

ADVANCED MATHEMATICAL ECONOMICS  
ECONOMICS EC3310A-001  
Department of Economics  
Western University

September 2022

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**Office hours:** Tue 2:30-3:30pm ET  
Thu 2:30-3:30pm ET  
**Delivery mode:** In person  
**Meeting times:** Tue 9:30-11:30am ET  
Thu 9:30-10:30am ET  
**Classroom:** AHB-2B02  
**Course website:** <https://owl.uwo.ca/portal>  
**Undergraduate inquiries:** 519-661-3507 or SSC Room 4075 or [econugrd@uwo.ca](mailto:econugrd@uwo.ca)

Please note the Key Sessional Dates listed below:

Classes begin: September 8, 2022  
Fall Reading Week: October 31 – November 6, 2022  
Classes end: December 8, 2022  
Exam period: December 10 – 22, 2022

**Contingency plan for an in-person class pivoting to 100% online learning:**

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

**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/Antirequisite Note:**

The prerequisites for this course are: Economics 2210A/B, OR both of Mathematics 1600A/B and Calculus 1501A/B. (Calculus 1301A/B with a mark of at least 85% will be allowed as a substitute for Calculus 1501A/B).

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 Description:**

This course is a second part of the introduction to mathematical economics (the first part is Economics 2210A/B).

**Course Objectives:**

The focus of the course is the application of optimization techniques to the modeling of decision making by economic agents.

**Course Learning Outcomes:**

As a result of taking this course, the students will gain a deep understanding of the methods of linear algebra, calculus and optimization in application to economics. The students will be able to apply these concepts and tools to analyze various economic models. The students will also be well prepared to take more advanced courses in modern economic theory and methods and to analyze models for their senior thesis projects.

**Textbooks and Course Materials:**

There are no required textbooks for this course. However, the following books might be helpful:

1. (SB) Carl P. Simon and Lawrence Blume, *Mathematics for Economists*, W.W. Norton
2. (S) Rangarajan K. Sundaram, *A First Course in Optimization Theory*, Cambridge University Press

Both books are available in the campus bookstore and have been put on reserve at Weldon library.

## Topics Covered and Readings:

1. Review of linear algebra and calculus (SB chapters 2,4,8,9,12-16; S chapter 1).
2. Optimization in  $\mathbb{R}^n$ : definition of an optimization problem and the existence of solutions (SB chapter 30, S chapters 2,3).
3. Unconstrained optima (SB chapter 17; S chapter 4).
4. Optimization with equality constraints (SB chapters 18,19; S chapter 5).
5. Optimization with inequality constraints (SB chapters 18,19; S chapter 6).
6. Convex and quasiconvex optimization (SB chapter 21; S chapter 7).
7. Parametric optimization and the envelope theorem (SB chapter 19).
8. Finite-horizon dynamic programming (S chapter 11).

## Communication:

- (i) Course OWL site
  - All course materials will be posted on course OWL site.
  - Students should check the course OWL site every 24-48 hours
- (ii) Email
  - Important announcements will be sent by email in addition to being posted on OWL.
  - Please put *Econ 3310* in the Subject when you send me an email about the course.
  - Emails will be monitored daily.

## Technical Requirements:

- Laptop or computer
- Stable internet connection
- Microphone
- Webcam

For technical support, see the OWL help page or contact Western Technology Services Helpdesk (<https://wts.uwo.ca/about-wts/contact.html>). Google Chrome or Mozilla Firefox are the preferred browsers for OWL; update your browser frequently.

## Assessments and Grading:

Problem sets (total of 5; due dates below): 25%; only the 4 best scores count towards the final mark

Midterm (tentatively scheduled for Tuesday October 18): 30%

Final (TBA): 45%

### **Problem sets:**

Problem sets will be posted in advance on the course information website. They will be due on the following dates by 11:59pm ET (electronic submission):

<b>Problem set</b>	<b>Due date</b>
1	Friday September 23
2	Friday October 7
3	Friday October 28
4	Friday November 18
5	Friday December 2

- No late problem sets will be accepted.
- You can work on the problem sets in groups. However, each student is supposed to submit an individual problem set and list the names of the people in their study group.
- Each problem set should be submitted in your individual dropbox on OWL as a single PDF file.
- Marked problem sets will be returned electronically through OWL.

### **Midterm and final exams:**

- The midterm exam is tentatively scheduled for Tuesday October 18 at 9:30am ET, during regular class time. It will be 1 hour 50 minutes long.
- The final exam will be scheduled by the Registrar. It will be 2 hours long.
- The final exam is partly cumulative (i.e., cumulative, but placing more weight on the material covered after the midterm exam).
- During the exams, students are forbidden to communicate with any person other than an examination proctor or the instructor.
- Students are forbidden from using any books, notes, study guides, diagrams, communication equipment such as a cell phone, computer programs or software, online resources or websites, or other aids unless authorized by the instructor; such authorization must be stated explicitly during the examination.
- The students are allowed to use non-programmable, non-graphing calculators during the exams.
- Marked midterm exams will be returned in class.

### **Student Absences**

#### **Missed problem sets:**

The instructor can, at her discretion, grant academic considerations (an extension or reweighting) for a missed problem set.

### **Absence from the midterm examination:**

You must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_medical.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf).

The Student Medical Certificate is available at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

Missed midterm exams without approved, documented official accommodation will be given a mark of zero. If there has been approved, documented official accommodation, the weight of the midterm exam will be transferred to the final exam.

All department and university policies regarding missed exams and necessary documentation apply. Please see **Policy Regarding Makeup Tests and Final Examinations and Policies Regarding Academic Accommodations** below.

### **Absences from Final Examinations:**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

All department and university policies regarding missed exams and necessary documentation apply. Please see **Policy Regarding Makeup Tests and Final Examinations and Policies Regarding Academic Accommodations** below.

**Note:** missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own. Students should check the Western website to see what directives for Covid are to be followed. Western has been and will continue to follow directives established by the Middlesex-London Health Unit. That directive will state whether students should or should not come to campus/class and any other requirements (e.g., masks are mandatory). Please check on your own and do not email the instructor, the Department Undergraduate Advisor/Coordinator or the Faculty of Social Science Academic Counselling Office.

### **Professionalism, Privacy, and Copyright:**

- Students are expected to follow the [Student Code of Conduct](#).
- All lectures and course materials, including slides, presentations, outlines, and similar materials, are protected by **copyright**. Students may take notes and make copies of course materials for their own educational purposes only.

- Students may not record lectures, reproduce (or allow others to reproduce), post or distribute lecture notes, assessments, or any other course materials publicly and/or for commercial purposes without written consent of the instructor.
- Recordings (audio or video) are not permitted without explicit, written permission of the instructor. Permitted recordings may not be distributed or shared.
- Some sessions may be recorded by the instructor. Recorded sessions will remain within the course site or be unlisted if streamed.

**Please Note**  
**Department & University Policies for Fall 2022**

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, policies, and your academic rights and responsibilities** are posted online in the current Western Academic Calendar at: <http://westerncalendar.uwo.ca>. Claiming that “you didn’t know what to do” is not an acceptable excuse for not following the stated policies and procedures.
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 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 to the instructor.
6. **Appeals:** University policies and procedures for appealing a mark can be found in 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.**

Department of Economics procedures for appealing a mark can be found here: [https://economics.uwo.ca/undergraduate/program\\_counselling/responsibilities\\_policies.html#appeals](https://economics.uwo.ca/undergraduate/program_counselling/responsibilities_policies.html#appeals). 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 to submit an appeal to [econugrd@uwo.ca](mailto:econugrd@uwo.ca). Please follow the instructions and use the appeal form shown in the above link.

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 add a first term half course: **Friday, September 16, 2022**
  - Deadline to drop a first term half course: **Saturday, November 12, 2022**

### **Policy Regarding Makeup Tests and Final Examinations**

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.

### **Policies Regarding Academic Accommodation**

- Academic accommodation will not be granted automatically on request. Students must demonstrate by documentation that there are compelling medical or compassionate grounds before academic accommodation will be considered. The Faculty of Social Science's policies on academic accommodation are found at [https://counselling.ssc.uwo.ca/procedures/academic\\_consideration.html](https://counselling.ssc.uwo.ca/procedures/academic_consideration.html)
- **Accommodation for Students with Disabilities:** Students with disabilities or accessibility challenges should work with Accessible Education (formerly SSD, see [http://academicupport.uwo.ca/accessible\\_education/index.html](http://academicupport.uwo.ca/accessible_education/index.html)), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: [Academic Accommodation for Students with Disabilities](#).
- **Rewriting Exams and Retroactive Reweighting are NOT Permitted:** 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 also book travel arrangements AFTER final exam dates have been posted as they must not conflict with test or final exams.
- Unless medically incapable of doing so, students must notify their instructor prior to the test date or at least within **24 hours** when requesting a makeup exam. Failure to follow this procedure may result in denial of academic accommodation and a grade of zero. Students should also set up an appointment as soon as possible to meet with their instructor. If the instructor is not available, send an email message to the instructor, copying the Undergraduate Coordinator at [econugrd@uwo.ca](mailto:econugrd@uwo.ca). **Notifying instructors of a missed exam does not automatically entitle students to a makeup.**



- For medical illnesses, students may consult Student Health Services and request a Student Medical Certificate from the physician. If assessed by an off-campus doctor, students must obtain a certificate from his/her office at the time of the visit/assessment. Student Medical Certificate (SMC) is available here:  
[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf)
- **Documentation for Accommodation:** Individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds or for other reasons.
- **Western University policy on Consideration for Student Absence** is available here:  
[https://counselling.ssc.uwo.ca/procedures/probation\\_rtw/appeals.html](https://counselling.ssc.uwo.ca/procedures/probation_rtw/appeals.html)
- **Religious Accommodation:** Students should consult the University's list of recognized religious holidays and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the [Western Multicultural Calendar](#).

**Policy Regarding Class Attendance and Engagement:** If the instructor deems a student's attendance or engagement in the class to be unsatisfactory, that student may be prohibited from writing the final examination. Examples of unsatisfactory class engagement include frequent absences from an in-person or synchronous online class, lack of assignment submissions, and inadequate use of online course materials. Instructors who intend to make use of this policy will notify the student in advance.

**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.

**Statement on Remote Proctoring:** While Western intends to hold most classes, mid-terms and finals in-person, the London-Middlesex Health unity may require western to teach in a remote format. If this occurs, all assessments will be done remotely and may involve the use of remote proctoring software (i.e., Proctorio, ProctorTrack). Instructors will provide information on the details should the need arise.