Preparatory Course in Mathematics Syllabus

Teaching language: English

Total lecture hours: 30

Lecturer: Carola Schrage

Course description: Precalculus Mathematics is reviewed which prepares for the Mathematics for Economists course. The course is directed to freshmen who are going to attend the Mathematics for Economists course.

List of topics covered:

1. Basic mathematical language: Sets and logic.

2. Numbers and their properties: Integers: addition and subtraction, multiplication and division, powers and roots. Negative numbers. Absolute value. Rational numbers: fractional, decimal, percentage representation. Irrational numbers. Order properties. The numerical line. Real numbers.

3. Elementary algebra. Symbols. Operations with symbols: commutative, associative, neutral element, inverse element and distributive properties. Brackets. Expanding and factorizing. Algebraic expressions. Monomials, polynomials, rational and irrational expressions. Elementary theorems of algebra: powers of a binomial; difference of powers. Operations with polynomials. Factorization of a polynomial: roots and the fundamental theorem of algebra.

4. Functions - basics. Real functions. Graph of a real function. Operations with real functions. Elementary functions: constant, linear, quadratic, polynomial function.

5. Exponentials and logarithms. Powers and exponentials: definition and properties. Roots and logarithms: definition and properties. Polynomial approximation to exponentials. The number e. Natural exponential and logarithms.

6. Equations and inequalities. Polynomial equations: linear, quadratic and higher order. Solution versus factorization. Polynomial inequalities. Simultaneous equations. Exponential and logarithmic equations and inequalities.

7. Functions - advanced. Composition of functions. Inverse function. Translations, reflections and absolute value of a function. Symmetries of a function. More examples.

Educational objectives:
(1) Refresh mathematical knowledge taught in high school, fill gaps and add a few new insights.
(2) Motivate to experience and communicate (about) Mathematics.

Format: Lectures and exercises.

Required reading Will be announced at the beginning of the course.

Further readings: Will be announced at the beginning of the course.