

CIS 420 – Database Systems Syllabus  
Fall 2020

**Textbooks:**                    **Required:** *First Course in Database Systems, A, 3rd Edition, Jeffrey D. Ullman, Jennifer Widom (ISBN-13: 978-0136006374 ISBN-10: 013600637X)*

**Recommended:** *Database System Concepts Sixth Edition Avi Silberschatz, Henry F. Korth, S. Sudarshan (McGraw-Hill ISBN 0-07-352332-1)*

**Instructor:**                    Supraja Gurajala,  
   Phone: 315-267-2091  
   Email : [gurajas@potsdam.edu](mailto:gurajas@potsdam.edu)

**Office Hours:**                    MTWTh: 9:00 am - 11:00am  
**Class Time/Place:**            TTh 11:10am - 12:25pm,  
**Final Exam:**                    Tuesday, Dec. 15, 12:30 - 2:30 pm

**Course Description:**

CIS - 420: Database Systems will focus on theory, design, implementation and applications of database systems.

**Learning Outcomes:**

Students who have taken this course should be familiar with:

1. Different concepts involved in the designing and implementing of a database system.
2. Physical and logical database designs, database modeling, entity-relationship and relational data models. Also, new "NoSQL" persistence models.
3. Designing relational databases, at the level of entity-relationship diagrams, schema diagrams, and SQL schemas
4. Relational algebra and usage of data manipulation language (SQL) to query, update, and manage a database
5. Quantifying design properties using various normal forms.
6. DBMS concepts such as: crash recovery, concurrency control, database security and integrity.
7. Various applications of database systems.
8. Designing database, implementation, and query formulation through a team project.
9. Commercial large-scale databases by reading research publications.

**Grading for the Course:**

1. **Daily Quizzes: 5 %**

A daily quiz will be given at the start of each lecture. This will also count as your attendance.

2. ***Weekly Quizzes:*** 10 %

A ten-minute weekly quiz will be given once a week. It can be on any class day. It will be based on lectures and Homework problems assigned for you. There is no make-up quiz.

3. ***Homeworks and Programming Assignments:*** 25 %

Several homeworks and programming assignments will be given based on the concepts discussed in lectures. These homeworks and assignments will be the essential part of the course and will be posted on moodle page along with the due date. Late work is penalized at 20% per calendar day that they are late. Your final submitted HW and assignment should represent your individual work; it is, however, acceptable to discuss the solution approach with other students. You will be responsible for keeping track of due dates posted on moodle.

4. ***Exams:*** 35%

- a. Midterm 1 – 10 % Date: TBA
- b. Midterm 2 – 10 % Date: TBA
- c. Final Exam – 15 % Tuesday, Dec. 15, 12:30 - 2:30 pm

Exams will be closed book and closed notes unless specified otherwise. Any request for re-grading must be received in writing and within 3 days of receiving your graded exam back. Prior notice must be given to your instructor. No make-ups will be granted unless satisfactory documentation is produced to show an extenuating circumstance.

5. ***Project and Research paper presentation:*** 30%

Students in groups will do a programming project, which involves database design and management using appropriate features of SQL. The database implemented should have a web portal. More details about the project will be discussed during lectures. Apart from project, students should also present a research paper on how big data is stored and retrieved.

## ***Course Policies***

1. ***Late work***

All due dates for the course will be strictly enforced. Prior approval will be required from the instructor for any late submission, including making up missed exams.

2. ***Attendance***

Attending all lectures and labs and completing required work is crucial to your success in this course. While attendance is not graded per se, in-class graded work cannot be made up without prior arrangement with the instructor. In the event of absences from weekly

labs, you are required to complete the missed lab work before the beginning of the next lab session. The instructor and CS tutors will be available to help you with completing labs during posted office and tutoring hours.

### **3. *Absences***

As noted above, in-class graded work cannot be made up without prior arrangement with the instructor.

Accommodation of Religious Observances: I will make reasonable accommodation for a student's religious beliefs. Please notify me within the first week of classes about any scheduled class date that conflicts with a religious observance.

### **4. *Academic Integrity***

You are expected follow the "SUNY Potsdam Academic Honor Code" (SUNY Potsdam Undergraduate Catalog, <https://catalog.potsdam.edu/content.php?catoid=7&navoid=566>) by doing your own work on all required work for the course unless specifically directed otherwise by the professor. Copying is strictly forbidden, regardless of the source (online, other students). Students caught cheating will receive a grade of 0 for that evaluation. More than one offense will result in dismissal from the course and possible disciplinary sanctions by the university. Academic Misconduct definitions, procedures, due process, and student rights are described on page in the SUNY Potsdam Undergraduate Catalog, as cited above.

### **5. *Grade Distribution***

At the end of the semester, I will calculate what fraction of the possible points you have earned, and your grade will be based on this distribution:

4.0:	95 – 100%
3.7:	90 – 94%
3.3:	85 – 89%
3.0:	80 – 84%
2.7:	77 – 79%
2.3:	73 – 76%
2.0:	70 – 72%
1.7:	67 – 69%
1.3:	63 – 66%
1.0:	60 – 62%
0.0:	<60%

Note that final grades may be determined using a class curve of the course-grade averages.

***Tentative Schedule:***

Weeks	Topics	Assignments
Week 1	Introduction, The Evolution of Database Systems, Overview of a Database Management System	
Week 2	The Relational Model of Data, Overview of Data Models, Basics of the Relational Model	Assignment 1
Week 3	Defining a Relation Schema in SQL, An Algebraic Query Language, Constraints on Relations	Programming Assignment SQL
Week 4	High-Level Database Models, The Entity /Relationship Model, Design Principles, Constraints in the E/R Model, Weak Entity Sets	
Week 5	From E/R Diagrams to Relational Designs, Converting Subclass Structures to Relations,	Assignment 2
Week 6	Algebraic and Logical Query Languages, Relational Operations on Bags  Extended Operators of Relational Algebra, A Logic for Relations, Relational Algebra and Datalog	
Week 7	The Database Language SQL, Simple Queries in SQL,  Queries Involving More Than One Relation, Subqueries, Full-Relation Operations  Database Modifications	
Week 8	Constraints and Triggers, Keys and Foreign Keys, Constraints on Attributes and Tuples  Modification of Constraints	Assignment 3
Week 9	Assertions, Triggers  Views and Indexes	
Week 10	Design Theory for Relational Databases, Functional Dependencies	Assignment 4

	Rules About Functional Dependencies	
Week 11	Design of Relational Database Schemas, Decomposition: The Good, Bad, and Ugly Third Normal Form	
Week 12	Multivalued Dependencies, An Algorithm for Discovering MVD's	
Week 13	Research Papers	Assignment 5
Week 14	NoSQL, MongoDB	
Week 15	Project Demos	