

Fall 2020

CS 631-1J1: Data Management Systems Design

Ananya Dass

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Recommended Citation

Dass, Ananya, "CS 631-1J1: Data Management Systems Design" (2020). *Computer Science Syllabi*. 122.
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CS6311J1-Data Mgt Systems Design

Course Objective:

The objective of the course is to give a thorough introduction to the concepts of designing, organizing, querying and managing relational databases. It will be balanced between theory and practice.

The course covers 7 topics:

1. Conceptual Modeling (the Entity-Relationship model and the Enhanced Entity-Relationship model)
2. Relational Model (Concepts, Integrity Constraints, Update Operations, Relational Algebra)
3. Mapping Conceptual Models to Logical Models (Mapping the ER Model to the Relational model)
4. Commercial Database Language SQL (Data Definition, Basic Integrity Constraints, Schema Changes, Basic and Complex Queries, Aggregate Functions and Grouping, Data Change Statements, Views, Complex Constraints)
5. Active Databases (Active Database Rules, Triggers)
6. Database Physical Organization (File Organizations, External Hashing, Indexing)
7. Database Design Theory (Functional and Other Dependencies, Dependency Inference, Normal Forms, Schema Decomposition, Normalization)

You will learn the latest of the SQL standard and you will get hands on experience on creating, populating, querying, maintaining and managing a relational database using a modern commercial database management system.

Text Book

[Fundamentals of Database Systems, 7th Edition \(Links to an external site.\)](#),

R. Elmasri and S.B. Navathe

Pearson, © 2016.

ISBN-10: 0-13-397077-9

ISBN-13: 978-0-13-397077-7

Time and Place

Date and time: Friday, 6.00 PM - 8.50 PM

Room: Converged Learning (HUD JC02 + Remote)

Instructor

Ananya Dass

Email: ananya.dass@njit.edu

Office Hours: Office hours to be held online Thursday, 6:00 - 7:00 PM

Required Background

Knowledge of a programming language, algorithms, data structures, file organization is required.

Course Organization

- The Notes for each lecture will be made available in CANVAS.
- After the theory on a certain topic is presented, you can download the corresponding questions and exercises which you should try to solve. Most of them are discussed in class in subsequent lectures. Four homework assignments will contain exercises on selected topics. Their solutions will be posted in due time.
- Alongside your assigned homework you should work in groups on a project which has three deliverables during the semester.
- Project deliverables are to be handed in the day they are due or earlier. A project demonstration is required for the third deliverable of the project.
- There will be two exams: a midterm halfway through the semester, and a final on the last day of the class.
- Lecture slides, exercises, homework assignments, project requirements, and other material (e.g. Entity-Relationship diagrams and solutions of homework assignments) will be available for downloading in due time.
- All the course communication will be done through Canvas. You are required to visit this page at least twice a week to keep yourself updated.

Attendance and Participation

You are supposed to attend all the classes (remotely/physically). Participation is highly encouraged to make the class more interactive. Class attendance and participation are taken into consideration by the instructor for the evaluation of the students. Experience shows that students that do not attend the classes do not perform well in the midterm and final exams. If you miss one class be sure to consult one of your classmates about the content of the lecture and visit the course CANVAS page to get notes, exercises, assignments, deadlines and announcements.

Assignment

There will be four homework assignments. You should work on the homework assignments individually. Solutions are provided for you after the due date to compare with your own solutions. If you work reasonably on them you will get all the points.

Assignment	Description
Assignment 1	The Relational model, Relational Algebra.
Assignment 2	Queries and Updates.
Assignment 3	Constraints in SQL and Triggers.
Assignment 4	Formal Database Design Theory.

Project

A project to design and implement a database using a DBMS will be assigned. It will proceed progressively through conceptual design, logical design, populating the database, and implementing application programs. The methodology for database development learned in class should be used.

- **Project groups**

Groups of at most 3 students are required. You can choose the classmates you want to work with. You can also work by yourselves if you prefer. In order to form a group you have to fill a form available in due time. If you do not express any preference in forming groups on your own, you will be put in a group randomly.

- **Project phases**

The project has three phases that cover the areas described below. Each phase has a different weight in the course grade. A report (deliverable) for each phase has to be handed in by the due date shown in the lecture schedule table below. For every phase of the project, one deliverable per group needs to be handed in (not one for each member of the group). Each group needs to schedule an appointment for demonstrating its project at the end of the semester (dates will be made available). All the group members should be present during the project demonstration.

Phase	Description
Phase 1	Analysis & Conceptual Design
Phase 2	Logical Design
Phase 3	Implementation and Testing

Homework and Project Deliverable 1 and 2 Submission

The **four homework assignments** and the **1st** and **2nd project deliverables** should be submitted on or before the day and time they are due **through Canvas**. Every Canvas submission should be a **SINGLE FILE** in **MS word** or **PDF** format **only**. The **3rd (and final) project deliverable** should be handed in the time of the project demonstration.

Late submissions will not be accepted or will get penalties.

Grading

The midterm, the project and the final exam contribute to the course grade as follows:

Midterm	30%	
Homework Assignments	5%	
Project	25%	5% for 1 st and the 2 nd , and 15% for the 3 rd deliverable
Final	40%	

Midterm and Final Exam

The midterm and the final will be remote. Logistics of the exam will be explained in due time.

The exam will be composed of several exercises/questions to be answered.

Academic Integrity

Violations of the academic integrity in this class will not be tolerated. Cheating in assignments or exams will result in an 'F' grade for the student.

Read the [Academic Honor Code of NJIT \(Links to an external site.\)](#). The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.