UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Mathematics

2425-1-E1601N060

Learning objectives

Introduction to the basic concepts of algebra, mathematical analysis, analytical geometry and combinatorics.

To understand and learn how to handle the concepts and tools of mathematics presupposed in the teaching of statistics, economics and quantitative methods, to be able to manage the most technical aspects of the program.

Contents

Set theory; Elementary functions; Graphs of real functions; Linear and quadratic functions; Equations and inequalities of first and second degree, fractal, irrational, exponential, logarithmic and with absolute value; Combinatorial calculation; Limits; Derivatives; Study of functions; Successions and series; Systems of linear equations.

Detailed program

Set theory.
Functions; Inverse and compound functions; Numerical sets; Graphs of real functions; Increasing and decreasing functions; Concave and convex functions.
Linear functions; First degree equations; First degree inequalities.
Quadratic functions and equation of the parabola; Second-degree equations; Second degree inequalities.
Equation of equilateral hyperbola and inversely proportional quantities; Fractional equations; Fractional inequalities; Power functions with full and fractional exponent.
Irrational equations; Irrational inequalities; Exponential functions; Exponential equations; Exponential inequalities; Simple, compound and continuous capitalization.

Logarithmic functions; Logarithmic equations; Logarithmic inequalities.
Absolute value of a real number; Equations and inequalities with absolute value; Triangular inequality.
Combinatorial calculation: simple dispositions, permutations, simple combinations and binomial coefficient; dispositions with repetition, combinations with repetition.
Limit: definition, existence, uniqueness and calculation; Derivatives: definition and calculation; De l'Hôpital theorem; Taylor's theorem.
Functional study: concavity, convexity and inflection points; first and second order conditions for minimums and maximums.
Summation; Successions and series; Convergent and divergent series; Geometric series; Convergence criteria.
Systems of linear equations.

Prerequisites

Algebra and basic notions of calculus.

Teaching methods

The course consists of 56 hours, of which approximately 75% is delivered through didactic teaching (structured lectures using slides, audio and video) and 25% through interactive teaching (exercises and real time questions).
Self-assessment tests and Q&A forum are available on the website.

Assessment methods

No intermediate tests.

The written exam is made up of closed questions and problems.
Each question/problem assigns from 0 (no answer or answer completely wrong) to max 2-4 points for a total of max 30 points.

Students must take the exam in max 90 minutes. They can take with them a basic scientific calculator and use notes containing formulas, concept maps, graphs, etc.

The types of questions/problems in the exam are going to be discussed and analyzed with the students in tutorship lectures during the course.
Students can also download from the website mock exams and all the past exams with the solutions.

Results are uploaded no later than 7 days after the exam. Students can accept or reject the mark.

Failing the exam does not make the student ineligible to retake the test on the following date.

Textbooks and Reading Materials

Textbook: Guerraggio, A. (2014), *Matematica*, 2nd ed., Pearson Prentice Hall, Milan, Chapters 1-9, 12.

Slides, additional references, exercises, and further material available at the course page on the e-learning platform
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Sustainable Development Goals

QUALITY EDUCATION