Course syllabus

Discrete Structures in Computer Science Diskreta strukturer i datavetenskap

EDAA40, 5.0 credits, G1 (First Cycle)

Valid for: 2025/26
Faculty: Faculty of Engineering LTH
Decided by: PLED C/D
Date of Decision: 2025-04-14
Effective: 2025-05-05

General Information

Main field: Technology **Depth of study relative to the degree requirements:** First cycle, in-depth level of the course cannot be classified
Mandatory for: D1
Language of instruction: The course will be given in English

Aim

The course is intended to introduce some of the basic formal concepts and terminology pervading all areas of computer science, and to establish a common lexicon, including notational conventions and nomenclature, that subsequent courses can build upon. This includes an introduction to abstract set theory, relations, functions, and ordered sets, Boolean algebra, logic and proof techniques and number theory as well as structures such as graphs and trees.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- demonstrate an understanding of basic notions of set theory, such as equivalence, cardinality, countability, infinite sets,

- be able to characterize functions, injective/surjective/bijective functions, relations, partial and total orders and their properties,
- understand basic proof techniques such as induction,
- be familiar with Boolean algebra and first order logic,
- understand fundamental structures such as trees and graphs.

Competences and skills
For a passing grade the student must

- be able to use notation associated with sets, relations, functions, and orders to define structures and discuss their properties,
- be able to use induction to prove properties of infinite sets of objects,
- be able to manipulate, transform and simplify Boolean terms according to the laws of Boolean algebra,
- be able to work with trees and graphs, such as devising proofs of properties,
- be able to implement simple algorithms and tests for properties on discrete structures,
- be able to use divisibility rules, the Euclidean algorithm, and modular arithmetic.

Judgement and approach
For a passing grade the student must

- be able to apply sets, graphs, and trees to represent aspects of real-world problems,
- show the ability to devise an appropriate proof strategy for a given problem.

Contents

Sets, set equivalence, infinite sets, countability, functions, properties of functions (injective, surjective, bijective functions), relations, orders (total and partial), transitivity, (anti) symmetry, reflexivity, equivalence relations and classes, Boolean algebra, predicate logic, proofs, induction, number theory, graphs, trees.

Examination details

Grading scale: TH - (U, 3, 4, 5) - (Fail, Three, Four, Five)
Assessment:

For final grades, approved compulsory course items and an approved written exam are required. The final grade of the course is based on the result of the written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Modules
Code: 0216. **Name:** Compulsory Course Items.
Credits: 2.0. **Grading scale:** UG - (U, G). **Assessment:** For a final grade the compulsory course items must be completed.
Code: 0116. **Name:** Written Examination.
Credits: 3.0. **Grading scale:** TH - (U, 3, 4, 5). **Assessment:** The final grade of the course is based on the result of the written examination. In order to pass, the compulsory course items must also be completed. **The module includes:** Written examination.

Admission

Admission requirements:

- EDAA20 Programming and Databases **or** EDAA45 Introduction to Programming **or** EDAA50 Programming, First Course **or** EDAA55 Programming, First Course **or** EDAA65 Programming, First Course **or** EDAA70 Introduction to Programming Using Python

The number of participants is limited to: No
Kursen överlappar följande kurser: EDAF10 EDAA75

Reading list

- Eric Lehman, F Thomson Leighton, and Albert R Meyer: Mathematics for Computer Science. The book is available as a free PDF at https://courses.csail.mit.edu/6.042/spring18/mcs.pdf.

Contact

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