UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Advanced Calculus - 2

2021-2-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

During the Covid-19 period of emergency lectures will be given in asynchronous remote mode with particular events in synchronous video conference.

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.

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