UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Linear Algebra

2627-1-E3004Q002

Aims

This course will give the students the basic knowledge in linear algebra.

DdD1 Knowledge and understanding – Students will acquire a good knowledge of linear algebra, including the necessary computational techniques (determinant and rank).
DdD2 Ability to apply knowledge and understanding – Students will be able to solve exercises
and problems using the theoretical knowledge and practical examples learned.
DdD3 Autonomy of judgment – Through guided problem solving and exercises, students
will develop the ability to apply the concepts of linear algebra and the related computational techniques to concrete problems.
DdD5 Learning ability - The mixed teaching organization requires students to take advantage of multimedia tools, the development of independent study and the ability to organize themselves, managing time, materials and exercises. This will improve their ability to learn in subsequent courses.

Contents

• Vector spaces.
• Linear maps.
• Matrices.
• Linear systems.
• Diagonalization theory.
• Unitary spaces.

Detailed program

Vector spaces: linear independence, generators, basis, subspaces.
Linear maps: kernel, image and the dimension formula.
Matrices: rank, determinant.
Linear systems: Gauss elimination, Rouché-Capelli theorem, affine subspaces.
Diagonalization theory: similarity of matrices, eigenvectors, eivenvalues.
Unitary spaces: Hermitian products, selfadjoint operators, spectral theorem.

Prerequisites

Students should have the basic notions of mathematics from high school: sets, functions, quantifiers.

Teaching form

Classes and practical exercise sessions will be conducted as follows:
• theoretical lectures delivered via the "Didattica Erogativa" (DE) mode (content delivery);
• practical exercises conducted by the instructor via the DE mode;
• guided exercises or problem-solving sessions involving student participation via the "Didattica Interattiva" (DI) mode (interactive learning);
• asynchronous or synchronous remote activities, where applicable.

Textbook and teaching resource

M. Benz , T. Kappeler: Linear Algebra for the Sciences, Springer
C. W. Curtis: Linear Algebra-An Introductory Approach, Springer
K. Jänich: Linear Algebra, Springer
S. Lang: Linear Algebra, Springer
A. M. Mathai, H. J. Haubold: Linear Algebra-A Course for Physicists and Engineers, De Gruyter Brill
N. A. Papadopoulos , F. Scheck: Linear Algebra for Physics, Springer
G. E. Shilov, R. A. Silverman: An Introduction to the Theory of Linear Spaces, Dover
L. Smith: Linear Algebra, Springer

Other textbooks and teaching materials will be indicated later.

Semester

First semester

Assessment method

The assessment relies on two written parts, one formed by questions and one by exercises. There will be no

intermediate tests.The written test will consist of theoretical questions and problems. The latter can be both theoretical (e.g. similar to proving a small theorem), both computational, that is based ot explicit matrices, vector spaces and linear maps. The oral test will be mostly theoretical. The student should have a sound knowledge of the theorems and should know how to apply them to solve the exercises.

Office hours

By appointment.

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE