

Course Name : Databases							
Course Code	Course Type	Regular Semester	Lecture (hours/week)	Seminar (hours/week)	Lab. (hours/week)	Credits	ECTS
CMP 217	B	Fall	3.00	0.00	1.00	3.50	5.00
Lecturer		Kleona Elezi, Msc					
Assistant		Hersi Kopani, Msc					
Course language		Albanian					
Course level		Bachelor					
Description		This course provides the necessary theoretical and practical foundations for relational database management systems. It also covers data analysis and modeling using entity-relationship techniques, relational theory and normalization, and the SQL language.					
Objectives		Understand the role of databases in managing and storing information. Distinguish between a database, a database management system (DBMS), and a relational database. Understand data modeling and database design. Create entity-relationship (ER) diagrams and convert them into relational tables. Learn to use SQL for creating tables, inserting, and modifying data. Use SQL commands for querying, updating, deleting, and managing data (SELECT, INSERT, UPDATE, DELETE). Explore concepts of data normalization and denormalization to eliminate redundancy and improve efficiency. Apply normalization forms up to the fourth normal form (4NF). Master methods for optimizing SQL query performance. Understand the use of indexes, query speed, and system resource management. Learn about transactions and how to maintain data integrity. Understand the ACID properties (Atomicity, Consistency, Isolation, Durability) and their implementation in DBMS. Study techniques for securing data and controlling access to databases. Learn methods for data backup and recovery. Understand user management and privilege control. Learn procedures for database maintenance and performance optimization. Understand distributed databases and distributed database management systems: Explore the concept of distributed databases and data synchronization across multiple systems. Examine the use of databases in modern applications, such as content management systems (CMS), e-commerce services, etc.					

Core Concepts	Introduction to Databases Understanding Databases: Definition and importance of databases. Types of Databases: Relational, non-relational, distributed databases, etc. Definition and Characteristics of a DBMS (Database Management System). Data Modeling and Database Design ER Diagrams (Entity-Relationship): Creating and understanding relationships between entities. Data Modeling Concepts: Entities, attributes, relationships. Database Design: Creating tables from ER diagrams. SQL Language – Part 1 Creating and Manipulating Databases with SQL: Creating tables and inserting data. Basic commands: CREATE, INSERT. Simple SQL Queries: SELECT, filtering data with WHERE. SQL Language – Part 2 Modifying and Deleting Data: UPDATE, DELETE. Advanced Queries: Joins, grouping, and aggregate functions (COUNT, SUM, AVG). Limiting Results: ORDER BY, LIMIT, GROUP BY. Data Normalization Normalization Concept: Reducing redundancy and improving efficiency. Normalization Forms: First, second, third, and fourth normal forms (1NF, 2NF, 3NF, 4NF). Preparing and Designing Normalized Databases. Database Security Access Control and Privileges: Users, roles, and authorization. Data Security: Encryption, storing sensitive information. Responsibility for Data Security and Protection. Transaction Management in DBMS Transaction Concept: Definition and importance. ACID Properties (Atomicity, Consistency, Isolation, Durability). Managing Transactions and Ensuring Data Integrity. SQL Performance Optimization Indexes and Their Use: Increasing query speed. Query Optimization: Strategies for performance optimization. Analyzing Speed and System Resource Usage. Database Administration Managing Users and Privileges: User management systems. Backup and Data Recovery: Protocols and best practices for data protection. Updates and Maintenance: Monitoring and maintaining system performance. Distributed Databases and Distributed DBMS Concepts of Distributed Databases: Data distribution and synchronization between systems. Managing Data in a Distributed Environment. Applications of Databases in Large Systems Use of Databases in Large-Scale Systems and Web Applications: CMS, e-commerce, etc. Real-Time Data and Analytics: The importance of databases for fast and accurate analysis. Review and Practical Application Projects Review of All Topics Covered. Practical Work and Group Projects: Assistance in designing and implementing a complete database.
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Course Outline

Week	Topic
1	Introduction to Database Systems, Database System Concepts
2	Entity-Relationship Model
3	Enhanced Entity Relationship Model
4	Relational Data Model
5	Normalization
6	Normalization
7	Normalizing a database
8	Midterm
9	Introduction to SQL
10	DML data manipulation instructions
11	More DML instructions, DDL table creation instructions
12	Introduction to MySQL, database design in MySQL
13	Tables in MySQL
14	Retrieve data from tables using MySQL statements
15	Database Programming
16	Final Exam

Prerequisites	The student must attend the course at a minimum rate of 75%.		
Literature	• Ch. FEHILY, SQL – Third Edition, 2008 • Jay Greenspan and Brad Bulger, ‘MySQL/PHP Database application’, 2001, Published by M&T Books • Emasri, Navathe, “Fundamentals of Database Systems”, 2011 sixth edition, Addison Wesley.		
References	• Alba Como, Xheni Melo, Menaxhimi bazë të dhënash, 2018, EneaS, Tiranë.		
Course Outcome			
1	Studenti arrin të krijojë një bazë të dhenash të thjeshtë.		
2	Studenti arrin të bëj query të thjeshta në databazë.		
3	Studenti njihet me komponentët bazë të një RDBMS.		
4	Studenti arrin të manipulojnë të dhënat e një bazë të dhënash me SQL dhe MySQL.		
5	Studenti është i aftë të administrojë një bazë të dhënash.		
Course Evaluation			
In-term Studies		Quantity	Percentage
Midterms		1	25
Quizzes		0	0
Projects		1	20
Term Projects		0	0
Laboratory		1	10
Class Participation		1	10
Total in-term evaluation percent			65
Final exam percent			35
Total			100
ECTS Workload (Based on Student Workload)			
Activities	Quantity	Duration (hours)	Total (hours)
Course duration (Including the exam week: 16x Total hours of the course)	16	4	64
Study hours outside the classroom (Preparation, Practice, etc.)	14	3	42
Duties	1	0	0
Midterms	1	10	10
Final Exam	1	10	10
Other	0	0	0
Total Work Load			126
Total Work Load / 25 (hours)			5.04
ECTS			5.00