Institute of Cyber-physical Systems			Semester 2. of the curriculum 2025-26-2			
Name of the subject:	Code of the subject:	Credits:	Weekly hours:			
				lec	sem	lab
Databases	NKXAB1EBNF	5	full-time	2	0	2
Responsible person for the subject: Rita FLEINER PhD			Classification: associate professor			
Subject lecturer(s): Erick Alexander Noboa Castro						
Prerequisites:	NSXPP1EBNF	Problemsolving using programming				
Way of the assessment:	Midterm grade					

Course description	
Goal:	The aim of the lesson is to familiarize students with advanced database management concepts and procedure, and to develop skills for query writing. The student will learn to select the proper system according to their application requirements, from SQL databases. Tables architecture design/relations based on use-case practice. Finaly the Student will learn how to implement their database.
Course description:	Relational data models, relational algebra, SQL deep dive. Logical and physical data models based on data relations. RDBMS design, dependencies, constraints, normal forms, normalization. Triggers and constraints in SQL. Database fundamentals, instance definition, memory structures in db. Transactions. Index types, hashes. SQL tuning.

Lecture schedule	
Education week	Topic
1.	Introduction to RDBMS. Relational database systems components analysis.
2.	Normalization forms (I, II, III) Basic SQL exercises as knowledge assessment.
3.	Database architecture, indexes, CBO statistics and histograms.
4.	Database statistics and histograms query understanding.
5.	1st Mid-Term Test
6.	Break
7.	Advanced SQL queries using joins, computational costs analysis.
8.	Advanced SQL exercises, merging tables, join types and subqueries, access paths and join algorithms analysis.
9.	
10.	Computational costs analysis, Access path study, hints implementation
11.	Holiday (Rector’s Break)
12.	Query execution plan interpretation, database tuning introduction and practice with study case, access paths analysis and selection, use of hints as cost reduction and optimization methods.
13.	2nd Mid-Term Test – project demonstration
14.	Retake midterm.
Mid-term requirements	

Conditions for obtaining a mid-term grade/signature	**There will be two midterm tests during the course:** **1. The first test is on the 5th week. Topic: Relational databases. Theory and practice (25 *points*)** **2. The second test is on the 13th week. (*25 points*)** **Weekly summary/homework of each lecture (*25 points)* *** **Student must solve a homework (25 *points*)** **Prerequisite for obtaining a mid-year grade: students must pass both tests and all homework with at least 51% each.** ***A student who has missed more than 30% of the classes will not receive a mid-year grade.*** **(*) *Student's participation during lectures is considered as part of the Homework.***

Assessment schedule	
Education week	Topic
5.	**RDMBS, Database architecture (concepts and queries)**
13.	**Tuning, Advanced SQL (concepts and queries)**

Method used to calculate the *mid-term grade* (to be filled out only for subjects with mid-term grades)

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Type of the replacement

Type of the replacement of written test/mid-term grade/signature	**If the midterm exam result is less than 51%, the student may take a make-up exam in week 13. Midterm grade make-up: once, during the week 14.**

Type of the exam (to be filled out only for subjects with exams)

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Calculation of the exam mark (to be filled only for subjects with exams)

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Final grade calculation methods:

The final grade is formed from the HomeWorks, project points and the tests points.

Achieved result	Grade
85%-100%	excellent (5)
74%-84<%	good (4)
63%-73<%	satisfactory (3)
51%-62<%	pass (2)
0%-50%	failed (1)

References

Obligatory:	• Lecture notes (download form https://elearning.uni-obuda.hu/)
Recommended:	• Elmasri, Navathe: Fundamentals of Database Systems
Other references:	-