University of Oklahoma

Department of Economics
2019 Fall

ECON5153 MATHEMATICAL ECONOMICS I

Professor Myongjin Kim
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Classroom: CCD1
TENTATIVE SYLLABUS

Office Hours: Tue. 1:55 pm - 2:55 pm
Thur. 1:55 am - 2:55 pm
and by appointment
Class schedule: TR 3:00pm - 4:15pm
& extended class schedule: TBA

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/end, and will be over before the end of Oct. 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 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 (at least every Tuesday and Thursday). All important announcements will be posted on it.

Teaching Assistant

TA : Donggeun Kim — Office: 336 in Cate1
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Grading

1. **The two midterm exams for 40%, the two quizzes 20%, and the final exam counts for 40%.**
2. All exams will be in closed-book forms.
3. No credit and/or points negotiation.

Quizzes

There will be 2 quizzes in class. It is students' responsibility to check the dates in which the quizzes are scheduled.
Quiz 1 : TBA, Thursday, in class
Quiz 2 : TBA, Tuesday, in class
If you miss all three quizzes, the weight will be shifted to the final exam.

Exams

There are two midterm exams. They cover the class material and homework problems *for the corresponding period*.
Midterm 1 : TBA. in class
Midterm 2 : TBA. in class

There is a **cumulative final examination** scheduled
Final exam was initially scheduled to be "Cate Center One, 0338, December 9, 2019, 4:30pm - 6:30pm." But, due to the adjusted course schedule (heavily front-loaded), the final exam will be in October. The exact date/time/place will be announced in two weeks advance.
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 35%.
2. NO makeup exams for missed midterm exams.
3. **If you miss one midterm exam, then the other midterm exam has a weight of 35%. If you miss both midterm exams, then your total midterm exam score will be 0.**
4. **The worst score out of the two quizzes will not be counted for your final grade.**
5. **If you miss one quiz, then the other quiz has a weight of 20%. If you miss both quizzes, then your total quiz score will be 0.**
6. NO makeup quizzes 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 quiz in written form. Any medical conditions resulting in unavoidable exceptional circumstances require documentation from Student Health Services at the University of Oklahoma.
7. 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.

8. 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.

9. 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.

10. All exams are closed book exams.

11. **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 and required. If you miss a class for any reason, it is your responsibility to obtain lecture notes from your classmates.

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. SB Part I, Appendix A1, A2.1-A2.3, A2.7 (1.5)

3. Matrix algebra (6)

   (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.

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

(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)

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

10. Final exam