Econ 6004: Mathematical Economics

Course Outline

Purpose: This course is an introduction to mathematical economics and as such has several purposes:

- to introduce students to the mathematical concepts and methods used by professional economists;
- to develop students’ facility to express economic ideas with formal mathematical concepts; and
- to develop students’ ability to derive the logical implications of formal economic models.

Possible Instructors: Gautam Bose, Lance Fisher, Kieron Meagher, Bill Schworm.

Background: You will be expected to have a working knowledge of introductory calculus including the differentiation and integration of real-valued functions of a single real variable. If you have not studied calculus recently, you may find the course difficult unless you devote considerable time at the beginning of the semester to reviewing the prerequisite material on your own. This can be accomplished by working through chapters 1 to 5 and appendices A1 and A.4 including all exercises.

Workload Expectations: It is expected that you will spend at least ten hours per week studying this course. This time should be made up of reading, research, working on exercises and problems and attending classes. In periods where you need to complete assignments or prepare for examinations the workload may be greater.

Lectures and Tutorials: There will be a three-hour class once each week with a two-hour lecture followed by a two-hour tutorial.

Reading: There will be weekly reading assignments in the textbook. You will be expected to understand and be able to apply all material covered in the reading assignments whether or not it is covered in the lectures or tutorials. We will use the lectures and tutorials to help you with the material you may find more difficult to learn on your own.

Problems: You will be given weekly assignments that are an essential part of the course. The tutor will discuss the assignments the following week. The assignments will not be marked so you will not be asked to submit your work.

Exams: There will be two midterms and one final exam. The exams will be designed to test your knowledge of the subject matter covered in the lectures, reading assignments and the problems. In the exam, you will be asked to solve problems that are similar to the weekly assignments but will have new aspects.

Assessment: In determining your mark for the semester, each midterm will have a weight of 25% and the final exam will have a weight of 50%.

Text: The primary text for the course is the following:

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**Alternative Texts:** If you would like supplementary reading or exercises on some topics, I recommend one of the following:


Reading Assignments

I. **Vector Spaces**  
   Simon and Blume, chs. 10, 11.

II. **Sets and Their Properties**  
    Simon and Blume, ch. 12.

III. **Functions and Their Properties**  
     Simon and Blume, chs. 13, 20, 21.

IV. **Linear Functions**  
    Simon and Blume, chs. 6, 7, 8, 9.

V. **Linear Approximation of Functions**  
    Simon and Blume, ch. 14.

VI. **Implicit Functions and Their Approximation**  
    Simon and Blume, ch. 15.

VII. **Quadratic Approximation of Functions**  
     Simon and Blume, ch. 16.

VIII. **Unconstrained Optimization**  
     Simon and Blume, ch. 17.

IX. **Constrained Optimization**  
    Simon and Blume, chs. 18, 19.

X. **Difference Equations**  
    Simon and Blume, chs. 23.

XI. **Differential Equations**  
    Simon and Blume, chs. 24, 25.