



## Course syllabus

Faculty of Technology

Department of Mathematics

1MA162 Diskret matematik, 7,5 högskolepoäng

1MA162 Discrete Mathematics, 7.5 credits

### **Main field of study**

Mathematics

### **Subject Group**

Mathematics

### **Level of classification**

First Level

### **Progression**

G1F

### **Date of Ratification**

Approved 2009-08-11

Revised 2014-09-03 by Faculty of Technology. Examination and prerequisites are revised.

The course syllabus is valid from spring semester 2015

### **Prerequisites**

1MA101 Basic Mathematics 7.5 credits or 1MA141 Basic Mathematics for Computer Scientists, 7.5 hp 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).

The student's knowledge is assessed in the form of written examinations and a project. This is presented orally and in writing.

## 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.