Mathematics for Economists
(ECO-1010)
Spring Semester 2024

Instructors:

Faculty	
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Teaching Assistants	
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Course Overview:

This course introduces students to all the mathematical tools necessary for the study of economics at the undergraduate level. We start with preliminary topics like logic and reasoning. First few topics include set theory, linear equations and their solutions. We will learn to apply these concepts to some applications from economics. We will then cover univariate and multivariate calculus, and rules of differentiation. Some of the material will be proof-based and technical. Once basic calculus is covered, we will study optimization techniques and linear algebra. We will apply theorems from these topics to different optimization problems in Economics like the consumer's utility maximization problem.

Learning Outcomes:

By the end of the course students should be adept at calculating derivatives, slopes of different graphs, concavity and convexity, single variable and multivariable optimization, comparative statics. Students are expected to learn proof techniques like the method of contradiction, direct proof, contrapositive, and mathematical induction. This will set a foundation for more advanced topics in Economics.

Prerequisites:

- Basic algebra
- Logic and reasoning

I will assume knowledge of class 12th Mathematics or Calculus Enabler course

(Students will be given problem sets regularly throughout the semester for practice.)

Required Course Material:

1. ***Essential Mathematics for Economic Analysis***, Fifth Edition (2016) by Knut Sydsæter, Peter Hammond, Arne Strøm and Andrés Carvajal, Pearson Education Inc.

Others:

1. ***Fundamental Methods of Mathematical Economics*** by Chiang, Alpha C.

2. ***Mathematics for Economic Analysi***s, by Sydsæter and Hammond's, 2002, Pearson Education.

3. ***Fundamental Methods of Mathematical Economics***, by Chiang and Wainwright, 4th Edition, McGraw Hill Education .

Evaluation:

Student grades have four components: final exam (50% weightage), first mid-term (20% weightage), second mid-term exam (20% weightage), and the total score in all problem sets combined (10% weightage).

The syllabus for the first and second mid-term exams will be announced in class and on AMS.

The instructor does not entertain marks obsession. Students should make use of office hours for any extra help or resources they require.

The Ashoka grading scheme:

- A/A- letter grade = outstanding. Students know the mathematical techniques and have the ability to apply them in novel problems.
- B+/B/B- letter grade = good. Students have expertise in most of the mathematical techniques taught in the course. They may lack creativity in problem solving but are well trained to do well in any mathematical or applied course.
- C+/C/C- letter grade = adequate. Student knows enough. If s/he tries to revise the course content, s/he shall do well in any application of the course content.
- D+/D/D- letter grade = barely satisfactory. Student knows little. S/he requires guidance and then s/he would be able to apply the courses' concepts.
- F letter grade = unsatisfactory. Student knows less than 40% of the course content. S/he has not achieved the minimum standards for this course.

Course Rules:

1. The central objective of the course is to learn mathematical skills. To achieve this goal, we would solve innumerous problems and will frequently change the type of problems we encounter. In class, we will discuss problems with a difficulty of medium level.

2. **Attendance policy**: If you miss 8 classes or less than that, you will be awarded an extra credit of 2%. If you miss either 9 or 10 classes, you will be given 1% extra credit. If you miss more than 10, you will not be given any advantage.
Attendance during mid-term exams and final exams is compulsory, no exam will be re-taken.

3. If students are **late** in entering the class **by more than 5 minutes**, they would be **marked absent**. Late assignments would not be graded.

4. **Attending a class means sitting in the classroom for the full 90 minutes.** Repeated entry and exit from the class will not be allowed. This means that once you exit the class before the class ends, you will not be allowed to re-enter and will be marked absent.

5. There is zero tolerance for accessing resource materials in final exams or during mid-term exams. **If you are found cheating in any of the tests you will get an automatic F in the course**.

How to succeed in this Course:

*   Read before lecture. Set aside time before class to read the section of the book covered in lecture.
*   Do lots of problems. You will need a lot of repetition to get these techniques down. If you have the time, I would encourage you to do extra problems from the book.
*   Work together. The best way to learn something is by explaining it to others. Your classmates can help you refine your understanding of the subject.
*   Come to office hours or make an appointment. If you have any questions about the material, please don't hesitate to come to office hours.

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