Database Systems - BMEEOFTMB-1

I. Subject Specification

1. Basic Data

1.1 Title

Database Systems

1.2 Code

BMEEOFTMB-1

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	1
Lab	2

1.5 Evaluation

Midterm grade

1.6 Credits

4

1.7 Coordinator

name	Dr. Bence MOLNÁR
academic rank	Associate professor
email	molnar.bence@emk.bme.hu

1.8 Department

Department of Photogrammetry and Geoinformatics

1.9 Website

https://epito.bme.hu/BMEEOFTMB-1
https://fiek2.mywire.org/course/view.php?id=3566

1.10 Language of instruction

english

1.11 Curriculum requirements

Compulsory in the Construction Information Technology Engineering (MSc) programme

1.12 Prerequisites

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

The course aims to give the student an insight into the possibilities of analyzing large amounts of data. The efficient way of storing data and the basics of data organization will be presented during the semester. A further aim of the course is to get to know all the levels of developing a database system and develop project approach.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. familiar with relational databases,
2. knows the steps of normalization and how to store data without redundancy,
3. familiar with the possibilities of modern databases,
4. knows the SQL database management language,
5. familiar with NoSQL databases,
6. familiar with CRUD model,
7. familiar with basic concepts of IoT systems.

B. Skills

1. is able to create the specification of an engineering task that can be solved with databases,
2. design a redundancy-free relational database based on a suitable specification,
3. is able to implement a relational database in a database management system,
4. is able to formulate analyzes using SQL language,
5. able to automatically process and convert data sources and then load them into a database,
6. is able to formulate CRUD queries on NoSQL databases.

C. Attitudes

1. open to the use of information technology tools,
2. seeks to solve an engineering problem with the help of co-actors.

D. Autonomy and Responsibility

1. openly answers her colleagues' questions and seeks professionally correct answers to them.

2.3 Methods

Lectures, exercises, written and oral communication, use of IT tools and techniques, independent and group work, work organization techniques.

2.4 Course outline

Week	Topics of lectures and/or exercise classes
1.	Introduction and fundamentals
2.	Defining analysis with graphical user interface (GUI)
3.	Operations of database management, CRUD model. SQL (PostgreSQL) and NoSQL (MongoDB) comparison.
4.	Data types, Keys, foreign keys, indexing.
5.	SQL and MongoDB practice. Queries, data manipulation, data definition.
6.	Optimal level of structuring. Normalization
7.	Database design workflow, ERD. Design patterns and case studies.
8.	Test
9.	Stored procedures, triggers, transactions.
10.	Challanges of importing data. Data cleaning, transformation.
11.	Storing, processing and analyzing of IoT data.
12.	When should we use databases and where not? How database approach helps to define BIM model template?
13.	Security and privacy. Legal aspects.
14.	Conclusion

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Books:

1. Jeffrey D. Ullman - Jennifer Widom: Database systems - The Complete Book, 2008.

b) Online materials:

1. Presentation slides

2.6 Other information

2.7 Consultation

Consultation dates: as specified on the website of the department, or by prior arrangement, by e-mail; e-mail: molnar.bence@epito.bme.hu

This Subject Datasheet is valid for:

Database Systems - BMEEOFTMB-1

2023/2024 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

Learning outcomes formulated in point 2.2 are assessed on one test, three homework assignments, and active participation in the exercises (partial performance assessment).

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
Test	T	A.1-A.7; B.4; C.1
1st homework	HW2	A.1-A.2; B.1-B.2, B.4-B.6; C.1-C.2; D.1
2nd homework	HW3	A.1, A.4; B.3-B.6; C.1-C.2; D.1

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
T	50%
HW1-2	50%
Sum	**100%**

3.4 Requirements and validity of signature

3.5 Grading system

The grade of those who meet the conditions for attendance is determined according to the following criteria: At least 50% of the test must be completed. The final grade is calculated on the basis of the average of the test and the homework.

3.6 Retake and repeat

The first and second homework submitted and accepted can be corrected during the semester free of charge until the submission of the third assignment.

3.7 Estimated workload

Activity	Hours/semester
participation in contact classes	14×3=42
preparation for the practices	14×0.5=7
preparing for performance evaluations	6
homework	55
independent acquisition of designated written curriculum	10
Sum	**120**

3.8 Effective date

1 September 2022

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2023/2024 semester I