Abstract Algebra

Programme course

6 credits

Abstrakt algebra

TATA55

Valid from:

Determined by
Board of Studies for Computer Science and Media Technology

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G2X

Course offered for
- Mathematics
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, M Sc in Engineering
- Computer Science and Software Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Computer Science, Master's programme

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Mathematics corresponding to basic courses in discrete algebra and linear algebra.

Intended learning outcomes

The course is intended to give basic skill and proficiency in the concepts and methods of abstract algebra and its applications, particularly in computer science, coding theory and cryptology. In particular, students should, after completing the course:

- Be able to use the Chinese remainder theorem to solve system of congruences
- Be proficient in the use of Burnside's theorem for solving combinatorial problems involving group actions
- Know how to calculate with permutations
- Be able to explain and prove Cayley's and Lagrange's theorem of elementary group theory.
- Know the basic facts in the theory of finite fields
- Be able to calculate the splitting field of a low-degree polynomial
- Be able to state the fundamental theorem of finite abelian groups
- Be able to state the tower theorem and primitive element theorem for finite field extensions

Course content

Groups, subgroups, quotient groups, group homomorphisms, rings, esp. PID:s, ideals, ring homomorphisms, fields, extension fields, finite fields, the Chinese Remainder Theorem.

Teaching and working methods

The theory is dealt with in lectures and office hours.
The course runs over the entire autumn semester.

Examination

UPG2	Assignments	6 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Matematiska institutionen

Director of Studies or equivalent

Jesper Thorén

Examiner

Jan Snellman

Course website and other links

http://www.mai.liu.se/und/kurser/index-amne-tm.html

Education components

Preliminary scheduled hours: 36 h
Recommended self-study hours: 124 h

Course literature

Additional literature

Books

P-A.Svensson, *Abstract Algebra, Studentlitteratur*
T. Judson, *Abstract Algebra, Theory and Applications*

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.