

Syllabus - ECON 3001
Introduction to Mathematical Methods
Summer 2022

LOGISTICS

Instructor	Yunyun Lv
Email	yunyun.lv@pitt.edu
Office Hours	4:15 - 5:15 PM Mon. & Wed. @ Posvar 4522
Teaching Assistant	Yu Qiu
Email	yuq23@pitt.edu
Office Hours	4:15 - 5:15 PM Tue. & Thu. @ Posvar 4522
Lectures	10:30 - 11:45 AM Mon. - Fri. @ Posvar 4940
Recitations	3:00 - 4:15 PM Mon. - Fri. @ Posvar 4940
Tests	every Friday after class

The first meeting starts from 10:30 AM on Aug 8. You are not required to wear a mask in class. But feel free to wear one if you want to.

COURSE DESCRIPTION

This course reviews basic mathematical concepts that will be useful for economics Ph.D. program. This will be a very high pace review.

A possible list of topics that is both incomplete and overreaching goes as follows.

- **Preliminaries:** logical statements and proof techniques, elementary set theory.
- **Analysis:** Cartesian products and relations, open sets and closed sets, convergence and compactness, functions, continuity of functions.
- **Linear Algebra:** vector spaces and subspaces, linear independence and basis, linear functions and matrix representations, inverse and determinant, positive and negative definiteness/semi-definiteness.
- **Calculus:** differentiability, partial and directional derivatives, the chain rule, Taylor's Theorem, gradient and Hessian, Jacobian and derivatives of matrix functions, the implicit function theorem, ho-

mogeneous functions, concave/convex and quasi-concave/quasi-convex functions.

- **Riemann Integration:** definition and properties, integration by parts, the Fundamental Theorem of Calculus, differentiation with respect to the variable of integration.
- **Difference and Differential Equations:** eigenvalues and eigenvectors, systems of linear difference equations, linear ordinary differential equations.

Although the last two bullet points will be covered only if time permits, the list includes too much material for anybody to “learn” in 3 weeks. The course assumes that you are already familiar with many (hopefully all) concepts covered, maybe not at the level of rigor and detail desirable. If that is not the case, you have some work to do before the class starts.

TEXTBOOK

There is no single source for all this material that is in exactly in the format the course will use. The following books are our major references.

- Angel de la Fuente: Mathematical Methods and Models for Economists.
- Carl P. Simon and Lawrence Blume: Mathematics for Economists. The first book may be sometimes harder than needed, while the second has parts which are too easy.
- Walter Rudin: Principles of mathematical analysis.

The first two include many economic applications as well as formal mathematics. The third one is a classical reference for analysis. This class is pretty standard in many economics program, so if you do an internet search for economics summer math camp you will find numerous sources that give you an idea of what to expect.

EVALUATION

40%	Problem sets, daily
20%	Aug 12: 1:00 - 2:15 PM Review, 3:00 - 4:15 Pm Test 1
20%	Aug 19: 1:00 - 2:15 PM Review, 3:00 - 4:15 Pm Test 2
20%	Test 3 on Aug 26 10:30 - 11:45 AM

You are expected to hand in every problem set. One or two randomly chosen questions will be graded everyday. This class is graded Pass/Fail.

ACADEMIC HONESTY

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Understanding and Avoiding Plagiarism tutorial.

Students ARE PERMITTED and are actually encouraged to work together on problem sets; However, dividing up the problems and each working on only part of the homework is NOT permitted. Each student is required to turn in their own work separately.

DISABILITY SERVICES

If you have a disability, contact both your instructor and the Office of Disability Resources and Services (DRS), 216 William Pitt Union, 412-648-7890/412-383-7355 (TTY) as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

STATEMENT ON CLASSROOM RECORDING

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.