CPSC 4620/6620 (Section 1): Database Management Systems

Term: Spring 2021
Instructor: James (Zijun) Wang, Professor
School of Computing
125 McAdams Hall, Clemson University
Phone: (864) 656-7678, Fax: (864) 656-0145
Email: jzwang@clemson.edu

Objectives and Learning Outcomes:
1. Students shall understand conceptual modeling concepts and be able to use ER Model to design database applications.
2. Students shall be familiar with relational data models and be able to design relational database schemas from ER diagrams.
3. Students shall be able to use an industry standard query language (SQL) to query the relational databases.
4. Students shall understand the basic concepts of query optimization and learn simple query optimization techniques.
5. Students shall gain experience in designing and implementing web-based database systems.
6. Students shall improve oral and written communication skills through written and oral presentation of their projects.


Prerequisite: CpSc 3220 or CpSc 3600.

Instruction Approach:
The problem-based instruction approach, TEXNH, will be used in this course. Students are expected to learn database concepts through a semester-long multimedia database project. Specifically, students will be required to implement an online multimedia database system, MeTube, which is essentially a modified version of the popular YouTube system (http://www.youtube.com), while learning database theories and technologies. Web technologies necessary for implementing the project will also been studied.

Content (tentative, may change during the semester):
1. Database Design Specification (1 hour): Learning database concepts; discussing the database architecture and design considerations.
2. Conceptual model and ER diagram (2 hours): Discussing ER Model; introducing EER diagram; studying how to use ER model to design a database system.
3. Relational data model and database schema (2 hours): Learning the relational data model and studying how to convert ER model to relational database schema.
4. Database normalization (2 hours): Introducing the functional dependency concepts; discussing the normal forms of relations, and the techniques used to perform the database normalization and the associated performance tradeoffs.
5. SQL language through MySQL (3 hours): Studying SQL language using MySQL DBMS system; learning how to install and manage the MySQL database; writing SQL queries for retrieving information from the database.
6. Index, key, and other constraints (2 hours): Discussing the concepts of indexing, key constraints, and integrity of the database.
7. Query Optimization (2 hours): Introducing the query processing and query optimization techniques. We will discuss how a DBMS system processes queries and introduce the options for query
optimization. Normalization will also be revisited with the emphasis on the performance tradeoffs associated to normalization.

8. **Web server, HTTP, HTML, PHP (4 hours):** Discussing web server, HTTP protocols, HTML scripts and PHP programming.

9. **HTTP form, script design and Multimedia presentation (3 hours):** Studying web form design and JavaScript. Discussing how to present multimedia data on the web page.

10. **View, Triggers, and Stored Procedure (3 hours):** Discussing the concepts of views, triggers and stored procedures; introducing transaction processing; studying the techniques for maintaining the data consistency.

11. **Performance Evaluation and System Improvement (3 hours):** Introducing the test case design, performance evaluation methods, and system improvement techniques.

**Class Hours/Room:** 8:00AM - 9:15AM, Tuesday and Thursday Online via Zoom

**Office Hours/Room:** 8:00AM – 9:00AM Wednesday or by appointment Online via Zoom

**Final Exam:** Friday, April 30, 7:00PM - 9:30PM Online

**Attendance Policy:**
- It is very important to attend the online class since the lecture content may come from sources other than the textbook.
- Failure to attend the class most likely leads to missing some information not in lecture notes or textbook. Such information is important for project and tests.
- The students can leave if the instructor does not show up online 15 minutes after the scheduled class starting time.
- Any exam that was scheduled at the time of a class cancellation due to inclement weather, University power outage, etc. will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless the instructor contacts students. Any extension or postponement of assignments or exams must be granted by the instructor via email or Canvas within 24 hours of the weather-related cancellation.

**Evaluation:**
- **Project (40%):** Implement an online multimedia database system.
- **Quizzes (20%):** Up to ten quizzes will be given throughout the semester.
- **Midterm Exam (20%):** Cover the content studied in first half of the semester.
- **Final Exam (20%):** A comprehensive exam on content studied in the entire semester.
- **CpSc 6620 Students:** More requirements on project.

**Project Policy:**
- The project should be done by a team of three students (two-student team may be allowed).
- Each team must finish their project independently. Any form of cheating (including copying or reusing code from any source) will result in 0 (zero) point for the project.
- Students must submit their project deliverables at the specified due dates. Late submission will not be accepted without the instructor’s approval.

**Grading:** A (90 - 100), B (80 - 89), C (70 - 79), D (60 - 69), F (0 - 59). (The scale may be curved down at the end of the semester if needed)

**Q&A:** Email questions to jzwang@clemson.edu with subject "CPSC 4620/6620 Q&A".

**Website:** [http://www.cs.clemson.edu/~jzwang/21014620/cpsc4620.htm](http://www.cs.clemson.edu/~jzwang/21014620/cpsc4620.htm)
References:
5. PHP official website: http://www.php.net/
7. PHP, MySQL, HTML Tutorials: http://www.w3schools.com/

Academic Integrity:
“As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”

“When, in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member shall make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean for Curriculum in the Office of Undergraduate Studies. At the same time, the faculty member may, but is not required to, inform each involved student privately of the nature of the alleged charge.”

http://www.clemson.edu/academics/academic-integrity/

Accessibility Statement:
Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged - drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

Title IX (Sexual Harassment) Statement:
Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 110 Holtzendorff Hall, 656-3184 (voice) or 656-0899 (TDD).