IX1500 Discrete Mathematics 7.5 credits

Diskret matematik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for IX1500 valid from Spring 2019

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Mathematics, Technology

Specific prerequisites

Entance qualifications:

- IX1303 - Algebra and Geometry
- IX1304 - Calculus

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

General Objectives

After course completion the student should be able to:

- formulate, analyze and solve problems in discrete mathematics significant to in the ICT sphere.
- apply and develop discrete models with the aid of mathematical programming language.
- review and comment a given solution to a problem.
- comment a discrete model and propose improvements.
- make presentations of solutions of a discrete problem.

Detailed Objectives

After course completion the student should be able to:

- compute the number of possibilities with simple selection principles (order/recurrence).
- compute permutations and combinations.
- use set notations and Venn Diagrams.
- use and refer to the Inclusion-Exclusion Principle.
- refer to the Induction Axiom and apply it in simple recursion examples.
- decide whether a function is surjective, injective or bijective.
- characterize relations in important classes, e.g. equivalence relation and partial order.
- decide whether an algebraic structure is a group, a ring or a field.
- determine sub groups and ideal.
- use Euler's and Fermat's theorems concerning element's order in a group.
- use the Chinese Remainder Theorem in certain problems.
- determine the minimum spanning tree.
- determine shortest path in graphs.
- set up graph models in problem solving (e.g. optimization and coloring).

Course contents

Combinatorics and setsInclusion-Exclusion Principleintegers, divisibilityinduction and recursionfunctions and relations Introduction to groups, rings and fieldsFermat's and Euler's theoremsChinese Remainder Theorem Graph theoryisomorphism trees, walks and searchesEulerian graphs, Hamiltonian graphsplanar graphscoloring, chromatic number.

Disposition

The teaching method is problem oriented and computer aided. The education time is evenly distributed among the three main topics:

- conceptual understanding and modelling
- algorithms
- conclusions and synthesis.

Examination

- INL1 - Problem Assignments, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Written examination, 3.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

- Written exam (TEN1; 3, 5 credits)
- Problem assignments (INL1; 4,0 credits)

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.