prepared to accept the mark. Rewriting tests or examinations, or retroactive reweighting of marks, is **not** permitted. Students must book travel arrangements AFTER final exam dates have been posted; travel is not an acceptable excuse for absence from a final exam.

Students who are temporarily unable to meet academic requirements due to extenuating circumstances can follow Western University procedures to request academic consideration through the following routes:

- a) Submit a Self-Reported Absence form if the conditions for submission are met (e.g., only for exams or assessments worth 30% or less of the course mark; not applicable to final exams; maximum 2 self-reported absences per academic year; see [link](#) for full list of conditions and info).

If the conditions for submission of a Self-Reported Absence form are not met, then:

- b) For medical absences, submit a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner along with a request for academic consideration to Academic Counselling in the student's home Faculty (see [link](#) for full info) ; or
- c) For non-medical absences (e.g., religious or compassionate), submit appropriate documentation to Academic Counselling in the student's home Faculty (see [link](#) for full info).

It is strongly recommended that students notify their instructors as soon as possible. University policy is that students **must** communicate with their instructors no later than **24 hours** after the end of the period covered by either the self-reported absence or SMC, or immediately upon their return following a documented absence. Failure to follow University policy and procedures may result in denial of academic accommodation and a grade of zero. Students should also set up an appointment to meet with their instructor as soon as possible. If the instructor is not available, send an email message, copying the Undergraduate Coordinator at [econugrd@uwo.ca](mailto:econugrd@uwo.ca).

Note: Academic consideration is not normally intended for long-term, recurring absences, an existing disability, or high levels of stress related to academic performance. In such cases, students should consult their academic counsellor. See [link](#) for full information. In all cases, if the documentation submitted to request academic consideration is not acceptable, students will receive a grade of zero for the missed test, exam, or assignment.

**For full information about Western University's policies and procedures for student absences and requests for academic consideration, please visit this [link](#).**

### **Policies Regarding Academic Accommodation**

The Faculty of Social Science's policies regarding academic accommodation is found at [http://counselling.ssc.uwo.ca/procedures/having\\_problems/index.html](http://counselling.ssc.uwo.ca/procedures/having_problems/index.html). "Academic Rights and Responsibilities" are also outlined in the Western Calendar at <http://westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=1&command=showCategory&SelectedCalendar=Live&ArchiveID=>. Claiming that "you didn't know what to do" is not an acceptable excuse for not following the stated procedures.

### **Policy Regarding Class Attendance**

If the instructor deems a student's class attendance as unsatisfactory, that student may be prohibited from writing the final examination. If there is intent to make use of this University policy, the student will be notified in writing.

### **Statement on Mental Health and Support Services**

Students under emotional/mental distress should visit [http://uwo.ca/health/mental\\_wellbeing/](http://uwo.ca/health/mental_wellbeing/) for more information and a complete list of resources on how to obtain help.