

Principles of Mathematical Economics
ECONOMICS 2141A-001
Department of Economics
Western University

September 2024

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Office hours: Thursday 1:30-2:30 pm, Friday 11:00am-12:00pm
Delivery mode: In-person
Meeting time(s): Tuesday 11:30am - 1:30pm, Thursday 12:30 - 1:30pm
Classroom: Room UCC 67
Course website: <https://westernu.brightspace.com/>
Undergraduate inquiries: 519-661-3507 or SSC Room 4078 or 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/Antirequisite Note:

The antirequisite(s) for this course is Economics 2210A/B.

The Prerequisite(s) for this course are Economics 1021A/B and Economics 1022A/B, or Economics 2001A/B, and 0.5 course from: Mathematics 1225A/B, Calculus 1000A/B, Calculus 1500A/B; plus 0.5 course from Calculus 1301A/B, Calculus 1501A/B, Mathematics 1229A/B, Mathematics 1600A/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:

An introduction to mathematical economics, showing the application of linear algebra, differential calculus and constrained optimization techniques to the modelling of decision making by economic agents. Examples include analysis of the consumer resource allocation problem and of the selection of preferred production plans by various types of firms.

Course Objectives:

This course introduces some frequently used mathematical tools in economics and business economics and discusses various examples of how these mathematical tools are relevant in economic analysis in everyday life. The course covers calculus and matrix algebra, unconstrained optimization, and constrained optimization techniques with equality and inequality constraints, and applications of these tools in economic theories such as consumer and producer theories, equilibrium in competitive and non-competitive markets, comparative statics, and national income accounting, etc.

Course Learning Outcomes:

After successful completion of the course, students will be able to:

- Present several economic functions using graphs, including linear and non-linear, rational, exponential, and logarithmic functions.
- 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 constraints, 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.

Textbook(s) and Course Materials:

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

Pena-Levano, Schaum's Outline of Calculus for Business, Economics and Finance, Fourth Edition, McGraw-Hill, 2021

For the recommended books, please visit the Book Store link:

https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024A&courses%5B0%5D=001_UW/ECO2141A

Course Schedule (Tentative):

Please see the tentative course schedule below.

	Tuesday	Thursday	Topic
Week 1		Sep 5	Review, One variable calculus: foundations
Week 2	Sep 10	Sep 12	
Week 3	Sep 17	Sep 19	One variable calculus: applications
Week 4	Sep 24	Sep 26	One variable calculus: applications in economics
Week 5	Oct 1	Oct 3	Calculus of exponential and logarithmic functions
Week 6	Oct 8 (1st Midterm)	Oct 10	Functions of several variables: foundations
Reading week			
Week 7	Oct 22	Oct 24	
Week 8	Oct 29	Oct 31	Functions of several variables: applications
Week 9	Nov 5	Nov 7	Unconstrained optimization of multivariable functions
Week10	Nov 12 (2nd Midterm)	Nov 14	Constrained optimization: equality constraints
Week11	Nov 19	Nov 21	Linear algebra
Week12	Nov 26	Nov 28	Constrained optimization: inequality constraints
Week13	Dec 3	Dec 5	Economic Applications, Review
TBA: Final Exam, Cumulative			

Lecture notes: All pdf notes will be available on Owl Brightspace.

In-Person Classes: I strongly recommend attending all in-person classes. I will not record in-person classes, and there are no perfect substitutes for in-person classes. If you miss a class, it is your responsibility to find out what you have missed from a classmate. There are no further lecture notes other than what is available on Owl Brightspace.

Email Policies:

- Please note that I am not allowed to respond to non-UWO emails, so please use your UWO email address in all communications.
- Please enter the course number (ECON2141) in the subject heading of your email (or at least in your email) and include your student number in the email so that I can support you as soon as possible. I will try to respond to all emails within 48 hours except for weekends and/or holidays.
- Please note that I will not respond to emails such as the following:
 - Any question that is on this syllabus or elsewhere on Owl Brightspace such as exam time and date, course materials, makeup policy, etc. If you are not clear about this information, feel free to ask me at the end of the lectures.

- Requests for extra assignments, reweighting of exams (apart from what is included in the course outline), assignments, etc. as they are prohibited under Senate regulations.
- Requests for any extra lecture notes other than the ones provided on the OWL Brightspace course page.

Assessments and Grading:

Your final course grade is based on two midterm exams and one final. The weights are below.

<i>Exam</i>	Date and Time* (Tentative)	Covers (Tentative)	Weight
Midterm Exam 1 (IN-PERSON)	Oct 8, 12:00 - 1:00	One variable calculus	25%
Midterm Exam 2 (IN-PERSON)	Nov 12, 12:00 -1:00	Multivariable calculus	25%
Final Exam (IN-PERSON)	TBA	Cumulative	50%

* All dates and times are tentative as they must be approved by Exam Central. When Exam Central confirms the exam date and time, I will notify you. The Registrar's Office will set the date and time for the final exam. All times are ET.

** I plan to arrange one **review session** before each Midterm exam if time allows (tentative). The review sessions are designed for discussions of material to be tested. You should plan to come with questions.

Exam Method: Midterm and final exams are in-person, closed-book exams. Note that the assessment dates, times, and methods may change if classes move to online status.

Exam Duration: The duration of each midterm exam is 60 minutes. The duration of the final exam is 120 minutes.

Exam Format: Written responses, questions requiring calculations.

During exams, you may have pens, pencils, a ruler, erasers, your student card, and a non-graphing, non-programmable calculator out of its case at your desk. All other items, including watches and cell phones, must be left in your bag at the front of the examination room.

Policy Regarding Missed Exams:

Midterm Exams

- **There will be no make up exams for the missed midterm exams. The weight of a missed test will be transferred to final exam if there is approved accommodation.**
- Self-attestation is not allowed in the second midterm. If you cannot attend the second midterm, medical documentation is needed. Unless medically incapable of doing so, students must notify me prior to the test date or at least within 48 hours. Failure to follow this procedure may result in denial of academic accommodation and a grade of zero. If your Academic Counselling accepts your documentation, then the percentage for the missed exam will be allocated to the final exam. Students should also set up an appointment as soon as possible to meet with me. **Notifying instructors of a missed exam does not automatically entitle students to a makeup.**
- Please note that students are required to submit their documentation to Academic Counseling for their approval, not to the instructor.

Final Exam

The final exam will cover material from the entire term. Students who miss the final exam must take their documentation to Academic Counselling and, students must notify me prior to the test date or at least within 48 hours when requesting a makeup exam unless medically incapable of doing so. Once your Academic Counselling approves your documentation for the missed Final exam, there will be a makeup date set by the Department. **The makeup may differ in length and format from the originally scheduled exam.** Failure to follow this procedure may result in denial of academic accommodation and a grade of zero.

Students who miss any assessment must follow Western University's procedures to approve their absence to receive accommodation. Missed tests/exams without approved, documented official accommodation from Academic Counseling or without a self-attested absence (where applicable) will be given a zero mark. Note self-attestation is not allowed on midterm 2 or the final.

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.

Tips on How to Be Successful in this Class:

Students in this class should understand the level of autonomy and self-discipline required to be successful.

- Start each week by checking the weekly announcement and reading the assigned chapter(s). Practice questions and answer keys will be available with the progression of the course (student will expect to see the corresponding questions before the class and answers after the class)
- Take notes as you go through the lesson material. Keeping handwritten notes or notes in a regular document will help you learn more effectively than just reading or watching.
- Students should check the course Owl Brightspace site frequently for updates and announcements as well as check their UWO email.
- Do not be afraid to ask questions. If you have questions or are struggling with a topic, contact me. Remember that you can always reach out to me if you require additional assistance.
- There are some online resources:
https://economics.uwo.ca/undergraduate/undergraduate_resources/math_resources_for_ec_2100_required_courses_.html. Students can work together with those resources on their own for practice.

PLEASE NOTE
DEPARTMENT & UNIVERSITY POLICIES FOR FALL 2024

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. A [*new academic consideration and flexibility in assessment*](#) policy is in effect starting September 2024. Students can miss one assessment per course per term without medical documentation. Faculty can designate one assessment per course for which students **cannot** self-attest.
3. Students must familiarize themselves with the “**Rules of Conduct for Examinations**” http://www.uwo.ca/univsec/pdf/academic_policies/exam/administration.pdf.
4. **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.
5. **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).

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 4.

6. It is a Department of Economics policy that **NO** assignments be dated, stamped or accepted by staff. Students must submit assignments to the instructor.
7. **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. **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. 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. Please follow the instructions and use the appeal form shown in the above link.

8. **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.

9. **ADD AND DROP DEADLINES:**

- Deadline to **ADD** first term full or half course: **Fri, Sept 13, 2024**

- Deadline to **DROP/WITHDRAW** first term full or half course: **Mon, Dec 2, 2024**

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
- **Accommodation for Students with Disabilities:** Students with disabilities or accessibility challenges should work with Accessible Education (formerly SSD, see http://academicsupport.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 **48 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. **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
- **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
- **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/ 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.