University of Oklahoma

Department of Economics
2022 Fall

ECON5153 MATHEMATICAL ECONOMICS I

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Office: 308 Cate Center Drive, Room 432 Classroom: CCD1 0145 & Online
Tentative syllabus: more details and adjustments TBA on Canvas and/or via email .

• The Delivery Method is BLEND due to its FRONT-LOADED structure: A mix of online instruction (synchronous and asynchronous lectures) and in-person lectures. The tentative structure can be 80/20, i.e. with 80% of the time online contents (i.e. video or reading) and the rest as in-person interaction.

• For the first two weeks (8/8 - 8/19) before the semester starts, the lectures will be online. Each online lecture will run for about 2 to 2.5 hours. Once the semester starts, the class meets TR 10:30 am - 11:45 am (regular class hours). The last day to attend (i.e. Final Exam) will be on Oct. 6th.
- The first meeting will be in Zoom at 8am on Monday, 8/8/2022.
- The online meeting link has been posted on the course web as well as copied below:

$https://oklahoma.zoom.us/j/91849298360?pwd=MnloMmxWenR4cUFxTUUvMW5nazc2Zz09$
Meeting ID: 918 4929 8360
Passcode: 79744524
- Asynchronous instruction to an online format (i.e. video or reading) will be posted on canvas in advance.

• Communications: Communications will be accomplished primarily in Zoom and by email. All pertinent student emails will be answered within 24- 48 hours of their arrival, unless prior notice of a delayed response is provided. For a quicker response please put the course prefix and number in the subject line (e.g., ECON5153: Question about the Syllabus).

• Email Account and Canvas: Students are expected to check their OU email accounts and the course site on Canvas daily for updates from the instructor. You will need to be sure to do the following:
Set up your default email address so you can reply to email directly from Canvas.
Set your profile photo as well and make sure to set up your Canvas notifications.
Recommend installing the Canvas Mobile app for on-the-go access to schedule and communications.

• Office Hours: Tue. 2:00pm -4:00pm by appointment. Video conferencing appointments for additional office hours can be made when needed with advanced notice.

Course Description

Economics 5153 is a semester long graduate-level course in mathematical concepts and methods for economics, that is in the graduate Mathematical Economics/Econometrics sequence. The purpose of the course is to help students be familiar with the mathematical techniques required in economics. The first part of the course concerns matrix algebra and functions of several variables. Determinant and applications of the matrix algebra in economics and implicit function theorem will be discussed in detail. The second part of the course focuses on optimization and dynamics. This part of the course will be spent learning unconstrained/constrained optimization, homogeneous and homothetic functions, Concave/convex functions, and differential equations. Learning these concepts and techniques will help students set up and analytically solve variable optimization problems in economics and be able to solve linear difference equations and ordinary differential equations.
The class is heavily front-loaded, meets more than twice a week online and in-person, and the lecture will be over before the end of September. The class starts two weeks before the fall semester begins. It will switch back and forth between a "lecture style" and a "practice & discussion

style." Typically for each class, I will present concepts and theoretical method with a couple of examples in lecture format and then announce when we will solve more practice questions. The topics we cover in class will be subject to change based on class progress.

Course Delivery Method

This course is delivered online and in-person. Assignments and activities will be listed on and will be facilitated via the Canvas course management system. Available online at: canvas.ou.edu

Course Material

The textbook for the course is: Simon and Blume:
Mathematics for Economists, W.W.Norton, 1994. This book is available at the OU bookstore, or you can buy it online.

A useful but not required reading is:
Chiang and Wainwright: Fundamental Methods of Mathematical Economics, McGraw-Hill, Fourth Edition, 2005.
Darrell A. Turkington: Mathematical Tools for Economics, Blackwell Publishing, 2007.
Avinash Dixit: Optimization in Economic Theory, Oxford University Press, Second Edition,1990.
Michael D. Intriligator: Mathematical Optimization and Economic Theory, Prentice-Hall, 1971.

Course Web Page

Class announcements will be posted on the course web:
It is students' responsibility to check the site regularly. All important announcements will be posted on it.

Teaching Assistant

TA : Junyeol Ryu — Office: 236 CCD1
Contact Info. : $junyeol.ryu - 1@ou.edu$ — **Office Hours**: Mon. 3pm - 4:30pm & by appointment

Grading

1. **Points Breakdown: The midterm exams for 40% and the final exam counts for 60%.**
2. No credit and/or points negotiation.
3. Grading Scale: Assigning final letter grades - If your final cumulative score is at least 90% out of 100% then your final letter grade will be an A. If your final cumulative score is less than 90% and at least 80% then a B. If less than 80% and at least 70% then a C. If less than 70% and at least 60% then a D. The lowest grade is F. That is:
Letter grades: A: 89.5-100 B: 79.5-89.4 C: 69.5-79.4 D: 59.5.0-69.4 F: less than 59.5

Exams

There are two midterm exams. They cover the class material and homework problems *for the corresponding period.*
Midterm 1 : 8/15 online (tentative)
Midterm 2 : 9/1 online (tentative)

There is a **cumulative final examination** scheduled
Due to the adjusted course schedule (heavily front-loaded), the final exam will be in September. The final exam schedule is:.
from 10:30am to 12:30pm online on Oct. 6.

You are responsible for **double-checking** your own final exam schedule.

Exam Policy

1. **The worst score out of the two mid-term exams will be dropped.** That is, the best mid-exam score will be counted and have a weight of 40%.

2. NO makeup exams for missed midterm exams.

3. **If you miss one midterm exam, then the other midterm exam has a weight of 40%. If you miss both midterm exams, then your total midterm exam score will be 0.**

4. Failure to take the final exam will automatically result in a course grade of F unless there are unavoidable exceptional circumstances verified by the College of Arts & Sciences. In case of such unavoidable exceptional circumstances it is the students' responsibility to inform the professor at least 24 hours prior to the start of the final exam in written form.
   Any medical conditions resulting in unavoidable exceptional circumstances require documentation from Student Health Services at the University of Oklahoma.

5. If there are any exam schedule conflicts with other classes, it is the students responsibility to inform the professor at least 7 days prior to the exam.

6. You have one chance to request a regrading after each exam. Any requests for regrading of exams must be submitted within one week from the date that exams are returned in class, and must be done in written form. The one-week period for submission of exams for regrading begins on the date that the exams are returned in class and not from the date that you pick up the exam. If you miss the class during which the exams are returned, it is your responsibility to pick up your graded exam within the one-week period. If a regrade is requested, the whole exam is subject to regrading. Submitted exams must be in original condition. Alternation of answers may lead to violation of course policies.

7. **All exams must be saved as .pdf and submitted to Canvas. The submission window will be created under the "assignment" navigation. You are responsible for double-checking completion of your submission on time. Late submission will not be counted.**

8. **NO cheating in exams**. Cheating is the fraudulent or dishonest presentation of work. Cheating policy: F in course and reported to the CAS Dean's office for investigation and possible referral to the CAS Academic Conduct Committee.

Policy regarding Class Attendance

Class attendance is encouraged.

Course & University Policies

1. Late Work: Except in cases of documented serious illness or documented emergency no late work will be accepted. Technical difficulties do not qualify as an emergency unless the problem is severe, prolonged, and on the server end (the problem is with Canvas). In such cases, the due date will be modified and a new due date specified. Expect technical difficulties on your own end and make arrangements for a secondary location from which to post and/or an alternative Internet Service Provider.

2. Posting Difficulties: Files which do not post correctly in the assignments area or responses which do not correctly post on the discussion board will not be accepted for a grade. If your file does not post (you are timed out, for example), becomes corrupted, contains a virus, or if your response is blank/partial, you should re-post prior to the deadline so that you may receive a grade. Always check to see that your response or file has correctly posted before you exit Canvas. Be sure to post in advance so that you have enough time to correct for any posting difficulties.

3. Academic Integrity: Cheating is strictly prohibited at the University of Oklahoma, because it devalues the degree you are working hard to get. As a member of the OU community it is your responsibility to protect your educational investment by knowing and following the rules. Absolutely no incidences of academic misconduct will be tolerated in this course. See the Academic Integrity website for more information.

4. Special Accommodations: Any student in this course who has a disability that may prevent the full demonstration of his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

5. Students requiring academic accommodation should contact the Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please see the Disability Resource Center website http://www.ou.edu/drc/home.html

6. Religious Holidays: It is the policy of the University to excuse absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays.

7. Since online courses allow students to complete course work around their unique schedules, and because you are given assignments well in advance of their due dates, most religious holidays should not conflict with the class schedule for this course. However, if you do have plans to observe a religious holiday, please notify your instructor as soon as possible in order to make appropriate arrangements for class work or rescheduling of assignments.

8. Adjustments for Pregnancy/Childbirth Related Issues: Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see www.ou.edu/content/eoo/faqs/pregnancy-faqs.html for commonly asked questions.

9. Title IX Resources: For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24.7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5, M-F) or OU Advocates 405-615-0013 (24.7) to learn more or to report an incident.

10. Incompletes: The OU College of Arts and Sciences advises its faculty to be very strict about the conditions under which a student is allowed to take an incomplete in a regularly scheduled, letter-graded course. A grade of Incomplete (I) will be given only for a justifiable reason (due to unavoidable circumstances, not lack of planning on the student's part) and only if the student is passing the course. It is the responsibility of the student to request a grade of "I" and to meet with the instructor as early as possible to determine requirements for completing the course. Any incomplete granted must be removed by the deadline specified by the instructor. The time limit set for removal of an incomplete will take into account the circumstances of the situation but may not exceed one calendar year.

Course Outline (preliminary)

The actual time spent on each topic is likely to be adjusted as the semester proceeds.[1]
SB stands for Simon and Blume.

1. Introduction (0.5)

2. One-variable calculus. *The first two lectures will be a review and refresher.*
   SB Part I, Appendix A1, A2.1-A2.3, A2.7 (1.5)

3. Matrix algebra (6)

[1] Special thanks to Dr. Liu who have taught this course for many years.

(a) System of linear equations, matrix operations and rank. SB 7.1-7.4, 8.1-8.4.
(b) Determinant and applications. SB 9.1-9.2, 26.1-26.3.
(c) Euclidean spaces and linear independence. SB 10.1-10.4, 11.1.

4. ch4: Functions of several variables (3)
   (a) Limits and sets. SB 12.
   (b) Functions of several variables. SB 13.2-13.5, 30.1.
   (c) Calculus of several variables. SB 14.2, 14.4, 14.6, 14.8. (iv) Implicit function theorem. SB 15.3
5. tentatively Exam 1
6. ch5: Optimization (11)
   (a) Quadratic forms and definite matrices. SB 16, especially pp. 391-392.
   (b) Unconstrained optimization. SB 17, 30.2-30.42
   (c) Constrained optimization I: FOCs. SB 18, Dixit. 1-6.
   (d) Constrained optimization II. SB 19.1-19.3, 30.5.
   (e) Homogeneous and homothetic functions. SB 20.1, 20.3-20.4.
   (f) Concave/convex and quasiconcave/quasiconvex functions. SB 21.1-21.3.
7. tentatively Exam 2
8. ch6: Dynamics (7)
   (a) Linear difference equations, eigenvalues and eigenvectors. SB 23.1-23.4, 23.7-23.8.
   (b) Ordinary differential equations. SB 24.1-24.3.
9. Handouts: Integration; Probability and Statistics (1) *(if time allows)*

   Follows Must-have Math Tools for Graduate Study in Economics by William Neilson, Chapters 10-13. The book is downloadable at $http://web.utk.edu/\ wneilson/mathbook.pdf$

Final exam on **on Oct. 6**.