



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Mathematics

2425-1-F5602M001-F5602M001M

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#### Learning objectives

The course is intended for students who wish to learn mathematical techniques suitable for economic analysis. The course aims at showing students how to apply a number of mathematical skills they require for a successful study of economics. A number of economic applications and models are presented.

#### Contents

Fundamental topics in mathematical economics

#### Detailed program

1 - Linear Algebra

1a) Vectors, Matrices and Systems of Linear Equation

1b) Determinants and the Inverse Matrices

1c) Vector spaces

1d) Eigenvalues and eigenvectors

2 - Quadratic forms

3 - Functions of several Variables

3a) Partial differentiation

3b) Concavity and Convexity

3c) Unconstrained and Constrained Optimization for Functions of several Variables: the method of Lagrange multipliers

- 3d) Comparative Statics
- 3e) The envelope theorem

#### 4 - Difference Equations

- 4a) Linear First Order Difference Equations
- 4b) Nonlinear First Order Difference Equations
- 4c) Systems of Difference Equations
- 4d) discrete-time dynamical models for economic analysis

## Prerequisites

Basic Real Analysis and Linear Algebra.

As a textbook, students might be willing to choose: *Essential Mathematics for Economics Analysis* - Knut Sydsaeter, Peter Hammond, Arne Strom & Andrés Carvajal

With respect to the fifth edition of this book, Chapters to be reviewed are from the first to the eight and the fifteenth

For all other editions, topics to be reviewed are:

- Essentials of Logic and Set Theory
- Algebra
- Solving Equations
- Functions of One Variable
- Properties of Functions
- Differentiation
- Derivatives in Use
- Single-Variable Optimization
- Matrix and Vector Algebra

## Teaching methods

In-class lectures. No interactive activities are scheduled.

## Assessment methods

A written exam covering lectures topics. The exam contains both theoretical questions and numerical exercises.

## Textbooks and Reading Materials

Lecture notes

A book in digital format collecting selected chapters of books

<https://www.egeaonline.it/ita/prodotti/metodi-quantitativi/mathematics-for-economics-and-business.aspx>

<https://www.egeaonline.it/ita/prodotti/metodi-quantitativi/dynamical-systems-and-optimal-control.aspx>

is under preparation.

Its final link will be published here and posted through the course's elearningf webpage.

## **Semester**

First semester

## **Teaching language**

English

## **Sustainable Development Goals**

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