



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Algebra III

2021-3-E3501Q054

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#### 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.

Until the end of the covid emergency, the oral exam will be done using the webex platform, the link for accessing to the exam sessions will be in the elearning page of this course.

## **Office hours**

On appointment

During the covid emergency the office hours will be done using the webex platform on appointment

