

Econ 5305: Applied Mathematical Economics

Section 002, CRN 18081, Fall 2024

University of Texas at El Paso

Time and Location: TR 6:00 – 8:50 pm, Aug 26 – Oct 18, BUSN 304

Instructor: Feng Liu, Ph.D.

Email: fliu@utep.edu (Please contact me using your UTEP emails
and put “Econ 5305 + full name” in the subject line.)

Office Hours: MW 1:00 – 3:00 pm or by appointment, BUSN 212

Blackboard course site: <https://blackboardlearn.utep.edu> (Students will find assignments and other class matters on BB. Students should visit BB on a regular basis for updates.)

Course Description

This course is required for students in the Master’s of Science in Economics program. Students must pass this course with a B or better to continue in the program.

This is a course in mathematical methods for economists. We will review calculus, especially derivatives, in this course, and see how calculus is used in economic theory.

Mathematical modeling is an indispensable tool in economics, finance, business, and management. It is not always simple to use mathematics, but its language and techniques enable us to frame and solve problems in an effective manner.

Course Goals

After taking this course, students are expected to be able

- to relate mathematical models to economic problems,
- to use mathematical tools to solve economic problems,
- to perform comparative static analysis.

Course Assignments and Grades

1. Assignments

<i>Assignment</i>	<i>Points</i>	<i>Date (tentative)</i>
Exam 1	100	9/10/2024
Exam 2	100	10/1/2024
Final Exam	100	10/17/2024
Homework	300 = 50 points × 6	TBD
Total	600	

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- There will be three exams. Due to its comprehensive nature, the final exam requires students to have knowledge from previous chapters. Mathematics is cumulative by nature, and the final exam is cumulative as well. If you get behind or have difficulty early on, don't delay getting help or you will have more difficulty as the course proceeds. There would be no make-up exams.
 - There will be six problem sets (HW). Homework assignments are to be used to check your understanding of the material and to help you work through some of the technical issues in this course. The problem sets will be available on Blackboard and must be submitted before or on the due date. The due dates are not flexible, and no late work will be accepted without an acceptable excuse.
 - I strongly urge students to use the problem sets as preparation for the exams. Mathematics cannot be learned passively, and the problem sets are a part of active learning.

2. Grading Scale

<i>Letter Grade</i>	<i>Percentages</i>	<i>Points</i>
A	[90, 100]	[540, 600]
B	[80, 90)	[480, 540)
C	[70, 80)	[420, 480)
D	[60, 70)	[360, 420)
F	below 60	below 360

- **There are no exceptions to the grading policy.** I sympathize with students who are close to the cutoff for the next higher grade. However, it is unfair to others to give special consideration to any student.
- **Grades will be posted on Blackboard**, so students can monitor their status throughout the semester. Any end-of-semester adjustments on final grades will be administered at the instructor's discretion and are extremely unlikely.

Textbook and Software (Required)

Fundamental Methods of Mathematical Economics, 4th edition, by Chiang and Wainwright, McGraw-Hill, 2005.
ISBN-13: 978-0070109100

Classroom Decorum

The learning process is more productive when there is a positive classroom environment. Part of the responsibility for maintaining that environment rests with students. What I ask is less for my benefit than for the benefit of your fellow students. Students should follow the simple guidelines below:

1. Treat class time as if it were a professional meeting. Disruptive student behavior, such as having personal conversations during lectures, is unacceptable.
2. Attendance is required. Students are responsible to catch up on any missed work.
3. Electronic devices are permitted only if students are using them to take notes or view the textbook. Please silence cell phones and other electronic devices before class starts.

4. Academic dishonesty is a serious offense. Cheating, plagiarism, collusion, or falsification will result in a **zero mark**. Academic dishonesty is defined by the University at <https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html>.

Note: Failure to adhere to course rules and expectations may result in a student being administratively dropped from the course or being downgraded to the next grade letter, for example, from B down to C.

Communication

The best way to reach me is via email. I strongly prefer to communicate **through emails rather than Blackboard course messages**. Please send emails to fliu@utep.edu and put “Econ 5305 + full name” in the subject line all the time. I will make every attempt to respond to your message within 24 to 48 hours of receipt. For email etiquette, see <https://www.unr.edu/writing-speaking-center/student-resources/writing-speaking-resources/email-etiquette-for-students>.

Academic Integrity and Scholastic Dishonesty

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures (HOOP). It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, processing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one’s own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso will be reported to the [Office of Student Conduct and Conflict Resolution](#) (OSCCR) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#). All students are responsible for knowing and adhering to UTEP’s policy on academic honesty.

Accommodations Policy

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#) (CASS). Contact CASS at 915-747-5148 or email them at cass@utep.edu, or apply for accommodation online via the [CASS portal](#).

Withdrawal and Incomplete Grade Policy

A student may officially withdraw from this class in accordance with UTEP policy and within the UTEP academic calendar dates. Automatic withdrawals will NOT be made by the instructor. To withdraw from the class, students must take the appropriate actions on or before the university deadlines.

Incomplete grade may be requested only in exceptional circumstances after a student have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines. The student must have a reasonable chance of passing the course to be considered for an incomplete. An incomplete will not be granted to avoid failing the course.

There are exceptions to the drop deadline. “Exceptions to this deadline will be considered if the student has a medical condition that would justify a request after the Automatic W Deadline. In order to petition for an exception, the student must submit a request with supporting documentation to the University Student Withdrawal Committee. Supporting documentation may include a letter from the attending physician, clinical psychologist, or licensed clinical practitioner on official letterhead with an original signature, stating the date(s) within the semester that the student was under medical care and that the student must withdraw because of the medical condition. Supporting documentation must be submitted within the semester or no later than 90 days after the end of the term for which the withdrawal is being requested. After 90 days, a full refund of tuition and fees will not be approved. If the student is unable to act on his or her own behalf, a representative can do this for the student.”

Course Evaluation

Your constructive assessment of this course plays an indispensable role in shaping education at UTEP. Upon completing the course, please take the time to fill out the online course evaluation.

Copyright Statement

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

COVID-19 Precautions

If you have tested positive for COVID-19, you are encouraged to report your result to covidaction@utep.edu, so that the Dean of Student Office can provide you with support and help with communication with your professors. It is important to follow all instructions that you receive as part of the diagnosis, including isolation and staying at home until a negative test is produced.

If you experience COVID-19 symptoms, please follow the isolation protocol by staying at home and getting tested as soon as possible. If the test is negative but you are still seeking accommodations, please contact the Dean of Students Office for guidance in a timely manner. Your instructor will work with Dean of Students Office to determine the extent of any such accommodations.

Final Note

The contents of the syllabus are tentative and subject to change. Any changes will be made known to the students beforehand and posted to Blackboard course site.

Tentative Course Content

The outline below provides a general plan for this course. Deviations may be necessary.

Module 1 Equilibrium Analysis (chapters 3, 5, 6, 7)

1. The meaning of equilibrium (section 3.1)
2. Example 1 D-S model (market model): graphical illustration, solving by elimination of variables (sections 3.2, 3.3)
3. Example 2 National-income model: graphical representation, solving by elimination of variables (section 3.5)
4. Existence of solutions and nonsingularity (sections 5.1, 5.2)
5. The nature of comparative statics and applications (sections 6.1, 7.5)

Module 2 Economic Models (chapters 2, 10)

1. Ingredients of a mathematical model (section 2.1)
2. Relations and functions (section 2.4)
3. Types of functions (section 2.5)
4. Exponential and logarithmic functions (sections 10.1, 10.3, 10.4)
5. Functions of two or more independent variables (section 2.6)

Module (tentative) Function Properties

1. Concavity and convexity (sections 11.5, 12.5)
2. Quasiconcavity and quasiconvexity (section 12.4)
3. Homogenous functions (section 12.6)
4. Homothetic functions (section 12.7)

Module 3 Derivatives (chapters 6, 7, 8, 9, 10)

1. The derivative, sensitivity, rate of change, and slope of a curve (sections 6.2, 6.3)

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2. Rules of differentiation (sections 7.1, 7.2, 7.3, 8.4, 8.5, 10.5)
 3. Partial differentiation (section 7.4)
 4. Higher-order derivatives (sections 9.3, 10.5)

Module 4 Derivative Applications (chapters 8, 9, 10)

1. Instantaneous rate of growth (sections 10.2, 10.7)
2. Total differential (sections 8.1, 8.2, 8.3)
3. Taylor series (sections 9.5, 10.2)
4. Total percentage change, point elasticity, substitution of elasticity (sections 8.1, 10.7, 12.7)
5. Plotting a function: increasing/decreasing, concave/convex, boundary
6. Finding local extrema for univariate functions
 - o Cases with a single choice variable (sections 9.2, 9.4, 10.6, 11.1)
 - o Cases with two or more choice variables (sections 11.2, 11.3, 11.4, 11.5)
7. Finding global extrema for univariate functions (sections 9.2)

Module 5 Optimization (chapters 9, 11, 12, 13)

1. Optimal values and extreme values (section 9.1)
2. Economic applications (sections 10.6, 11.6)
3. Optimization with more than one variable (sections 11.2, 11.3, 11.4, 11.5, 11.6)
4. Optimization with equal constraints (sections 12.1, 12.2, 12.3, 12.4, 12.5)
5. Optimization with inequalities: Kuhn-Tucker conditions (sections 13.1, 13.2, 13.3, 13.4)

Module 6 Comparative Static analysis (chapters 6, 7, 8, 13)

1. The nature of comparative statics and applications (sections 6.1, 7.5)
2. Comparative statics of general-function models (sections 8.6, 8.7)
3. Comparative-static aspects of optimization (sections 11.7, 12.5)
4. Maximum-value functions and the envelope theorem (section 13.5)
5. Duality and the envelope theorem (section 13.6)
6. Does it matter a lot if there is an optimization error (i.e., if there is a deviation from the optimal solution)?