UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Algebra III

2122-3-E3501Q054

Aims

One of the central subjects in field theory is the study of finite extensions, in particular finite Galois extensions. The main objective of the course will be to introduce the concepts necessary to formulate the Fundamental Theorem in Galois Theory and to analyse its consequences.

During the times of Galois many mathematicians were still working on problems raised by greek mathematicians. One problem of this type is the trisection of an arbitrary angle by ruler and compass. Using Galois theory one may show easily that this is indeed impossible.

Contents

Ruler and compass constructions, Field extensions, the algebraic closure of a field, the fundamental theorem in Galois theory, applications.

Detailed program

1. finite field extensions,
2. algebraic closure,
3. splitting field

4. normal and separable extensions,
5. fundamental theorem of Galois theory,

6. galois group and soluble groups,
7. soluble extensions,
8. cyclotomic extensions,
9. solution of polynomial equations by radicals,
10. finite fields,
11. constructions with straight edge and ruler,
12. applications.

Prerequisites

Algebra I & Algebra II

Teaching form

Lectures, 6 CFU (ECTS)

Textbook and teaching resource

Basic algebra I,N.Jacobson

Semester

First semester

Assessment method

Oral examination on the content of the course.

Office hours

On appointment