# DD2469 Database Theory 6.0 credits

## Databasteori

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

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

## Establishment

Course syllabus for DD2469 valid from Autumn 2008

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Computer Science and Engineering,Information Technology,Information and Communication Technology

## Specific prerequisites

## Language of instruction

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

## Intended learning outcomes

The goals of the course are to give the students

- deeper knowledge of relational algebra and relational calculus, functional dependencies, normal forms, and optimization of queries to a relational database system
- knowledge of and proficiency in using set-valued dependencies, join dependencies, higher normal forms, transitive closures and their use, and formalization of non-normalized structures
- give an introduction to different generalizations of the concept of models, formalization of the different generalizations of the concept of models, and cost calculations when optimizing queries to a relational database system

so that they will

- have a solid theoretical foundation in database handling systems and their applications,
- be able to apply the mathematical theories on real database systems.

## Course contents

Refreshing, extension and formalization of basic concepts and mathematics from earlier courses: Relational algebra, tupel calculus, and domain calculus. Different key concepts. Functional dependencies, axioms and deduction rules for these. Lower normal forms, theorems and proofs concerning normal forms. Algorithms for normalization.

General dependencies: Multi-valued dependencies, join dependencies, axioms and deduction rules for these.

Higher normal forms: Theorems and proofs. Algorithms for normalization to higher normal forms.

Transitive closures and their use: Connection to the normal forms. Algorithms to compute transitive closures and for the verification of normalized structures.

Formalization of non-normalized structures: Extensions and generalizations of the relational model and the formalizations related to it.

Introduction to models: The relational model, the nested relational model, functional and logical models, object models. The mathematical foundation for the different models. Generalization of the concept of a model.

Optimization: Mathematical principles for query optimization. Cost functions.

## Course literature

Reading list available at the department. Previous year: P. Atzeni & V. De Antonellis: Relational database theory, Benjamin/Cummings.

## Examination

- LAB1 - Assignments, 6.0 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.

## Other requirements for final grade

Assignments (LAB1; 6 university 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.