COURSE SYLLABUS

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YEAR COURSE OFFERED: 2021
SEMESTER COURSE OFFERED: Fall
DEPARTMENT: Computer Science
COURSE NUMBER: COSC3380
NAME OF COURSE: Database Systems
NAME OF INSTRUCTOR: Carlos Ordonez
TEACHING MODE: Face to face (one lecture per week, probably 2)
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The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.
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Learning Objectives

Students will gain a basic understanding on the theory and internal systems aspects to design, update and query a relational database, managed by a DBMS. From a theory perspective, there will be an introduction to first order logic, set theory, relational algebra, functional dependencies and normalization. From a programming perspective, students will learn how to design a database with ER, create tables, indexes, schemas, as well as developing queries and transactions in SQL. The course will give an overview of the main subsystems of a DBMS, including the file system, storage manager, locking manager, transaction scheduler, query optimizer and recovery manager.

Major Assignments and Exam

This is a course that gives more weight to programming homeworks. Grading is as follows:

- 70%: 4 programming assignments. HW0 (diagnostic, basic Unix and SQL), HW1 (queries, individual) is 20%, HW2 (normalization, individual) 20% and HW3 (transactions+queries, web app, team of 2 students) has 30% weight. HW0: getting familiarized with Unix/DBMS programming environment. HW1: SQL queries. HW2: functional dependencies & normalization; HW3: designing an ER database model, developing SQL transactions, defining SQL queries, and creating a web application program with JavaScript or Python, sending SQL statements to a DBMS and retrieving results. HW 3 will be delivered in 2 phases and then carefully tested by TAs. Phase 1 will be a basic pass/fail test and receive a preliminary score and it is a requirement to submit
Phase 2: Phase 2 will not be accepted without Phase 1 submitted. A score will be assigned based on 10 test cases of varying difficulty and checking source code originality and quality. In HW3 there will be an opportunity for resubmission with 10%-20% penalty depending on the number and importance of source code fixes.

- 30%: midterm exam. If classes are face to face the exam will be in-class, closed-book. Otherwise, if the course switches to online mode exam would be open-everything and the weight would be 20%. The exam has 10 questions, short answer. The weight of the midterm may be decreased at the end of the course, if convenient for most students.
- Bonus points: Up to 5 points out of 100 (i.e. up to 5%), towards final grade, based on participation (in-class, answering theory and system programming questions).

**Required Reading**

This is the textbook used in the course:


**List of lecture topics**

1. Review of set theory and first order logic
2. Relational model: domains, tuples, arity, cardinality
3. Relational algebra and SQL
4. Functional dependencies
5. Normalization up to 3NF and BCNF
6. Database design and software engineering: ER model, flows
7. DBMS subsystems
8. Storage, Indexing, transaction/locking manager, query optimizer
9. Transaction processing: ACID, locking, timestamping, MVCC
10. Query processing: SPJA queries, derived tables/view, optimization, cost
11. Advanced (if there is time): MVDs, 5NF, UDFs, pivoting, recursive queries, security.
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Face Covering Policy

To reduce the spread of COVID-19, the University strongly encourages everyone (vaccinated or not) to wear face coverings indoors on campus including classrooms for both faculty and students.

Presence in Class

Your presence in class each session means that you:

- Are NOT exhibiting any Coronavirus Symptoms that makes you think that you may have COVID-19
- Have NOT tested positive or been diagnosed for COVID-19
- Have NOT knowingly been exposed to someone with COVID-19 or suspected/presumed COVID-19

If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see Student Protocols for what to do if you experience symptoms and Potential Exposure to Coronavirus for what to do if you have potentially been exposed to COVID-19. Consult the (select: Undergraduate Excused Absence Policy or Graduate Excused Absence Policy) for information regarding excused absences due to medical reasons.

COVID-19 Information

Students are encouraged to visit the University’s COVID-19 website for important information including on-campus testing, vaccines, diagnosis and symptom protocols, campus cleaning and safety practices, report forms, and positive cases on campus. Please check the website throughout the semester for updates.

Vaccinations

Data suggests that vaccination remains the best intervention for reliable protection against COVID-19. Students are asked to familiarize themselves with pertinent vaccine information, consult with their health care provider. The University strongly encourages all students, faculty and staff to be vaccinated.
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Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for disabled students. In accordance with Section 504 and ADA guidelines, UH strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact the Justin Dart Jr. Student Accessibility Center (formerly the Justin Dart, Jr. Center for Students with DisABILITIES).

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Justin Dart, Jr. Student Accessibility Center. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor’s recordings for their own studying and notetaking. Instructor’s recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.
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Syllabus Changes

Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through (specify how students will be notified of changes).