



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Advanced Calculus - 2

2122-2-E1802M118-E1802M130M-T2

Learning objectives

To explain the following mathematical tools and teach how to use them in economic applications: : sequences, explicitly or implicitly defined, series (numeric and power series), integrals (ordinary and generalized Riemann integrals); vector spaces (in particular, Euclidean vector spaces), matrices and simultaneous linear equations.

Contents

Sequences, Series, Integration theory, Linear algebra.

Detailed program

Sequences. Series: character and sum of a series; series with nonnegative terms; series with alternating signs; convergence tests; 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; rank; simultaneous linear equations; Cramer rule; Rouché-Capelli theorem; solution procedure for simultaneous linear equations systems; applications to economics.

Prerequisites

Calculus I

Teaching methods

Frontal lessons.

During the Covid-19 period of emergency lectures will be given in synchronous remote mode. The corresponding video recordings will subsequently remain available in the course's website page for at least three exam dates.

Assessment methods

The exam consists of a written and an oral exam which are evaluated as follows:

- If the mark of the written test is less than 18, the exam has been failed and must be retaken;
- if the mark of the written test is greater than or equal to 18, it is possible to sustain the oral exam at the same exam event.

There is no difference in the exam modality between attending and non-attending students.

It is not required to skip the exam date immediately following the one at which the student has participated (and failed).

During the Covid-19 period of emergency exams will be given telematically. They will be performed using the WebEx platform, and in the course's e-learning page will be given a public link for access to the exam by outside virtual visitors.

Textbooks and Reading Materials

- Allevi-Bertocchi-Birolini-Carcano-Moreni, *Manuale modulare di Metodi Matematici*, Giappichelli. Editore, seconda edizione, 2003-2004. Modulo 5: Successioni, serie, integrali.

For Linear Algebra:

- Marco Vignati, Annamaria Squillati. *Appunti di Algebra Lineare con esercizi svolti*, Datanova 1995.

- Allevi-Bertocchi-Birolini-Carcano-Moreni, *Manuale modulare di Metodi Matematici*, Giappichelli. Editore, seconda edizione, 2003-2004. Modulo 4: Algebra lineare.

For exercises:

- G. Carcano, *Matematica Generale. Successioni, serie, integrali. Test ed esercizi, con richiami teorici*, Datanova, Milano 2000.
- G. Carcano, *Algebra lineare. Test, esercizi e temi d'esame, svolgimenti e richiami teorici*, Datanova, Milano (2002).
- F. Brega, G. Messineo, *Esercizi di Matematica Generale. Successioni e serie –Integrali – Algebra Lineare*. Giappichelli, 2006.

For the arguments of the pre-session course:

- R. D'Ercole, *Matematica per i precorsi*, Pearson Education, 2007.

Semester

First semester

Teaching language

Italian
