DA505 – Introduction to Data Modeling & Processing

Course Instructor

Uğur Koç, kocugur@sabanciuniv.edu

Course Schedule

Saturday 09:00 - 12:00

Monday 19:00 - 22:00

Course Objective

This course is designed to provide an overview of concepts and theories as well as hands-on practice. In this course, you will learn and practice data modelling techniques, including: three phases of modelling, normalization, SQL databases, and a variant of different NoSQL solutions.

At the end of the course, a successful student should be able to:

- Model a database based on business requirements
- Implement a relational database from scratch using SQL code
- Perform data processing tasks with SQL, and understand the limitations/possibilities available with different SQL systems
- Understand why SQL may be insufficient or not desirable under certain conditions
- Design data models, and perform processing with various NoSQL systems, including document, key-value and graph models

Course Prerequisites

None.

Course Materials

There are no required textbooks. Students may find the following books/resources useful:

- Fundamentals of Database Management (Elmasri & Navathe)
- Modern Database Management (Jeffrey A. Hoffer)
- NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence
- Oracle Online Documentation Library

https://docs.oracle.com/en/database/oracle/oracle-database/19/admin/index.html

- MySQL Online Documentation

  https://dev.mysql.com/doc/refman/8.0/en

- PostgreSQL Online Documentation

  https://www.postgresql.org/docs/13

Course Outline

- Introduction to Data, and Data Modelling Concepts
- Conceptual Modelling
  - E-R Model
  - How to convert business requirements to E-R Diagrams
  - Entities, Relationships, Identifiers
- Logical Modelling
  - Converting a conceptual model to logical model
  - Integrity constraints
  - Normalization
- Physical Modelling
- Data Processing
  - SQL practices
- Limitations of relational databases, alternative solutions
- Transactions, ACID, BASE
- Document, Key-value, Graph model

Grading

4 Homework (60%)

1 Final (40%)