MA120 Mathematics for Social Science

Seminar Leader: Israel Waichman
Course Times: Tue 10:45-12:15, Thu 10:45-12:15
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Course Description

This course focuses on the (basic) tools important for the study of political science and economics: analytic geometry, functions of a single variable, and calculus. The course will also be of interest for any student with a general interest in mathematics, or who does not intend advanced specialization in economics. This course is highly recommended for students who want to specialize in Economics, but do not have a strong background in mathematics. After successfully completing this course they will have to take (the more advanced) Mathematics for Economics course.

Learning Outcomes

➤ Mastery of basic mathematical knowledge (with some basic applications in economics)
➤ Ability to understand and participate in debates on the uses of mathematics in economics
➤ Capacity to complete exercises and projects proper to mathematical analysis or its use in economics

Requirements

Textbook

For this course, we will use the textbook "Maths for Economics" by Geoff Renshaw (4th edition, 3rd edition will work as imperfect substitute) and required readings/exercises will mostly be from this book. It is vital for your success in the course that you prepare our sessions by carefully studying the assigned parts of the textbook and that you carefully do the exercises provided in class and the book. Mathematics is not a topic that is easily understood by just browsing through the readings but requires the actual use of the concepts discussed in class. To be successful, you will need to practice maths continuously and do many more of the exercises than we can actually do together in class. Because of this importance of exercising, an essential part of the grade will be based on the exercises given throughout the course.

Attendance

Attendance at ALL classes is expected. More than two absences (that is absences from two sessions of 90 minutes) in a semester will significantly affect the grade for the course.

Assessment

Assessment will be based on attendance, preparation for classes, regular and active participation, professionalism (see below), quizzes, exercises as well as a midterm (60 minutes) and final examination (90 minutes). The worst-graded exercise will not count towards the grade.

Policy on Late Submission of Exercises

Exercises that are up to 24 hours late will be downgraded one full grade (from B+ to C+, for example). After that, we will accept late submissions only until the end of the week in which they were due (Sun, 23:59), but these cannot receive a grade of higher than C. Thereafter, the student will receive a failing grade for the assignment.

Grade Breakdown

Seminar preparation, professionalism and participation 20%
Quizzes and exercises 20%
Midterm examination 30%
Final examination 30%

Schedule

Classes start on Tuesday, January 29 and run until Thursday, May 9, with spring break planned for April 15-21. Completion week is from May 13-17. Attendance is mandatory during completion week and the final will be scheduled during this week.

The schedule provided is provisional in order to allow for flexibility (I will possibly add a couple of additional topics depending on the level of class). It is the students' responsibility to keep themselves informed of any changes to the schedule provided here. An up-to-date schedule will be maintained by the course management on the internet in Google classroom. The password to join google classroom will be handed out in class.

We start out with the very basics but rest assured that the difficulty of the course will increase during the semester. The first weeks constitute mainly a repetition of basic mathematical concepts that should be known already from school; afterwards we will study basic algebra and functions. We will learn how to solve linear and quadratic equations. In the second part of the course we will learn about derivatives and differentiation and solve related economic applications. Finally, if we will have time we will look at specific application of mathematics (e.g., financial mathematics).

Class sessions will generally consist of three parts: Exposition of mathematical concepts and techniques, exercising their use as well as a discussion of their use in economics via examples where appropriate.

Week 1 – Introduction
Jan 29, Jan 31
Reading: Renshaw, Ch. 1

Week 2 – Repetition of arithmetic; Algebra and functions
Feb 05, Feb 07
Reading: Renshaw, Chs. 2-3

Week 3 –Linear equations
Feb 12, Feb 14
Reading: Renshaw, Ch. 3

Week 4 – Linear equations and their application in economics
Feb 19, Feb 21
Reading: Renshaw, Ch. 3-4

Week 5 –Application of linear equations in economics and quadratic equations
Feb 26, Feb 28
Reading: Renshaw, Ch. 4-5

Week 6 – quadratic equations
Mar 05, Mar 07
Reading: Renshaw, Ch. 5

Week 7 – Derivatives and differentiation I and the midterm exam (during class hours)
Mar 12, Mar 24
Reading: Renshaw, Ch. 6

Week 8 – Derivatives and differentiation I
Mar 19, Mar 21
Reading: Renshaw, Ch. 6

Week 9 – Derivatives and differentiation II
Mar 26, Mar 28
Reading: Renshaw, Ch. 7

Week 10 – Derivatives and differentiation II
Apr 2, Mar 4
Reading: Renshaw, Ch. 7

Week 11 – Economic applications of functions and derivatives
Apr 9, Mar 11
Reading: Renshaw, Ch. 8

Spring break
Apr 15-Apr 19

Week 12 – Economic applications of functions and derivatives
Apr 23, Apr 25
Reading: Renshaw, Ch. 8

Week 13 – Mathematics of finance and growth I
Apr 30, May 2
Reading: Renshaw, Ch. 10

Week 14- Possibly another topic (t.b.a), Review
Mai 7, May 9

Week 15 – Completion Week (date and time of the final exam: t.b.a.)

Classes missed due to federal holidays will not be rescheduled.

Exercise Deadlines
Exercises are due before class one week after being given. Those exercises will be given throughout the course where appropriate and constitute an integral part of the final grade.

Professionalism

Being a student is your full-time job and with it come a set of responsibilities and expectations, as with any other job. Maintaining a professional attitude towards your course of study is something that also prepares you for later work life. A professional attitude towards your studies is shown by coming to class on time, being prepared, being courteous to your teachers and fellow students. It is exhibited by writing your essays with care, actively participating in class, avoiding distractions (excessive bathroom breaks, using smartphones to check on irrelevant issues during class etc.), not missing classes except for the most dire of circumstances and in general by adapting to the rules of the course without trying to bargain for personal exceptions.

Ethics/Academic honesty

A core value of the academy is truth and the pursuit thereof. Nothing can shake the foundations of this pursuit as much as academic dishonesty as it undermines the trust that is indispensable to it. This is why I will not excuse any instance of academic dishonesty. Plagiarism, cheating during exams, copying homework assignments (or doing individual assignments with a classmate) all constitute violations of academic honesty and of the clause on "academic integrity" that each student has signed in the student handbook. They can lead to failing the course and will be reflected in the student's record (having a record of academic dishonesty can make obtaining scholarships, achieving a study abroad place or admission to another program difficult if not outright impossible).

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