Bard College Berlin
A LIBERAL ARTS UNIVERSITY

MA120 Mathematics for Economics

Seminar Leaders: Martin Binder, Israel Waichman
Course Times: Tue 15:15-16:45, Thu 15:15-16:45
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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 (3rd or 4th edition) 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), 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 10%
Exercises (some individual, some in groups) 30%
Midterm examination 30%
Final examination 30%

Schedule

Classes start on Tuesday, January 31 and run until Thursday, May 11, with spring break planned for April 10-16. Completion week is from May 15-19. 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-2016/

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 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 and serve as short refresher before we start with some less familiar topics. These repetitions also allow for "confidence building" and a "steady learning gradient" for students who feel a bit rusty as regards their maths skills. After these introductory weeks we look into optimization problems with one variable and how to model demand, cost and other functions in economics. Before going 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
Jan 31, Feb 2
Reading: Renshaw, Chs. 1-2

Week 2 – Repetition of arithmetic and algebra; Linear equations and their application in economics
Feb 07, Feb 09
Reading: Renshaw, Chs. 1-2, Ch. 3

Week 3 – Linear equations and their application in economics
Feb 14, Feb 16
Reading: Renshaw, Ch. 3

Week 4 – Repetition of quadratic equations and further equations and techniques
Feb 21, Feb 23
Reading: Renshaw, Chs. 4-5

Week 5 – Derivatives and differentiation I
Feb 28, Mar 2
Reading: Renshaw, Ch. 6

Week 6 – Derivatives and differentiation II
Mar 07, Mar 09
Reading: Renshaw, Ch. 6

Week 7 – Derivatives and differentiation III; Economic applications of functions and derivatives I
Mar 14, Mar 16
Reading: Renshaw, Chs. 7, 8

Week 8 – Economic applications of functions and derivatives II
Mar 21, Mar 23 (mid term is Mar 23, during class hours)
Reading: Renshaw, Ch. 8

Week 9 – Economic applications of functions and derivatives II, Matrix Algebra I
Mar 28, Mar 30
Reading: Renshaw, Chs. 8, 19

Week 10 – Matrix Algebra II, Optimization in two or more independent variables I
Apr 04, Apr 06
Reading: Renshaw, Chs. 19, 14

Spring break
Apr 10-Apr 16

Week 11 – Optimization in two or more independent variables II
Apr 18, Apr 20
Reading: Renshaw, Chs. 15-16

Week 12 – Economic applications of functions and derivatives
Apr 25, Apr 27
Reading: Renshaw, Chs. 14-16

Week 13 – Economic applications of functions and derivatives; Mathematics of finance and growth I
May 2, May 4
Reading: Renshaw, Ch. 10

Week 14 – Mathematics of finance and growth II; Review
May 09, May 11
Reading: Renshaw, Chs. 11-13 (parts)

Week 15 – Completion Week (FINAL EXAMINATION: 15.05.2017, time 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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