



## Course Information

<b>Course Code</b>	2460311
<b>Course Section</b>	1
<b>Course Title</b>	MODERN DATABASE SYSTEMS
<b>Course Credit</b>	4
<b>Course ECTS</b>	6.0
<b>Course Catalog Description</b>	Introduction to database systems. Relational databases. Entity relationship (ER) model. Normalization. Structured Query Language (SQL). Designing databases. Introduction to distributed, parallel and object databases. Big data storage systems. Datawarehouses. Online Analytic Processing (OLAP). Big data analytics and NoSQL. Web data management. Cloud computing.
<b>Prerequisites</b>	Students must complete one of the following sets to take this course.

Set	Prerequisites
1	2460291

**Schedule** Wednesday, 12:40 - 15:30, P4  
Thursday, 15:40 - 16:30, YP-B201

## Instructor Information

<b>Name/Title</b>	Lecturer DENİZ ÇELİKEL
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<b>Office Phone</b>	
<b>Office Hours</b>	Wednesday 11:40-12:00

## Course Assistants

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## Course Objectives

This course introduces the fundamental concepts of database management systems. It covers relational database theory, database design, normalization, query processing with SQL, and basic transaction management. Students will gain both theoretical understanding and practical skills by designing and implementing databases.

## Course Learning Outcomes

Upon successful completion of the course, students will be able to:

- Understand the concepts of databases and database management systems.
- Model data using the Entity-Relationship (ER) model and convert ER diagrams into relational schemas.
- Apply relational algebra to express queries formally.
- Use Structured Query Language (SQL) to create, query, and manipulate relational databases.
- Apply functional dependency theory and normalization techniques to improve database design.
- Understand basic concepts of transaction management, concurrency control, and recovery.



- Implement a database project with presentation, logic, and data layers, including CRUD operations.

## Program Outcomes Matrix

Undergraduate

Program Outcomes	Level of Contribution			
	0	1	2	3
1 Applying the knowledge of statistics, mathematics and computer to statistical problems and developing analytical solutions.			X	
2 Defining, modeling and solving real life problems that involve uncertainty, and interpreting results.			X	
3 To decide on the data collection technique, and apply it through experiment, observation, questionnaire or simulation.			X	
4 Analysing small and big volumes of data and interpreting results.				X
5 Utilizing up-to-date techniques, computer hardware and software required for statistical applications; developing software programs and numerical solutions for specific problems when necessary.				X
6 Taking part in intradisciplinary and interdisciplinary teamwork, using time efficiently, taking leadership responsibilities and being entrepreneurial.			X	
7 Taking responsibility in individual work and offering authentic solutions.			X	
8 Following contemporary developments and publications in statistical science, conducting research, being open to novelty and thinking critically.			X	
9 Efficiently communicating in Turkish and English to define and analyze statistical problems and to interpret the results.			X	
10 Having a professional and ethical sense of responsibility.			X	
11 Developing computational solutions to statistical problems that cannot be solved analytically.				X
12 Having theoretical background and developing new theories in statistics, building relations between theoretical and practical knowledge.			X	
13 Serving the society with the expertise in the field.				X

0: No Contribution 1: Little Contribution 2: Partial Contribution 3: Full Contribution

## Instructional Methods

- Lecture notes **might be provided** by the instructor.
- Classes will include both theoretical instruction and applied examples.
- Students will practice SQL queries and database design on **PostgreSQL** during lectures and lab sessions.
- A semester project will be assigned where students must design and implement a relational database with at least 5 tables, including CRUD operations, a logic layer, and a presentation (user interface) layer.
- Project presentations will take place in the last two weeks of the semester.
- The main reference for the course will be *Fundamentals of Database Systems* (7th Edition) by Ramez Elmasri & Shamkant B. Navathe.



## Tentative Weekly Outline

Week	Topic	Relevant Reading	Assignments
1	WeekTopics		
	1 Database and Database Users		
	2 Database System Concepts and Architecture		
	3 Relational Data Model and Relational Database		
	4 Relational Algebra		
	5 Data Modeling and ER Model		
	6 Relational Database Design with ER		
	7 Functional Dependencies and Normalization		
	8 Relational Design Algorithms and Further Dependencies		
	9 Introduction to Transaction Processing		
	10 Concurrency Control Techniques		
	11 Disk Storage, File Structures, Hashing		
	12 Indexing Structures for Files		
	13 Project Presentation		
	14 Project Presentation		
	15 Final Exam		

## Course Textbook(s)

**Ramez Elmasri & Shamkant B. Navathe**, *Fundamentals of Database Systems*, 7th Edition.

## Course Material(s) and Reading(s)

### Material(s)

Lecture slides and materials **might be provided by the instructor if needed**

### Reading(s)

Additional practice exercises will be shared during lectures and lab sessions **if needed**.

## Supplementary Readings / Resources / E-Resources

### Readings

Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*, latest edition.

Online PostgreSQL documentation: <https://www.postgresql.org/docs/>

### Resources

Additional articles and resources may be announced during the semester.

## Assessment of Student Learning



**Assessment**

**Dates or deadlines**

**Quiz / Homework (10%)**

One short quiz or homework will be given to assess understanding of the fundamental concepts introduced in class. The date will be announced in advance. No late work will be accepted, except in excused (instructor-approved) circumstances.

**Project (30%)**

A semester project will be assigned in mid-semester. Students must design and implement a relational database with at least 5 tables, including CRUD operations, a logic layer, and a presentation (user interface) layer. The project is due before the project presentations. Detailed guidelines will be provided.

**Project Presentation (20%)**

Students will present their projects during the last two weeks of the semester (Weeks 13 and 14). Each presentation should demonstrate the database design, implementation, and functionalities.

Assessment	Dates or deadlines
Final Exam (40%)	The final exam will be held during the official exam week (Week 15). It will cover all topics in the Weekly Outline. The format and further instructions will be provided later in the semester.

## Course Grading

Deliverable	Grade Points
Quiz / Homework	10
Project	30
Project Presentation	20
Final Exam	40
<b>Total</b>	<b>100</b>

## Course Policies

### *Class Attendance*

Attendance is **not compulsory**, but students are strongly encouraged to attend classes regularly in order to benefit from the course.

### *Late Submission of Assignments*

Late submissions will not be graded.

### *Make up for Exams and Assignments*

No make-up (exam, quiz, assignment, project, etc.) will be provided without a valid documented excuse (e.g., medical report).

## Information for Students with Disabilities

Students who experience difficulties due to their disabilities and wish to obtain academic adjustments and/or auxiliary aids must contact ODTU Disability Support Office and/or course instructor and the advisor of students with disabilities at academic departments (for the list: <http://engelsiz.metu.edu.tr/en/advisor-students-disabilities>) as soon as possible. For detailed information, please visit the website of Disability Support Office: <https://engelsiz.metu.edu.tr/en/>

## Academic Honesty

The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."