Course syllabus

Diskret matematik
Discrete Mathematics

FMA091, 6 credits, G1 (First Cycle)

Valid for: 2013/14
Decided by: Education Board B
Date of Decision: 2013-04-10

General Information

Main field: Technology.
Elective for: C4, D4, E2, F1, Pi1
Language of instruction: The course will be given in Swedish

Aim

The aim of the course is to treat some basic parts of discrete mathematics, of importance in computer science, information theory, signal processing, physics and many other subjects in technology and science. The aim is also to develop the students’ ability to solve problems and to assimilate mathematical text. The course should also provide general mathematical education.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

be able to understand and in his or her own words clearly define the central concepts in combinatorics, number theory, functions and relations, and graph theory.

in his or her own words be able to describe the logical connections between the occurring concepts (theorems and proofs).

with confidence be able to carry out routine calculations within the framework of the course.

in practical situations, with confidence be able to identify different combinatorial selections: with/without repetition, with/without regard to order.
**Competences and skills**

For a passing grade the student must

be able to demonstrate ability to identify problems which can be solved with methods from discrete mathematics and to choose an appropriate method.

in connection with problem solving be able to demonstrate ability to integrate results from various parts of the course.

be able to describe the connections between the different concepts in the course, in a well-structured, logically consistent manner and using proper terminology.

with proper terminology, in a well-structured way and with clear logic be able to explain the solution to a problem.

**Contents**

**Number theory:** Divisibility. Prime numbers. The Euclidean algorithm. Diofantine equations. Modular arithmetic.

**Sets, functions and relations:** Injective, surjective and bijective functions. Inverse function. Equivalence relations. Partial order relations.

**Combinatorics:** The four cases of counting with or without repetition and with or without regard to order. Binomial coefficients. The principle of inclusion and exclusion. The method of generating functions.

**Graph theory:** Terminology and basic concepts. Eulerian and Hamiltonian graphs. Planar graphs. Graph colouring.

**Examination details**

**Grading scale:** TH

**Assessment:** Written test comprising theory and problems.

**Admission**

**Required prior knowledge:** Elementary linear algebra and analysis (FMAA01/05 and FMA420).

**The number of participants is limited to:** No

**The course overlaps following course/s:** FMA661

**Reading list**


**Contact and other information**

**Course coordinator:** Studierektor Anders Holst, Studierektor@math.lth.se

**Course homepage:** [http://www.maths.lth.se/matematiklth/vitahyllan/vitahyllan.html](http://www.maths.lth.se/matematiklth/vitahyllan/vitahyllan.html)