Georgia Institute of Technology
Ivan Allen College of Liberal Arts
School of Economics

ECON 6170-MO

Mathematics for Economic Modeling
Fall 2025 (Aug. 18 – Dec. 12)

Class Meeting Time and Location: TR, 3:30-4:45pm, Van Leer C340
Instructor: Dr. Matthew E. Oliver, Associate Professor
Office: Old C.E. Building, room 223
Office Hours: Tuesday & Thursday 5:30-6:30pm*
E-Mail: matthew.oliver@econ.gatech.edu
Office Phone: 404-894-6305

*You will need your BuzzCard to enter the building after 5pm, at one of the side doors.

Teaching Assistant: Victoria Godwin (Economics PhD Candidate)
Email: vgodwin3@gatech.edu
Office hours: Monday 12:00-1:00pm (remote only: email VG to acquire Zoom link)

NOTE: All participants in this course—students, instructor, and TA—are expected to abide by the values enumerated in the Statement of Diversity and Inclusion of the Ivan Allen College. Please take a moment to read and reflect upon this statement.

Course Description: Economics is not simply applied math. Rather, economists use mathematical models to gain insight into systematic economic relationships. For example, an economic relationship of interest is first translated by the economist into a (simplified) mathematical model, which can then be manipulated using standard mathematical tools to develop a deeper understanding of the nature of that relationship, to solve for an 'economic equilibrium,' and/or to make predictions about how certain variables might respond to changes in the model's parameters. However, whatever the mathematical 'results' are, to be useful they must then be interpreted via the intuitive language of economics, with the understanding that the mathematical model and results are at best an approximation of the true economic relationship under investigation. As the great John Maynard Keynes stated in his most famous work, "The object of our analysis is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organized and orderly method of thinking out particular problems." Math therefore provides a foundation and logical framework for economic analysis, but the math is not the end in itself. Nonetheless, advanced study in modern economics requires students to have a firm grasp of a variety of mathematical tools, including (but not limited to) probability theory, statistics, geometry, algebra, calculus, linear algebra, and even more advanced mathematical methods like dynamic optimization. Such methods—and their specific applicability to economic analysis—are the focus of this course.

Course Objective: This course provides a detailed and rigorous foundation for advanced study in economics through formal exposition of the core mathematical concepts and tools used in modern economic analysis.

Course Prerequisites: ECON 3110 and ECON 3120

Text (required): *Fundamental Methods of Mathematical Economics,* by Alpha C. Chiang & Kevin Wainwright, 4th ed., McGraw-Hill.

Grading Scale: We will follow a standard grading scale for this course:

90%-100%	A
80%-90%	B
70%-80%	C
60%-70%	D
< 60%	F

Course Grade: Your grade for this course will be comprised of three components:

1. ***Homework Assignments*** (30%) – These are written problem sets that you will complete on paper and submit in class on the specified due date.
    - Homework assignments will be posted on the Canvas course site, in the *Homework Assignments* module.
    - Late submissions will be accepted for up to one week after the due date, for a penalty of 5 points (out of 100) per working day (M-F). After one week, late submissions will not be accepted and will be counted as a zero.

2. ***Exam 1*** (30%) – Because this material is advanced, solving many of the problems we will learn can be time-consuming. So, the time limit imposed by a one-hour-and-fifteen-minute class period is very constraining, especially for students who work more slowly. For this reason, the first exam will be split up across two days. **Part 1** will be on **Tuesday September 30, 2025**, and **Part 2** will be on **Thursday October 2, 2025**. These dates are non-negotiable. For those with GT-approved absences only, a make-up exam will be scheduled accordingly.

3. ***Exam 2*** (30%) – Exam 2 will be taken during the Final Exam period but will NOT be comprehensive. It will cover only the material discussed following the material covered on Exam 1. The date and time will be in accordance with the GT Final Exam Schedule. For those with GT-approved absences only, a make-up exam will be scheduled accordingly. **DO NOT book your flight home for the holidays before the exam date and then beg me to let you take the exam early. The answer, preemptively, is no.**

4. ***Attendance*** (10%) – I will take attendance every day except for exam days. At the end of the semester, your attendance rate will be your attendance grade. So, if you attend 100% of the lectures, your attendance grade will be a 100. If you attend 85% of the lectures, your attendance grade will be an 85, and so forth. Thus, it is still possible to get an A even if you literally never come to class except on exam days, but you would have to have perfect scores on all assignments and exams.

The percentages next to each component above indicate the weight that each component carries in your final grade. Thus, your final grade will be calculated as a *weighted average*. So, for example, if at the end of the semester your homework average is a 94, you got an 90 the first exam and an 80 on the second exam, and your attendance rate was 90%, your grade for the class would be:

$$(0.3 \times 94) + (0.3 \times 90) + (0.3 \times 80) + (0.1 \times 90) = 88.2 \rightarrow \text{B}$$

Rounding Policy: I have a hard rule about rounding, which is that there is none. Your final score is what it is down to the last decimal. An 89.999 is a B (just as a 79.999 is a C, and so on), no exceptions.

Final Grade Policy: Final grades are final. Please do not contact me after the term is over to ask if there is anything you can do to improve your grade. There isn't. This is not because I'm mean or I don't like you. It's simply a hard rule designed to maintain fairness. It would not be ethical to extend a special favor to any one person that I do not also extend to everyone. The only reason I would change your grade after the fact is if you can show me incontrovertible evidence that I have made a mistake in calculating it (for example, because I had one of your homework/exam scores recorded incorrectly).

Exam Schedule Policy: If you do not have a GT-approved excused absence (*e.g.*, for athletics or if you have a disability waiver), DO NOT ask me if you can take an exam at some other time for any reason. The answer is, preemptively, "no" (verifiable minority religious holidays are the *only* exception). Here also, this is a rule to maintain fairness. I do it for one person, I have to do it for everyone, which would be way too much to deal with. If, on an exam date, you come down with

a legitimate serious illness or have an automobile accident or something like that, I will send you to the Office of the Dean of Students to plead your case to them. Only after I receive confirmation from ODS that your excuse is legitimate will I allow you to reschedule the exam.

Canvas Grade Posting Policy: Throughout the session/semester, either I or my TA will post your homework and exam grades in the Canvas course site Grades tab for you to keep track of your grade. If you find any discrepancy between what you actually made on a quiz/exam and the grade that is posted on Canvas, please notify me immediately so that I can double check to make sure it is correct.

Other Course Policies: Please make every effort *not* to arrive late to class or leave early. Please set cell phones to 'silent' and *do not* answer your phone while in class (do not get up and leave the classroom to answer your phone either). If it is a genuine emergency, you will be permitted to exit the classroom to address the issue. Texting during class is not permitted. Any other rude or disruptive behavior will be dealt with appropriately. You may bring your laptop computer or other device to class, but only if you are using it for course-related activities (not for playing games or watching YouTube, among other things). *During exams, you **may not** use your cell phone calculator (so bring an actual calculator), and if you need to go to the restroom, you must leave your cell phone with me while you go.*

Academic Dishonesty: Cheating and plagiarism will not be tolerated. Any violation of the Institute's Honor Code will be reported to the Dean of Students.

Group Work: You are encouraged to interact with other students outside the classroom to discuss the homework and study for exams, but no formal group assignments are assigned.

Disclaimer: If anything significant should change with respect to this syllabus, I will let you know immediately.

Course Outline:

1. Introduction: Chapter 2
2. Static Analysis: Chapters 3-5
3. Comparative-Static Analysis: Chapters 6-8

EXAM 1 (*Sept. 30 & Oct. 2, over Chapters 2-8*)

4. Optimization Problems: Chapters 9-13
5. Dynamic Analysis: Chapters 14-15

EXAM 2 (*See GT Final Exam Schedule for date & time, over remaining chapters*)