Linnæus University

Course syllabus

Faculty of Technology

Department of Mathematics

1MA462 Diskret matematik, 7,5 högskolepoäng
1MA462 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 Faculty of Technology 2015-05-22
The course syllabus is valid from spring semester 2016

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. Recusive 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 A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

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

Course Evaluation
During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

Credit Overlap
The course cannot be included in a degree along with the following course/courses of which the content fully, or partly, corresponds to the content of this course: 1MA162 Discrete Mathematics, 7.5 credits

Other
The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Required Reading and Additional Study Material
Required reading
Kenneth H. Rosen.*Discrete mathematics and its Applications*, McGraw-Hill, senaste upplagan. 500 (830) pages.