Mathematics for Economists A
66-110-18-19

Lecturer: Dr Ziv Hellman
Type of course: Lecture
School year: 2016-2017 **Term: Autumn** **Scope: 2 hours per week**
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A. Goals of the course / learning outcomes*:

Impartation of knowledge in mathematics, with emphasis on issues which are relevant for students of economics, in order to give them the mathematical tools that they may need for research and other endeavours in various economics-related professions.

B. Description of the course:

We will use two textbooks in the course:

1. *Calculus*, by Howard Anton, Irl Bivens, and Stephen Davis
2. *Mathematics For Economists: An Introductory Textbook*, by Michael Pemberton and Nicholas Rau

The book by Anton, Bivens, and Davis will become increasingly important as the course progresses. The book by Pemberton and Rau will be used more often in the first half of the course.

Outline of Lessons:

1. Sets: definition, set membership, set inclusion, empty set, union, intersection, complement, Venn diagrams, De Morgan's laws.
   Reading: Section 3.1 of Pemberton and Rau

2. Sets of numbers: natural numbers, integers, rational, real, bounded sets, number intervals.
   Reading: Sections 3.1 and 3.2 of Pemberton and Rau

3. The concept of the function: domain of definition, range, injective (one-to-one) function, inverse function, complex function.
   Reading: Sections 0.1 – 0.3 of Anton, Bivens, and Davis

4. Real functions: graphic description, bounded function, monotonic function, polynomial, rational function, absolute value function and the floor and ceiling function, series, even and odd functions.
   Reading: Sections 0.1 – 0.3 of Anton, Bivens, and Davis
   Reading: Section 3.3 of Pemberton and Rau

5. Linear functions: constant function, identity function, general linear function, general equation of a straight line, equation of a straight line using two points and using the point and slope technique.
   Reading: Chapter 1 of Pemberton and Rau

6. Quadratic equations: graphic description and properties.
   Reading: Sections 4.1 and 4.2 of Pemberton and Rau

7. The exponential function and the logarithmic function.
   Reading: Sections 0.5 of Anton, Bivens, and Davis
   Reading: Sections 4.3 and 4.4 of Pemberton and Rau

8. Limits and continuity: definition of concepts, continuity of elementary functions, types of discontinuity, one-sided continuity and one-sided limit, calculation of limits – elementary rules.
   Reading: Chapter 1 of Anton, Bivens and Davis

9. The concept of the derivative and its elementary meaning (increasing and decreasing, drawing the tangent), elementary rules for calculating derivatives (sum of a product, ratio), derivatives of polynomials and of rational functions, derivative of a complex function and of an inverse function.
   Reading: Chapter 2 of Anton, Bivens and Davis
   Reading: Chapter 6 of Pemberton and Rau

10. Elementary rules for calculating limits in exponential functions.
    Reading: Section 3.3 of Anton, Bivens and Davis
    Reading: Chapter 9 of Pemberton and Rau and

11. Defining the number e, derivative of the logarithmic function, natural logarithms, derivatives of exponential functions, logarithmic derivation.
    Reading: Section 3.3 of Anton, Bivens and Davis
    Reading: Chapter 9 of Pemberton and Rau

12. Second order and higher derivatives.

Prior requirements:
Matriculation in mathematics, as required for admission to the department

Obligations / requirements / tasks:**
Attendance in the lessons, solving exercise sets during the course.

Components of the final grade
The grade on the final examination comprises 100% of the grade.

* Learning outcomes are explicit goals indicating what students are expected to achieve by the end of the study period in the course. Learning outcomes are defined in terms of attainment of knowledge, understanding, skills, abilities and/or attitudes that a student is expected to demonstrate as a result of his/her academic learning experience in the course. For additional details, click here.

** For further information, consult the university's official documents on avoiding ethical transgressions when submitting papers. To access this documentation, click here.