UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Mathematical Methods - 1

**2021-2-E3301M131-T1**

### Learning objectives

Aim of this course is to provide financial and mathematical tools useful to applications in economic field. Students should be able to define and then solve the proposed mathematical models.

### Contents

Numeric and power series. Riemann integration theory. Linear algebra. Financial Mathematics. Linear Programming.

### Detailed program

Numeric series: character and sum of a series; series of nonnegative terms; convergence tests; alternating series; absolute and non-absolute convergence. Power series: Taylor / Mac Laurin power series expansions.

Integration theory: Riemann integral; indefinite integral, primitives; fundamental theorem of calculus; integration methods; generalized integral. Linear algebra: Euclidean vector spaces; matrices and operations; determinant; inverse matrix; range; simultaneous linear equations; Cramer rule; Rouché/Capelli theorem; solving simultaneous linear equations; applications to economics.

Financial Mathematics: Principles of financial calculus. Simple and compound interest, trade discount. Present and future values. Annuities and perpetuities. Amortization plans. Financial flows analysis: DCF. Investment appraisal. Bond pricing. Yields. Duration. Term structure of interest rates. Forward rates. Linear Programming: definition; simplex method; duality theory.

## Prerequisites

Basic maths (Calculus)

## Teaching methods

Lectures and practicals in classroom.
During the emergency period due to the Covid-19 disease, lessons will be held remotely asynchronously. Some videoconferencing lessons will be planned. All lessons will be recorded and the registration will remain available on the e-learning page during the academic year.

## Assessment methods

A written exam, composed in two parts: the first part characterized by multiple-choice questions. The second part consists of exercises and theoretical questions

## Textbooks and Reading Materials

Scovenna Marina, Scaglianti Luciano, Torriero Anna, Manuale di Matematica - Metodi e applicazioni, Editore: Cedam, 2010

S. Stefani, A. Torriero, G. Zambruno, Elementi di matematica finanziaria e cenni di programmazione lineare, Giappichelli Editore, V

## Semester

First Term

## Teaching language

Italian