UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Geometric Methods for Theoretical Physics

2425-1-F1701Q152

Aims

Introduction to Differential and Complex Varieties and Algebraic Topology.

Contents

Differentiable and Riemannian manifolds, differential forms and cohomology, Riemann surfaces and complex manifolds, coverings and fundamental group.

Detailed program

- Theory of Differentiable Manifolds
  Definition and initial properties of differentiable manifolds, differentiable maps, and bundles, differential forms, and de Rham cohomology. Riemannian manifolds (brief introduction).
- Complex Geometry
  Riemann surfaces, holomorphic and meromorphic maps, line bundles. Complex manifolds, complex bundles.
- (Algebraic) Topology
  Covering theory, liftings, homotopy, fundamental group.

Prerequisites

Undergraduate Mathematics Courses.

Teaching form

24 2-hour lectures, delivered in-person in a didactic format. In Italian.

Textbook and teaching resource

Milnor, J. Topology from a differentiable viewpoint
Jost, J. Compact Riemann Surfaces
Huybrechts, D. Complex Geometry: an introduction
Petersen, P. Riemannian Geometry
Hatcher, A. Algebraic Topology

Semester

First semester

Assessment method

Oral exam on the course content, including further insights or solving simple exercises. The grade is comprehensive.

Office hours

By appointment

Sustainable Development Goals

QUALITY EDUCATION | REDUCED INEQUALITIES