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)*

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Email : gurajas@potsdam.edu

Office Hours: MTWTh: 9:00 am - 11:00am
Discord Text Channel : dr_gurajala_office
Discord Voice Channel : Dr. Gurajala_office

Class Time/Place: TTh 11:10am - 12:25pm, Zoom link provided on moodle course page

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. Underlying file structures used to build databases, and their performance implication.
7. DBMS concepts such as: crash recovery, concurrency control, database security and integrity.
8. Various applications of database systems.
9. Designing database, implementation, and query formulation through a team project.
10. 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 % Date: Friday, Dec. 13, 10:15 am - 12:15 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.

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

90% >=	A
80% - 90	B
70% - 80	C
60% - 70	D

< 60% F

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

Due Dates

All due dates for the course will be strictly enforced. Prior approval will be required from the instructor for any late submission.

Impact of extracurricular activities on class work

You make the choices about how you will spend your time, including investing your time in non-academic activities. As a student, you need to give priority to your academic work, and prevent extracurricular commitments from negatively impacting your work for classes. You are, of course, free to participate in activities that are meaningful to you; however, do not expect me to give special consideration because of time management issues that arise from those activities. You should not be missing class because of extracurricular activities, nor should you allow yourself to fall behind on assignments. **NOTE: I will not give extensions that relate to participation in extracurricular activities, even if the activity is related to Computer Science.**

6. Technical Requirements Summary

Hardware*:* The course is being taught virtually, with all participants working remotely. That means that you will need to have the following computer hardware:

- Laptop or desktop computer – This is a programming-intensive course. You will need a computer to be able to do the programming. If you have only a tablet or a smartphone, please contact me so we can talk about alternatives for you to do the work.
- Camera and microphone – You need these to support video/audio for synchronous class meetings and for using the CS Department Discord server (more information below). Your laptop or desktop system may have built-in camera and microphone, or you could use eternal camera and microphone. You can also use a tablet or smartphone for video/audio communication.

Software*:* Here is a summary of the various software you will need for the course, in addition to the basics of a computer, browser, and typical software.

- **VPN (virtual private network) software** – You may want to connect to the university's VPN so that you can connect remotely to the CS lab in Dunn 302. If you are using Windows or Mac OS, you can find instructions for the software download and setup here: https://www.potsdam.edu/about/administrative-offices/computing-technology-services/services/vpn. If you use Linux, Dr. Ladd has made a video to help you set up to use the VPN. The video is available near the top of the Moodle course page.
- **Command line interface (cli) tool** – If you access the CS lab remotely, you will need a command line tool to work on the lab machines. You will not have access to any graphical

user interfaces when working remotely. Windows, Mac, and Linux operating systems have a version of the command line interface available to users.

- **VSCode** – We recommend that you install this free programming environment. It is free (as just noted), available for any OS, easy to use, and allows for users to share code. You can download VSCode from https://code.visualstudio.com/download.
- **Java 11** – This is the version of Java that is installed in the lab, and VSCode will want you to use this version as well.
- **Discord** – The CS Department has Discord server (more information below) that is our "virtual department". My office hours will take place in Discord, our CS tutors will work on Discord, and our ACM chapter has its meetings on their Discord server. You can join our server at https://discord.gg/Np2NEQ and find information about getting started with Discord at https://discord.com/new
- **Zoom** – Our synchronous (real-time) class meetings will take place through Zoom. You can get a free Zoom account here https://zoom.us/. There may be additional updates about Zoom; the university and SUNY are working on finalizing license and technical details.

Tentative Schedule:

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
Week 3	Defining a Relation Schema in SQL, An Algebraic Query Language, Constraints on Relations
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,
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
Week 9	Assertions, Triggers Views and Indexes
Week 10	Design Theory for Relational Databases, Functional Dependencies 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
Week 14	NoSQL, MongoDB
Week 15	Project Demos

Expectations for the Course

- You will be expected to come prepared to class and be an active participant in class discussions. You should plan on spending a significant time outside class in reviewing course material covered in class. It is critical that you keep up with the course material on a timely basis.
- Academic dishonesty: Students are expected follow the "SUNY Potsdam Academic Honor Code" (SUNY Potsdam 2014-2016 Undergraduate Catalog, p. 42) by doing their own work on quizzes, exams and programming assignments unless specifically directed otherwise by the instructor. Copying is strictly forbidden. Students caught cheating will receive a grade of 0 for that evaluation. Repeated offenses 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 35 of the SUNY Potsdam 2016-2018 Undergraduate Catalog.
- Disability Assistance: Anyone who has special needs that must be accommodated to fulfill the course requirements should notify the instructor and the Director of Accommodative Services, 111 Sisson Hall, 267-3267. The college has resources available to assist qualified students with their academic studies.
- Food and Drink in Class and Lab**:** Beverages are allowed in the classroom as long you clean up after yourself and do not disturb others. In the Unix lab, food and drink are restricted to the coffee table. UNDER -NO- CIRCUMSTANCES ARE FOOD AND BEVERAGES (EVEN GUM) ALLOWED NEAR THE COMPUTERS.
- No devices are allowed during class. Notes must be hand-written

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

Attendance

Regular attendance is critical for your success in this course. You are responsible for updating yourself with announcements made in class concerning material covered, home works, and any changes in course syllabus, due dates, or other course-related issues.

SUNY Potsdam Department of Computer Science Code of Professional Conduct

1. ***Preamble***
   All members of the ACM, including the Computer Science faculty of SUNY Potsdam, are committed to ethical professional conduct as specified in the ACM Code of Ethics and Professional Conduct. Students, taking courses from the faculty, are bound by our commitment.

   All members of the Department are obliged to remind one another to behave professionally. Violations should be reported promptly; however, capricious or malicious reporting of violations is, itself, a violation. When reporting, bring all relevant aspects of the incident to the faculty's attention.

2. ***Moral Imperatives***
   As a Computer Science student I will...

   2.1. Respect all members of the Department.

      2.1.1. Be professional in face-to-face and electronic interactions.

      2.1.2. Be fair so everyone is free to work and learn.

      2.1.3. Be active in preventing discrimination in physical and electronic spaces frequented by Department members.

   2.2. Accept and provide appropriate feedback.

      2.2.1. Avoid starting or spreading rumors.

      2.2.2. Respect confidentiality.

   2.3. Be honest, trustworthy, and respect intellectual property.

      2.3.1. Only take credit for my own work.

      2.3.2. Respect the privacy of others.

      2.3.3. Access computing resources only when authorized and report any access risks discovered.

   2.4. Contribute to society and human well-being.

      2.4.1. Improve public understanding of computing and its consequences.

2.4.2. Consider both the direct and indirect impacts of my actions.

Based on the ACM Code of Ethics and Professional Conduct, retrieved from https://www.acm.org/code-of-ethics

Student Support

Every student in this class is a valued individual. If you are struggling with issues outside of the classroom, please know that there are professionals both on and off campus who can assist you. If you need immediate assistance, please contact our campus Counseling Center (with free counseling) at (315) 267-2330 or visit their website. Links to other resources are provided below:

- • Stacey L. Basford- Title IX Coordinator ▪ Van Housen Extension 392
  - ▪ (315) 267-2516
  - ▪ basforsl@potsdam.edu
  - ▪ http://www.potsdam.edu/offices/hr/titleix

- • Bias Incident Reporting-
  - ▪ http://www.potsdam.edu/about/diversity/biasincident

- • Center for Diversity
  - ▪ 223 Sisson Hall
  - ▪ (315) 267-2184
  - ▪ http://www.potsdam.edu/studentlife/diversity

- • University Police
  - ▪ Van Housen Extension
  - ▪ (315) 267-2222 (number for non-emergencies; for an emergency please dial 911)

- • Student Conduct and Community Standards
  - ▪ 208 Barrington Student Union
  - ▪ http://www.potsdam.edu/studentlife/studentconduct/codeofconduct

- • Reachout (24-hour crisis hotline) ▪ (315) 265-2422

- • Renewal House (for victims of domestic violence)
  - ▪ SUNY Potsdam Campus Office: Van Housen Extension 390 (open Wednesdays, 9-5:00)
  - ▪ (315) 379-9845 (24-hour crisis hotline)
  - ▪ Renewalhouse_campus@Verizon.net

And please: if you see something, say something. If you see that someone that you care about is struggling, please encourage them to seek help. If they are unwilling to do so, Care Enough to Call has guidelines on whom to contact. Everyone has the responsibility of creating a college climate of compassion.