

# Course **Specifications**

Valid as from the academic year 2024-2025

# Database Systems (F000923)

Course size	(nominal values; actual values may depend on programme)				
Credits 6.0	Study time 180				
Course offerings and	teaching methods in academic yea	r 2024-2025			
A (semester 1)	Dutch, English	Gent	lecture		
Lecturers in academic	year 2024-2025				
vanden Broucke, Seppe			EB24	lecturer-in-charge	
Offered in the following programmes in 2024-2025				crdts	offering
Bachelor of Science in Business Engineering				6	А
Preparatory Course Master of Science in Business Engineering				6	А

# **Teaching languages**

English, Dutch

# Keywords

Information systems development, conceptual modelling, database development, programming of database-applications, implementing relational database systems, SQL, NoSQL databases

# Position of the course

In this course students get acquainted with complex issues concerning the development of organisational information systems for storing and processing structured data (e.g., transactional data, masterdata). The focus is on the systematic development of relational databases systems, in which both relational database technology and several established and modern techniques of data modelling (ER, EER, UML), database modelling (relational model, SQL-DDL) and database usage/querying (APIs, SQL-DML, SQL-DQL) are studied and practiced. We also pay attention to the storage and processing of non-structured data (e.g., big data) by using NoSQL techniques and data warehouses. Another objective of this course is to develop skills concerning database design and -management, and systems development by means of exercises and a group project.

#### Contents

Theoretical part:

- Chapter I: Introduction to databases
- Chapter II: Conceptual modeling
- Chapter III: Relational modeling
- Chapter IV: SQL
- Chapter V: Database APIs
- Chapter VI: NoSQL
- Chapter VII: Physical and transactional aspects of databases
- Chapter VIII: Organizational aspects

Practical part:

- Modeling of databases ((E)ER)
- Design of databases and gueries (SQL)
- Development of end-user databases with MySQL

Proiect:

• The project is jointly organized with the course Algorithms and Data Structures. The goal of the project is the analysis, design and implementation of an information system in Java that uses a relational database. The project has two parts:

- Analysis of the information system and modeling, designing and implementing a relational database
- Designing, programming and testing an information system that complies to the analysis of part one and that uses the relational database developed in part one

# Initial competences

Understanding the fundamentals of computer science and information and communication technologies. Applying abstraction and algorithmic thinking when solving data processing problems. Understanding Java programs. Understanding the principles of object orientation. Implementing a given program design as a Java program.

# **Final competences**

- 1 Analysing conceptual models (business process models, data models) and database models.
- 2 Developing conceptual models (business process models, data models) and database models.
- 3 Designing process-aware database-oriented information systems starting from conceptual models (business process models, data models).
- 4 Implementing a database-oriented information systems in MySQL and Java.
- 5 Formulating SQL statements for defining databases and updating/querying data.
- 6 Understanding recent developments in NoSQL databases.
- 7 Understanding organizational and managerial aspects of databases.
- 8 Being able to present and defend a designed database system.

# Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

# Conditions for exam contract

This course unit cannot be taken via an exam contract

# **Teaching methods**

Group work, Lecture

# Extra information on the teaching methods

- Ex cathedra for theory chapters
- Guided self-study MySQL and SQL
- Project: programming in Java of an information system that uses a relational database (jointly with Algorithms and Data Structures)

# Study material

Type: Handbook

Name: Principles of Database Management: The Practical Guide to Storing, Managing and Analyzing Big and Small Data Indicative price: € 65

Optional: no Language : English Author : Wilfried Lemahieu, Seppe vanden Broucke, Bart Baesens ISBN : 978-1-10718-612-5

# References

Links to relevant literature and research (including research of the UGent Business Informatics research group) are made available (via Ufora)

#### Course content-related study coaching

via Ufora: Forum Individual guidance or group work guidance is possible (after appointment)

# Assessment moments

end-of-term and continuous assessment

# Examination methods in case of periodic assessment during the first examination period

Written assessment open-book

#### Examination methods in case of periodic assessment during the second examination period

Written assessment open-book

# Examination methods in case of permanent assessment

Presentation, Peer and/or self assessment, Assignment

# Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

# Extra information on the examination methods

Periodic evaluation: written open book exam with multiple choice questions and open answer questions, which evaluates knowledge of and critical understanding of the material taught as well as the ability to apply it.

Permanent evaluation: evaluation of the group assignment based on the report, the end result of the system development, feedback through peer assessment, and the presentation of the result.

The evaluation is an integrated evaluation and is part of the evaluation for the courses Database Systems and Algorithms and Data Structures. The ability to independently analyse, design, program (Java) and test in a group of students a database-oriented information system is assessed.

For the project the second chance exam is ether a computer exam which covers MySQL, JDBC and Java or an additional question(s) on the written exam - which will be communicated well upfront.

#### Calculation of the examination mark

The final score consists of:

- Score1: Score open book exam. The Ghent University standard setting will be used to score the multiple choice questions.
- Score2: Score project work (second chance: score PC exam)

Final score = 0.6 \* Score1 + 0.4 \* Score2

Score2 consists of a 30% joint evaluation for both courses. 70% is specific to the courses Database Systems and Algorithms and Data Structures.

#### **Facilities for Working Students**

No participation in the project work required. Instead they prepare for an additional computer exam Java, JDBC and MySQL