



## Course syllabus

Faculty Board of Science and Engineering  
School of Computer Science, Physics and Mathematics

1MA162 Diskret matematik, 7,5 högskolepoäng  
Discrete Mathematics, 7.5 credits

**Main field of study**

Mathematics

**Subject Group**

Mathematics

**Level of classification**

First Level

**Progression**

G1F

**Date of Ratification**

Approved by the Board of the School of Computer Science, Physics and Mathematics  
2009-08-11

Revised 2012-08-17. Prerequisites are revised.

The course syllabus is valid from spring semester 2013

**Prerequisites**

1MA101 Basic Mathematics 7.5 credits or equivalent.

## Objectives

The student should be able to:

- interpret, communicate and argue using mathematic notions.
- define exactly central concepts of the course, derive relations between them and apply them to solve problems.
- solve combinatorial problems using different methods.
- perform proofs by mathematical induction.
- use generating functions in problem solving
- perform logical deductions using truth tables and deduction schemes.
- use quantifiers, and construct some simple expressions in predicate calculus.
- solve linear recurrence relations.
- know elementary properties of graphs. Decide if a graph has an Euler circuit, if it is planar etc. Construct the chromatic polynomial for a graph.
- know the basic facts about relations, especially about Equivalence Relations and Partial Orders. Be able to represent them as graphs and as matrices.
- know the basic facts about Function. Decide whether they are one-to-one and if they are onto. Derive the inverse function in case there is one

## Content

- Logic: Truth tables, deduction schemes. Some predicate calculus formalism.
- Set Theory: The principle of duality. De Morgan's laws. The principle of inclusion and exclusion.
- Relation and Functions: Theory of functions. Properties of relations. Equivalence relations. Partial orders. Representation of relations graphs and as matrices.
- Induction: The well-ordering principle. Mathematical induction. Recursive definitions and recursive procedures
- Generating Functions.
- Combinatorics.
- Difference Equations. Linear recurrence relations.
- Graphs: Euler circuits. Hamilton cycles. Planar graphs. Graph coloring and chromatic polynomials. Something about trees.

## Type of Instruction

Lectures and seminars. Compulsory assignments may be given during the course.

## Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

**Assessment methods** The student's knowledge is assessed in the form of written examinations. Furthermore, continuous assessment can be used during the course. The principle assessment method for the course is determined at the beginning of the course.

## Course Evaluation

After the course a written evaluation of the course will take place according to the University guidelines.

## Required Reading and Additional Study Material

### **Required reading**

Kenneth H. Rosen. *Discrete mathematics and its Applications*, McGraw-Hill, senaste upplagan. 500 (830) pages.