Course Syllabus

Department of Economics
University of Connecticut
Mathematical Economics

Spring 2023

Instructor: Professor Tianxu Chen

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Office Hours :

Wednesday 2:30-3:30 pm on WebEx, and by appointment

Every student is responsible for reading and understanding the content of this course outline.

Course Description

Modern economics is based on mathematics to a great extent. The course will be intended to be a "tools" course. Primarily, the course will provide the necessary tool box for advanced economics courses, such as matrix algebra, equilibrium analyses, and optimization theory etc.

Prerequisites: Econ 1200 or both 1201 and 1202; and Math 1071Q or 1110Q or 1121Q or 1131 Q.

Class Information

Lecture time: Tuesday, Thursday 15:30 - 16:20
Location: Mont 104

Teaching Assistant(s): Yijia Gao, yijia.2.gao@uconn.edu
TA Office Hours: Friday, 12:00-1:30 pm, Oak Hall 320 and by appointment

Weekly "Laboratory" TA Sessions:
Students will be expected to come to one of the two TA sessions every week to have more practise. Each week the two TA sessions will cover exactly the same materials. The TA will give lectures at the two slots (9:05AM-9:55AM/Fr in Oak 117 and 10:10AM - 11:00AM/Fr in Mont 104) every week. The TA could go over selected questions in practise questions or lectures , and further, the TA will talk about certain extra practise problems in the session. This will also give the students a chance to work on questions with the TA readily available to lend assistance.

Course Website

- Problem sets, answer keys, additional readings, and other useful information will be posted on the HuskyCT course website.
- Important announcements will be posted on the HuskyCT course website. Students are advised to check frequently.

Texts/Materials

Textbook(Required):

Chiang, A., and K. Wainwright, Fundamental Methods of Mathematical Economics, 4th Edition, McGraw-Hill (earlier editions also work)

Grading Scheme

There will be 2 in-class Midterms (20% each) and one cumulative Final Exam. (40%).

There will be 4 Problem Sets (20% totally, and the lowest grade will be dropped out).

- *Homework*

  There will be four homework assignments, which are comprised of True/False and short-answer questions. Homework assignments will be collected through HuskyCT. Students could work in groups (four students at most for a group), and each student must, however, submit their own answers as sepearte ones. Everyone in the group may not receive the same grade if the answers provided are different (sometimes typos). The goal of this setup is to make sure everyone is participating and make sure everyone in the group is on the same page. Students should be responsible for giving me the problem sets on time. I allow students to submit later homework within 48 hours after the deadline, and the late homework will get a 10% off discount for its grade. Late homework *will not* be accepted after 48 hours because the solution will be posted on HuskyCT then. If there are some medical conditions or other emergency situations that stop some student from handing in problem sets on time, the student should email me immediately and provide solid evidence.

- *Exams*

  Two in-class midterm exams will be given over the course of the semester. The exams will be similar to the homework assignments. The questions will be in True/False and short-answer format.

  - Make-up Midterms

  I will allow students to make-up a midterm exam **if and only if** three conditions are met: (1) I am notified before the exam date; (2) the reason for missing the exam is sensible and verifiable; and (3) the make-up exam is taken before the answers to the exam are posted online.

  - Regrading Issues

  Students have ONE week from the time I give back an exam (not when you retrieve it) to ask questions regarding the exams. This pertains to exam scoring, grading or re-grading an exam, missed questions etc. Note that if regrading is requested, the whole exam will be regraded, not any sole parts.

  - Grades on HuskyCT

  Besides midterms, grades of homework will be also posted on HuskyCT. I will use the grades on HuskyCT, as well as the final exam grade to calculate the final grade. If a student has any questions about the grades on HuskyCT (homework grading, anonymous homework, etc.), the student should contact me as soon as possible, at latest by the end of final week of classes. No changes could be made after the final week of classes.

- Proposed Exams/Homework Dates (subject to change, will be communicated by the instructor)

Midterm #1: Thursday, 3/2 (normal class time/place)

Midterm #2: Thursday, 4/6 (normal class time/place)

Final exam: Scheduled by the University. Details of the final exam will be provided in class.

Assignment #1: Friday, 2/3 at 5:00 p.m. (online submission)
Assignment #2: Friday, 2/24 at 5:00 p.m. (online submission)
Assignment #3: Friday, 3/31 at 5:00 p.m. (online submission)
Assignment #4: Friday, 4/21 at 5:00 p.m. (online submission)

- *Attendance*

  It is very important for students to attend class regularly, as students who do not attend class on a regular basis typically perform much worse than those who attend class regularly. The in-class interaction fosters a better learning environment and, should lead to better performance on all graded components of the course.

Learning Objectives

By the end of the course, students should be able to:

1. Use the tools of matrix algebra in economic applications.
2. Apply the implicit function theorem with the calculus tools to perform comparative static analysis.
3. Understand the constrained optimization techniques in economics models and apply them in economic problems.

Student Expectations

I expect students to (a) attend each class, (b) read the relevant material before class, (c) review the content covered in class, (d) complete and submit assignments on time, and (e) participate in classroom activities. If students meet these expectations, grades will take care of themselves.

Course Email Policy (for this big lecture class)

- I recommend that students use the @uconn email address when emailing me.
- I recommend students to include the course info in emails to allow me help you efficiently.
- Note emails are mainly for quick communications. If students have any detailed questions about the course contents, the problem sets, questions about slides/lecture notes, etc., students should come to my office hours instead.
- If you believe something is important, please talk to me during office hours or schedule an appointment.
- I will be as responsive as possible. You can expect a response within 48 hours Monday
- Friday.

Respect and Diversity

- I will do my best to provide you with an atmosphere of mutual respect and trust. Everyone, including me, should abide by UConn policies concerning academic integrity, anti-harassment, and anti-discrimination.
- I will NOT tolerate disrespectful comments regarding elements of diversity like, but not limited to, ethnicity, gender, age, social class, and dialect.
- In spite of my best efforts, I might accidentally overlook the sensitivity of some issues. If you feel uncomfortable with a topic, discussion, or any aspect of the class environment, please let me know as soon as possible.

- I will be as responsive as possible. You can expect a response within 48 hours Monday - Friday. If you haven't heard from me within that time, please email me a reminder.

Academic Integrity

- Academic dishonesty or plagiarism.pdf of any type will not be tolerated in this class. Please refer to the Student Code for specific guidelines: http://community.uconn.edu/the-student-code-appendix-a/
- We understand that the concept of academic integrity might vary on different countries, so we will be addressing more specific issues during the course. In any case, ignorance of the proper code will NOT excuse a student from facing the consequences of academic misconduct, so make sure you are familiar with the expectations.
- Academic misconduct will result in a failing grade for the cycle in which it occurred. Recurring cases will result in failure of the whole course and the student will be reported to UConn's Community Standards Office, which can lead to disciplinary action.

Healthy Ways to Cope with Stress

Know what to do if you are sick and are concerned about COVID-19. Contact a health professional before you start any self-treatment for COVID-19.

Know where and how to get treatment and other support services and resources, including counseling or therapy (in person or through telehealth services).

Take care of your emotional health. Taking care of your emotional health will help you think clearly and react to the urgent needs to protect yourself and your family.

Take breaks from watching, reading, or listening to news stories, including those on social media. Hearing about the pandemic repeatedly can be upsetting.

Take care of your body.

Syllabus Changes

I reserve the right to change the course syllabus. If changes are made, adequate notice will be provided. The most likely changes (if any) will be to the course outline .

Course Outline, Topics and Readings:

You are advised to read ahead in order to prepare for lectures.

1. Linear Algebra
Matrix algebra.
Determinants, Cramer's rule.
Quadratic forms, Definiteness, Eigenvalues (characteristic roots).

References:
Chiang : chapters 4, 5.

2. Differential Calculus
Functions.
Limits, Continuity, Differentiability.
Differentiation and its rules.
Partial derivative, Implicit functions, Total differential.
Curvature of functions, Hessian matrix.
Homogeneous functions, Euler's theorem.

References:
Chiang : chapters 6, 7.

3. Comparative Statics
Comparative statics using implicit function and total differential.
Economic applications.

References:
Chiang , chapter 8.

4. Optimization
First order necessary condition(s), Second order sufficient condition(s).
Local maximum/minimum, Global maximum/minimum.
Economic applications.
Quasiconcave and quasiconvex functions,

References: Chiang , chapters 9, 11.

5. Further Topics in Optimization (Optional)