

ECO 4401: INTRODUCTION TO MATHEMATICAL ECONOMICS

FALL SEMESTER 2022

Instructor: Dr. Joel D. Carton
Office: DM 313B
Phone: 305-348-2682
E-mail: joel.carton@fiu.edu
Teaching Assistant: TBA

Office hours and appointments:

I will hold virtual office hours on Wednesdays, from 5:00 – 6:30, and Thursdays, from 3:00 – 5:00, via Zoom. Those can be accessed at the scheduled times with the link: <https://fiu.zoom.us/j/4332681122>. No passcode is required to join. In addition, I will be available for appointments as the need arises. To insure availability, appointments should be made with at least 24 hours advance notice.

Textbook and references:

The required textbook for the course is:

- *Essential Mathematics for Economic Analysis, 5th edition* (2016) by Knut Sydsaeter and Peter Hammond, published by Pearson Education Limited.

Other useful references for additional explanation and exercises are:

- *Fundamental Methods of Mathematical Economics, 4th edition* (2005) by Alpha C. Chiang and Kevin Wainwright (McGraw-Hill Irwin)
- *Mathematics for Economists* (1994) by Carl Simon and Lawrence Blume (W. W. Norton and Company)
- *Mathematics for Economists, an Introductory Textbook, 2nd edition* (2007) by Malcolm Pemberton and Nicholas Rau (Manchester University Press)
- *Mathematics for Economists, 2nd edition* (2001) by Michael Hoy et. al (The MIT Press)
- *Linear Algebra and its Applications, 4th edition* (2012) by David C. Lay (Pearson)

Prerequisites:

Students should have completed ECO 3101, ECO 3203, and a course in Calculus (MAC 2233 or MAC 2311) with a C or better before enrolling in this course.

Course content:

The purpose of this course is to introduce students to the mathematical tools commonly used by economists to rigorously describe and analyze the predictions made by the models that they use. To that end, the course examines a variety of classic problems from economic theory, and develops the mathematical methods required to solve those problems.

Although I reserve the right to make modifications as I see fit, my tentative plan is to cover the following topics in order:

- Gaussian elimination and row echelon forms (ch. 15.6)
- Vectors and vector equations (ch. 15.7, 15.8)
- Linear independence ([online](#))
- Matrix operations (ch. 15.2 – 15.5)
- Systems of linear equations and $A\mathbf{x} = \mathbf{b}$ (ch. 15.3)
- Determinants (ch. 16.1 – 16.5)
- Finding the inverse of a matrix (ch. 16.6, 16.7)
- Cramer's rule (ch. 16.8)
- Eigenvalues and eigenvectors ([online](#))
- Diagonalization (online)
- Discrete time dynamical systems ([online](#))
- Derivatives of univariate functions (chs. 6, 7)

- Partial derivatives of multivariate functions (ch. 11)
- Total differentials (ch. 12.9 – 12.11)
- Differentiating implicit functions (ch. 7.1 – 7.3)
- Comparative statics (chs. 13.7)
- Critical points of an objective function (chs. 8.1 - 8.6, 13)
- Second derivatives (ch. 6.9)
- Concave and convex functions (chs. 6.9, 8.7, 13.2)
- Second order conditions for local extreme values (chs. 6.9, 13.2 – 13.3)
- Hessian matrices (ch. 11.6)
- Positive definite and negative definite matrices ([online](#))
- Constrained optimization (ch. 14)

Course Grades:

Grades will be based on six homework assignments and three exams, including two midterm exams and a comprehensive final exam. In particular, a student's overall numerical score for the course will be a weighted average of his/her average homework score, average midterm score, and final exam score. The average homework score will receive a weight of .30 in the overall grade. Of the midterm average and final exam grade, the better score will receive a weight of .50, while the worse score will receive a weight of .20.

Letter grades for the course will be determined by students' relative overall numerical scores for the course. Specifically, grades will be based on the following scale, although I reserve the right to be more generous if appropriate:

- A: Top 20%
- B: Next 20%
- C: Next 40%
- D, F: Bottom 20%

Note: There will be no extra credit of any kind offered to any student under any circumstances

Exam schedule:

Exams are scheduled as follows:

- Exam 1: Monday, September 26th
- Exam 2: Monday, October 31st
- Final Exam: Monday, December 5th; 2:15 – 4:15

Note: If you take this class, you must take the exams at the scheduled times, unless you have a university sanctioned schedule conflict. If you won't be available to take the exams at the scheduled times, don't take this class. There will be no makeup exams offered to students who miss exams without prior authorization!

Late homework:

In order to encourage timely submission of homework, late homework will be penalized as follows.

- Assignments submitted after the deadline (including after class on the due date), but within 3 days of the deadline will lose 50% of their value.
- Assignments submitted more than 3 days late will receive a zero.

Attendance policy:

I highly recommend that students attend all lectures. When you skip lectures regularly, you only make the class more difficult for yourself. However, attendance will not directly figure into the calculation of grades for the course.

Academic dishonesty:

I will not tolerate cheating of any kind. Although you are free to collaborate with other students on your homework assignments, you will be expected to submit our own assignments and complete your exams without assistance from anyone (or anything) else. Any student who, in my judgment, is found to have cheated on a homework assignment or an exam will receive an automatic zero for that assignment/exam and have a complaint filed against them with FIU's Office of Student Conduct and Academic Integrity.

Accommodating disabilities:

In keeping with the Americans with Disabilities Act, I will make every effort to accommodate the needs of students with disabilities. Any student who, because of a disabling condition, may require some special arrangements in order to meet course requirements should contact me as soon as possible to make necessary accommodations.

Drop/add deadlines:

- Monday, August 29th: Drop/Add period ends. You will not be refunded for the course if you drop it after this date.
- Monday, October 31st: Last day to drop with DR grade or withdraw from the University with a WI grade.