

MA120 Mathematics for Economics

Seminar Leader: Martin Binder

Course Times: Tue 10:45-12:15, Thu 10:45-12:15

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IMPORTANT: This course is only open to students who took last year's Maths for Economics or Maths for Social Sciences class (Spring 2018). Students testing out of the first Maths class in the economics sequence in Spring 2019 are scheduled to take the Maths for Economics class in Fall 2019, which will be substantially different from this class. More information on this is provided in the Maths class taught by Israel Waichman in Spring 2019.

Course Description

This course focuses on the mathematical tools important for the study of economics: analytic geometry, functions of a single variable, functions of two variables, calculus, integrals and linear algebra (matrices, determinants, systems of linear equations and methods for solving them). A large part of the course will deal with optimization in one or more variables and its corresponding applications in economics (e.g. utility and profit maximization problems). 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, but wishes to become informed regarding the essential mathematical building blocks of economics as a discipline.

Learning Outcomes

- Mastery of basic mathematical knowledge and its application to 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 quiz and 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 17, with spring break planned for April 15-22. Completion week is from May 13-17. Attendance is mandatory during completion week and the final will be scheduled during this week.

Scheduled class times are available online under the relevant course heading:

<http://www.berlin.bard.edu/academics/courses/spring-2019/>

The schedule provided is provisional in order to allow for flexibility. 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 a brief recap of the basics and then go into less familiar topics. After the introductory weeks we look into optimization problems with two variables, which are relevant in the context of modelling utility or production functions and solving the consumer's utility maximization problem, we make a detour and deal with topics such as matrix algebra and integration (used for instance to derive consumers' surplus). Finally, we look into the mathematics of growth and finance (compound growth, calculating net present values etc.).

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 and Recap from previous maths class including some economic applications

Jan 29, Jan 31

Reading: Renshaw, Chs. 3-5

Week 2 – Recap continued

Feb 05, Feb 07

Reading: Renshaw, Chs. 6-9

Week 3 – Recap continued

Feb 12, Feb 14

Reading: Renshaw, Chs. 6-9

Week 4 – Optimization in two or more independent variables I

Feb 19, Feb 21

Reading: Renshaw, Ch. 14

Week 5 – Optimization in two or more independent variables II

Feb 26, Feb 28

Reading: Renshaw, Ch. 15

Week 6 – Economic applications I

Mar 05, Mar 07

Reading: Renshaw, Chs. 14-17

Week 7 – Economic applications II

Mar 12, Mar 14

Reading: Renshaw, Chs. 14-17

Week 8 – Midterm and Matrix Algebra I

Mar 19, Mar 21 (mid-term is Mar 19, during class hours)

Reading: Renshaw, Ch. 19

Week 9 – Matrix Algebra II

Mar 26, Mar 30

Reading: Renshaw, Ch. 19

Week 10 – Integration I

Apr 02, Apr 04

Reading: Renshaw, Ch. 18

Week 11 – Integration II

Apr 09, Apr 11

Reading: Renshaw, Ch. 18

Spring Break

Apr 16-Apr 18

Week 12 – Mathematics of finance and growth I

Apr 23, Apr 25

Reading: Renshaw, Chs. 10-11

Week 13 – Mathematics of finance and growth II

Apr 30, May 2

Reading: Renshaw, Chs. 12-13

Week 14 – Difference and differential equations; Review

May 07, May 09

Reading: Renshaw, Ch. 20

Week 15 – Completion Week (FINAL EXAMINATION: tba.)

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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