CS 4400 INTRODUCTION TO DATABASE SYSTEMS - FALL 2019 (V1)

INSTRUCTORS:

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LECTURE LOCATIONS AND TIMES:

Section B: Clough Commons Room 144   TR 1:30 – 2:45pm
Section A: Clough Commons Room 144   TR 3:00 – 4:15pm

HEAD TA:

Yujia Xie   yxie@gatech.edu

TEACHING ASSISTANTS:

Names, locations and office hour schedules coming soon to Canvas.

COURSE CONTENT:

We introduce the fundamental concepts necessary for the design and use of modern database systems in today's large-scale enterprise applications. We examine the concepts in the order that we typically encounter them in the actual database design process. We start with the problem of conceptually representing data that is to be stored in a database. From there, we see how the data in a conceptual data model can be converted to a database specific model (e.g., the relational data model). We also discuss various forms for relations that possess good properties. We see how to use the relational database language SQL to define the relations and to write SQL statements to insert, delete, retrieve and update the data. We also examine some of the fundamental storage structures that are used in relational database systems. We end the course with a discussion of some advanced topics in the database management area.

PREREQUISITES:

Basic programming skills. Knowledge of GUI programming is helpful.

TEXT, NOTES, RESOURCES:

- Required Text: Fundamentals of Database Systems, 7th (or 6th) edition, Elmasri & Navathe, Addison-Wesley, 2016.
- Chapter by Chapter Slides
- Database Design Methodology Notes
- Sample Quizzes

CLASS PROJECT:

Coming soon.

GRADING DETAILS:

- Exams (Exam 1 through 3): **48%** total (**16%** each)
- Projects (Phase I through III): **27%** total (**9%** each)
- Final Events (Project Phase IV **or** Final Exam - select one but not both): **15%** total
- Project Demonstration: **5%** total
- CATME Assessments (Initial Background Survey & 3 Post-Project Surveys): **5%** total
- There will also be In-Class Events and Mini-Quizzes. Though they don't officially count for points towards the overall grade, they will be assessed if you are close to a grade border to help determine if a grade increase is warranted.

Standard letter grade cutoffs apply (and final scores will NOT be rounded):
- **A**: 90% and above of the total course points
- **B**: 80% and above of the total course points
- **C**: 70% and above of the total course points
- **D**: 60% and above of the total course points
- **F**: less than 60% of the total course points

REGRADE REQUEST DEADLINE:

Once graded phases and/or quizzes are returned, there is a one-week deadline during which you can contest your grade. This clock starts not when you personally get your returned paper, but when the papers are returned (e.g. posted on Canvas) in general.

SLS AFFILIATION:

This course is part of Georgia Tech's Serve-Learn-Sustain (SLS) initiative, which provides students with opportunities to combine their academic and career interests with their desire to make worthwhile contributions to the world and build sustainable communities where people and nature thrive, in Georgia, the United States, and around the globe. More information about SLS can be found at www.serve-learn-sustain.gatech.edu. Visit the website to sign up for the SLS Email List, view the full list of affiliated courses and projects, and find links to Facebook, Instagram and Twitter.

TEAM PROJECT:

You will design and implement a database application using the MySQL relational database system available by the College of Computing. The Project must be done as a team of 4-5 students. You are allowed to form teams across the two sections of the class. It is important to understand that we expect the high quality that can come from a team working together, coordinating, and thoroughly testing their system. Good teamwork requires strong collaboration, and does not equate to simply dividing the work across the team and expecting a good result.

We will follow a typical database design methodology for the Project. Notes describing the methodology will be available. The Project will consist of 3 mandatory phases (deliverables/phases I through III) along with a final scheduled demonstration to one of the TAs. There will also be an optional phase (IV) of the project that teams can complete in lieu of the Final Exam. The Project Phases will be:

- Phase I: Develop an (Extended/Enhanced) Entity-Relationship Diagram (EERD) and Information Flow Diagram (IFD) based on the Problem Description
- Phase II: Develop a set of Relational Schema and (initial) Physical Schema based on an approved Entity Relation Diagram
- Phase III: Develop the Structured Query Language (SQL) views, queries and transactions needed to support an application
- Phase IV (optional): Develop a fully-functional version of the application that includes a Graphical User Interface (GUI)

All team members must be physically present and participate in the final demonstration (either Phase III or IV) of this semester-long project. Any team member not present will lose their demonstration points. The team members that are present will not be penalized for this issue. Also, if a member of the team does not carry his/her weight on the Project, then the team may drop that person from the team at the end of Phase I or Phase II only. The Course Instructor and Head TA must be notified of this request.

At the start of the demo, the team must tell the TA if this is to be judged as the Lightweight (Phase III) or Heavyweight (Phase IV) version of the Project. This decision cannot be changed once the demo begins. If a team does poorly while demonstrating the Heavyweight version, then they will NOT be allowed to change mid-demonstration to be judged as though it were the Lightweight version. If a team's Project was judged as the Heavyweight version, then it will count as Final Event component of each team member's final grade, and none of team members will be allowed to take the Final Exam. Be sure your team is in complete agreement over the choice to do the Heavyweight (Phase IV) version – doing a poor job will have a significant impact on each team member's overall grade.

TEAM PEER EVALUATION:

For each phase of the project, each team member will submit a peer evaluation of the other team members. This evaluation will be taken into account when determining the grade for each team member. If all team members do an equal amount of work, then each will receive the same grade for that phase of the project. On the other hand, if a team member does not do an equal share of the work, then that member's grade for that phase will be lowered. Completion of the evaluation survey itself is a course requirement and counts as 5 points per each phase of the Project.

PROJECT COLLABORATION:

Students within a project team obviously will collaborate closely with each other to work as a team for each phase of the project. No collaboration of any kind whatsoever is allowed outside the team except as noted here. Students are allowed to consult with the current TAs and Course Instructors. Students are expressly forbidden to collaborate across teams or to collaborate with others outside of the course. Any violation of this policy will be reported to the Dean of Students without exception.

PROFESSIONALISM:

I expect every student to behave in a professional manner befitting Georgia Tech. Your behavior matters, and poor behavior can result in severe consequences for you as a student. I expect you to be aware of and abide by Georgia Tech's Code of Conduct, which includes the Academic Code of Conduct. Lack of professionalism that specifically crosses over into areas of academic misconduct (or that results in significant violations of any aspect of the GT Code of Conduct) will likely be referred to the Dean of Students Office.

SCHEDULE:

- See Canvas for the Official Course Schedule

IMPORTANT EVENTS AND DATES:

- All dates are tentative, but you should mark these dates on your calendar now! Makeups are rarely granted.
- All Quizzes are closed notes, closed book, no cell phones, no calculators, etc.
- All Quizzes and Exams must be taken in your officially registered Oscar section.

PROJECT DEMO DATES:

- All team members must be present for the final demo of the semester-long project
- Team members who are not present will not receive points for the demonstration component of the project
- The team members that are present will not be penalized for this issue

LECTURES/READINGS:

Topics	Chapters		
	7th Edition	6th Edition	5th Edition
Basic Concepts - Data Independence, 3-level Database Architecture, Database System Components	1, 2	1, 2	1, 2
Conceptual Database-level Entity-Relationship Modeling	3, 4	7, 8	3, 4
DBMS Design Methodology	notes	notes	notes
Relational Data Model, Algebra and Calculus	5, 8	3, 6	5, 6
Structured Query Language (SQL)	6, 7	4, 5	8
Mapping from ER Model to Relational Model	9	9	7
Relational Database Design - Normal Forms, Functional Dependencies	14, 15	15, 16	10, 11
Internal Database-level Storage Structures	16, 17	17, 18	13, 14