Linnæus University

Dnr: 2022/3296-3.1.2.2

Course syllabus

Faculty of Technology

Department of Computer Science and Media Technology

1DV503 Databasteknik, 7,5 högskolepoäng
1DV503 Database technology, 7.5 credits

Main field of study
Computer Science

Subject Group
Informatics/Computer and Systems Sciences

Level of classification
First Level

Progression
G1F

Date of Ratification
Approved 2020-05-18
Revised 2022-09-26 by Faculty of Technology. Assessment methods are revised.
The course syllabus is valid from spring semester 2023

Prerequisites
Introduction to programming, 7.5 credits or Clientside Web Programming, Module A or equivalent.

Objectives

After completing the course the student shall be able to:
Knowledge and understanding

- A.1 Explain basic concepts related to computer-based information systems and explain the most important problems and regulations related to data management in large organizations and companies,
- A.2 give an overview of different database types, e.g., relationship-, document- and graph-based,
- A.3 explain the different types of models (conceptual, logical and physical) used to develop and reason about a database, and
- A.4 explain the relational model, relational algebra, the connection to predicate logic, and normal forms.

Skills and abilities

- B.1 Design data models at different semantic levels (conceptual, logical, physical) using appropriate formalism, such as Entity-Relationship and relational model,
- B.2 optimize a database design using normal forms (1NF, 2NF, 3NF, BCNF), taking into account the properties of the physical media used for data storage, and
- B.3 implement relational data models in a database manager and create, query, and manipulate data using SQL through client programs and programs implemented in a programming language securely and reliably.

Judgement and approach

- C.1 Analyze and evaluate a domain and its limitations as a data model as well as discuss the advantages and disadvantages of the design orally and in writing,
- C.2 reflect on the characteristics of different data models and choose the ones that are most suitable for the problem to be solved, and
- C.3 discuss how different design options affect the properties of the database, e.g., performance and possible issues.

Content

The course provides an introduction to databases and information management systems. It is based on the basics of how data can be stored, e.g., via the relational model or through network models and discusses how query languages can be built on top of these. Good design is discussed at several different levels, from logical data models, to e.g., the relationship model and normal forms and the actual physical storage.
The following topics are covered:

- Introduction to computer-based information management systems.
- The importance of databases and information management in society.
- What data can, is allowed to and should be stored. What regulations apply, e.g., GDPR.
- Conceptual, logical, and physical data models.
- Different types of data models and database managers.
- Graphs for modeling data, e.g. E/R.
- Propositional calculus and set theory
- Relational models and relational algebra.
- Database queries and database manipulation in SQL.
- Functional dependencies and normal forms (1NF, 2NF, 3NF, BCNF).
- Installation and use of common database managers, e.g., MySQL in the lab environment.
- Development of programs that use a database, as well as how these are made secure and reliable.
- First-order predicate calculus and its relation to databases.
- Introduction to concurrency, locking, and how transactions work.
- Introduction to data consistency, how it is handled in different database types/managers, and what limitations it creates.
- Introduction to scalability of databases and how it is affected by different data models and database managers.
- File systems and how data is stored on block drives (e.g., hard drives).

Type of Instruction

The teaching consists of lectures and teacher-supervised laboratory sessions. All assignments are individual.

Examination

The examination of the course is divided as follows:

Code	Designation	Grade	Credits
2301	Written Exam	AF	3,00
2302	Programming assignment	AF	3,00
2303	Assignment	AF	1,50

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).

Assessment of student performance is made through theoretical assignments, programming assignments, and a written exam. Repeat examination is offered in accordance with Local regulations for courses and examination at the first- and second-cycle level at Linnaeus University.

To pass the course, grade E or higher is required for all parts. The final grade is decided from: Written exam (40%), Programming assignments (40%), and homework assignments (20%)

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customized exam or to have the student conduct the exam in an alternative way.

Objectives achievement

The examination elements are linked to the course objectives in the following ways:

Goal	2301	2302	2303
A.1	☑		
A.2	☑		
A.3	☑		
A.4	☑		☑
B.1	☑	☑	☑
B.2	☑	☑	☑
B.3		☑	
C.1	☑		☑
C.2	☑	☑	
C.3	☑	☑	

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.

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: 1DT903, 5 credits, 2DV513, 7.5 credits and 1DV513, 7.5 credits

Other
Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

The course is conducted in such a way that the course participants' experiences and knowledge are made visible and developed. This means, for example, that we have an inclusive approach and strive for no one to feel excluded. This can be expressed in different ways in a course, for example by using the gender neutral example.

Required Reading and Additional Study Material

Required Reading

- Elmasri, Ramez, & Navathe, Shamkant B., Fundamentals of database systems. Pearson. senaste upplagan. Antal sidor: 600 av 1280.