CS 331: Database System Design & Management - HONORS

Fall 2025

Credit: 3

Instructor: Dr. Shantanu Sharma

Location: GITC 1400

Class sessions: Monday and Wednesday 11:30 AM – 12:50 PM

Instructor Office: GITC 4201B

Instructor email: shantanu.sharma@njit.edu

Office Hours: Monday (10:15 AM – 11:15 AM) or by appointment over email. No office hours on 09/08.

Office Hours Location: GITC 4201B

Prerequisite:

1. CS 114. Introduction to Computer Science II, or
2. CS 116. Introduction to Computer Science II in C++, or
3. IT 114. Advanced Programming for Information Technology.

Course Overview:

This course will give a broad overview of database management systems. Fundamental concepts of databases will be explained. Topics include database system architecture, data modeling using the entity-relationship model, storage of databases, query languages, indexing, functional dependencies and normalization for relational database design, relation decomposition, concurrency control, and transaction management.

The outcome of the course:

Students will:

1. Gain knowledge of the requirements and applications of the database management system.
2. Understand the fundamental components and operations supported by a database management system.
3. Gain experience with a DBMS.

Primary Textbook:

1. Lecture slides will cover major topics.
2. Database management systems (3rd edition) by Raghu Ramakrishnan and Johannes Gehrke.
3. Database System Concepts (7th edition) by Avi Silberschatz, Henry F. Korth, and S. Sudarshan.

Lecture slide availability: *Slides will be online before the lecture. If there are any changes to the slides during or after the lecture, they will be updated accordingly.*

Other reference books: Students may refer to the following books to gain a deeper knowledge of databases. However, reading all such books is not mandatory.

1. Fundamentals of Database Systems (7th edition) by Ramez Elmasri and Shamkant Navathe
2. Database Systems: The Complete Book by Héctor García-Molina, Jeffrey Ullman, and Jennifer Widom
3. Architecture of a Database System by Joseph M. Hellerstein, Michael Stonebraker, and James Hamilton
4. Principles of Database and Knowledge-Base Systems, Volume I, by Jeffrey D. Ullman.

Grading policies:

Quiz	15%
Assignments	20%
Mid-term exam	25%
End-term final exam	30%
Attendance	10%
Total	**100**
Bonus point (see details below)	***10***

I reserve the right to make minor adjustments to grade weights or to add/remove assignments, projects, or quizzes as needed.

Grade letter:

Grade letters will be allocated as follows:

Grade letter	**Points**
A	89 and above
B+	88 – 80
B	79 – 65
C+	55 – 64
C	45 – 54
D	35 – 44
F	Below 34

Quizzes: (15 points)

1. Each quiz will contain ***15 to 20 questions*** (multiple-choice, fill-in-the-blank, or small questions).
2. Each quiz will be in the classroom.
3. ***15-20 minutes*** will be given to return the sheet.
4. Each student must submit their own quizzes. No groups will be allowed.
5. The quizzes will be on the following dates:
   a) 09/24
   b) 10/15
   c) 11/12
   d) 12/03
6. **Grading of quizzes:** Grades of all the quizzes will be included.
7. The grade of each quiz will be published before the following quiz.

Mid-term (25 points) and End-term (30 points):

1. Students can carry **books, printed notes, and printed slides**. However, Internet access is not allowed.
2. Mid-term date: 10/27 or 10/29 (depending on the progress of the course)
3. End-term date: will be announced.

Attendance (10 points):

1. There will be 3-4 guest lectures. The tentative time and locations are as follows: Wednesday, 3:30 PM in GITC.
2. Each lecture will carry 2 or 3 points.
3. Attending and participating in each lecture will result in some points.
4. *If a guest lecture will not happen, then points will be added to the final and mid-term exams.*

Assignments: (20 points)

1. Four assignments will be given.
2. **Each student must submit in a group of two. Without groups, assignments will NOT be accepted**.
3. Each assignment of 10 points.
4. The assignment will be published on the following date and will be due as mentioned in the following table

Assignment number	Published on the web	Due date and time
1	10/01	10/15 11:59 PM
2	11/01	11/15 11:59 PM
3	11/16	12/05 11:59 PM
4	11/25	12/10 11:59 PM

5. All assignments must be submitted on Canvas on/before the due date.
6. *Assignments should **NOT be handwritten*.** Students may use Microsoft Word, Google Docs, or Overleaf.
7. The grade for each assignment will be published before publishing the next assignment, except for the third assignment.
8. ***Late submission*** of the assignment will be allowed with the given reasons. Each day, a deduction of 1 point will be made. However, assignments will not be accepted after the 20th of each month and will result in **zero points**. Without reason, late submissions are ***not*** allowed.

Bonus points:

1. There is a provision for earning 10 bonus points.
2. However, if a student obtains 100 points in the final grade without a bonus, then their final grade will be 100. Students who earn a final grade between 85 and 100 will secure an A, and the bonus points will not affect their grade.
3. To earn 10 bonus points, a student needs to meet the instructor before 11/01.
4. Students *may select a research paper or a project given by the instructor*.
5. Each student will discuss a single research paper or project with the entire class.
6. Students can also use the slides of the paper available online. No point will be deducted if a student does not prepare slides on their own.

Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu*

Note for Students with Disabilities We will follow the university rules in this regard.

Weekly Schedule of the Lectures

(Tentative -- *the schedule may change according to the progress in the lectures*)

Week number	Topic to be covered
1	Introduction
2	SQL
3	
4	
5	
6	
7	Data storage
8	Review class – tentative
9	Indexes
10	
11	Query execution and optimization
12	
13	Database design and functional dependencies
14	Transaction management
15	Discussion and others (ACID vs BASE)