

ECON 401: MATHEMATICAL METHODS IN ECONOMICS  
MARK MOORE  
FALL 2022

**PRELIMINARY AND INCOMPLETE  
NOTHING IN THIS SYLLABUS SHOULD BE REGARDED AS FINAL. AN  
UPDATED SYLLABUS WILL BE PROVIDED WHEN CLASSES BEGIN IN  
FALL 2022.**

THIS SYLLABUS HAS FIVE PAGES.

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This course aims to train you to apply mathematical methods commonly in use in economic analysis. Throughout, the intent is to integrate the mathematics with economic applications. The course focuses on three topics: comparative statics, optimization, and dynamic analysis.

Comparative statics refers to analysis of the relation between the values of the endogenous variables in a model's equilibrium state and the set of values of the parameters and exogenous variables. In other words, if the value of a parameter or exogenous variable changes, how are the equilibrium values of the endogenous variables affected? Optimization concerns methods for determining the maximum (minimum) values of functions, with and without constraints. Dynamic analysis concerns methods for examining the path of variables over time, methods for determining whether variables will tend to converge to certain values over time, and methods of optimization when variables are changing over time.

For many topics, the course will rely heavily on the assigned textbook. However, I will supplement the textbook with additional material and examples. At some points in the course, there will be additional posted lecture notes.

#### Website

There will be a course website on the blackboard system. All course documents will be posted on the course website.

#### Course Mode

This course is designed for in-person delivery and will make extensive use of the chalk board or dry erase board in class. The lectures will not be recorded.

If USC policy with respect to course delivery changes in response to COVID circumstances, then the delivery method for this course will change accordingly.

Please note that office hours will likely be held via Zoom.

#### Use of Course Materials, Recordings, Cell Phones

Any class materials—recordings, lecture notes, problem sets, etc.—provided to students or posted on the course website are for the use of enrolled students and are not

for distribution beyond the members of the class. In addition, any recordings posted may not be downloaded, but only viewed.

Students may not record class lectures, in either audio or video format, without permission of the instructor.

Cell phone use of any kind is not permitted during class. Please put your cell phones away and keep them out of sight during class.

### Requirements

There will be three exams in the course. The first exam will be in two parts, called quiz 1 and quiz 2. The exam weights are given below. Note that the final exam is in accordance with the University-wide exam schedule.

Exam 1 (in two parts)	
Quiz 1: TBA	50 points
Quiz 2: TBA	50 points
Exam 2: TBA	100 points
<u>Final Exam: Tuesday, December 13, 8 – 10 am</u>	<u>100 points</u>
Total Points for the Course	300 points

Please do not miss the exams/quizzes. If you foresee any reason that you may miss an exam, please send me an email message within the first three weeks of the semester, so that we can discuss the situation. Note that apart from conflicts with University-sponsored activities, there are very few legitimate *foreseeable* reasons for missing an exam. If you do not send me a message within the first three weeks, the only valid excuses for missing an exam are medical or family emergencies.

The text includes many problems, some with answers. I may suggest some problems for review at times throughout the course. I will also assign practice problems not in the text at various points in the course. These problem sets will not be graded. They are for your review. You are strongly encouraged to complete these problems, however. Struggling with problems is the best way to learn the material. I will work through some of the problems in class and on review days, and I may schedule extra sessions for problem review.

### Textbook

The required text for the course is Chiang and Wainwright, *Fundamental Methods of Mathematical Economics*, 4<sup>th</sup> edition. I will supplement the text with additional material in class at some points in the course.

### Course Outline (Tentative—Will be updated)

The topics and exam dates are fixed dates. The scope of the readings is tentative. We will likely not cover all of the chapters listed below in their entirety. In each section, I will pick and choose material from among the chapters listed. I will adjust the pace and scope of the course as we move along. I will discuss in class which sections of parts I and II will be covered on quiz 1 and which parts will be covered on quiz 2, and to what extent the exams will be cumulative.

## I. Introduction, Models, and Linear Algebra

Chapters 3-5 (omit 4.7, omit 5.7-5.8)

## II. Comparative Statics

Basic concepts in real analysis: sets and limits (in class presentation and posted lecture notes)

Chapters 6 -8.

In-Class Review for Quiz 1: Lecture Preceding Quiz 1 (Second half of class)

**Quiz 1:** TBA (First half of class)

In-Class Review for Quiz 2: Lecture Preceding Quiz 2 (Second half of class)

**Quiz 2:** TBA (First half of class)

## III. Optimization

### *Part A*

Chapters 9-12 (at least through 12.5, the exact stopping point for this section is TBA)

{Note that we likely cover chapter 9 before Quiz 2, even though material for Chapter 9 will not be tested until Exam 2.}

Some supplemental material will be presented in class.

In-Class Review: Lecture Preceding Exam 2

**Exam 2:** TBA

### *Part B*

Chapter 12 (any parts not covered in Part A)

Chapter 13 (parts)

## IV. Dynamic Analysis

Chapters 14, 15 16 (parts), 17, 18 (parts), 19 (parts)

Introduction to dynamic optimization (time permitting)

**Final Exam:** Tuesday, December 13, 8-10 a.m.

## Statement on Academic Conduct and Support Systems

### Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

### Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](http://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

### Support Systems:

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](http://studenthealth.usc.edu/counseling)

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*  
[suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call*  
[studenthealth.usc.edu/sexual-assault](http://studenthealth.usc.edu/sexual-assault)

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086*  
[eeotix.usc.edu](http://eeotix.usc.edu)

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

*Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298*  
[usc-advocate.symplicity.com/care\\_report](http://usc-advocate.symplicity.com/care_report)

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

*The Office of Student Accessibility Services (OSAS) - (213) 740-0776*  
[osas.usc.edu](http://osas.usc.edu)

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

*USC Campus Support and Intervention - (213) 821-4710*

[campussupport.usc.edu](http://campussupport.usc.edu)

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity, Equity and Inclusion - (213) 740-2101*

[diversity.usc.edu](http://diversity.usc.edu)

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

*USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu), [emergency.usc.edu](http://emergency.usc.edu)

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

*USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu)

Non-emergency assistance or information.

*Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)*

[ombuds.usc.edu](http://ombuds.usc.edu)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

*Occupational Therapy Faculty Practice - (323) 442-3340 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)*

[chan.usc.edu/otfp](http://chan.usc.edu/otfp)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.