UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Algebra III

2425-3-E3501Q054

Aims

On the basis of the knowledge acquired in the Algebra I and II courses, the course will present a gentle introduction to Galois theory.
In the second part we will apply our theoretical knowledge to concrete classical mathematical problems, e.g., in general it is not possible to divide an angle in 3 equal parts using only ruler and compass, it is impossible to find a general formula calculating the roots of a polynomial of degree 5 or higher.

Achievements of a successful attendance of the course include

- Knowledge: The knowledge and the understanding of the principle definitions, theorems and results in Galois theory.
- Capability: The capacity to apply this abstract knowledge to concrete mathematical problems..

Contents

The theory of field extensions and Galois theory

Detailed program

The algebraic closure of a field,
normal and separable extensions of fields,
the existence of primitive elements in finite separable field extensions,

The fundamental theorem in Galois theory,

cyclotomic extensions,
Finite and solvable groups,
polynomial equations of degree at least 5 are in general
not solvable,
the field of elements in C constructable by compass and ruler,
the field of complex numbers is algebraically closed.

Prerequisites

Prerequisites: The contents of the courses *Linear algebra and Geometry*, *Algebra I* and *Algebra II*.

Teaching form

The lectures will be given in a lecture hall in Italian.
6 credits (ECTS) of lecturing.
In hours: 48 hours of lecturing.

Textbook and teaching resource

N. Jacobson, Basic Algebra I, Freeman & Co, 1985.

Additional References:

S. Bosch, Algebra, Springer-Verlag, 2003.

Semester

1?? semester

Assessment method

Examination: **oral examination** of ca. 20 minutes on the content of the course.

The questions will concern definitions, examples, counterexamples, exposition and application of Theorems as well as their proofs.

Office hours

On appointment

Sustainable Development Goals

QUALITY EDUCATION