### **Fall 2018 - Syllabus ECE 464: Databases**

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### **Overview**

“Engineering and design of databases. Topics to be covered may include: data models, database and scheme design; schema normalization and integrity constraints; query processing and optimization; distributed and parallel databases; SQL and XML.”

This course is designed to introduce students to the foundations of database systems, focusing on basics such as the relational algebra and data model, query optimization, query processing, and transactions. This is not a course solely on database design or SQL programming - though we will discuss these issues briefly.

### **Lectures**

Lectures are held once a week, Tuesday 1800-2100. Attendance is not mandatory, but I strongly advise all students to attend every lecture. Lack of attendance will degrade performance in the class and more importantly degrade knowledge of databases.

I will not hold official office hours but I will be available for extra questions after lectures should the need arise. Students may reach me via email at any time and I will try my best to reply within 24 hours.

### **Prerequisites**

Students should have taken ECE 264 - Data Structures and Algorithms 1. A background in software development and general knowledge of programming languages is assumed and will be further explored in this course. My preferred programming language is Python.

### **Text**

The course readings will primarily be drawn from the 3rd Edition of "[Database Management Systems](http://www.cs.wisc.edu/~dbbook/)" from Ramakrishnan and Gehrke - http://pages.cs.wisc.edu/~dbbook/

In addition, the 4th Edition of “Readings in Database Systems'', edited by Stonebraker and Hellerstein.

### **Grading**

The breakdown is as follows:

* Final Project: 40%
* Final Exam: 30%
* Problem Sets: 20%
* Academic Paper Mini Quizzes: 10%

Tardiness of assignments will incur an appropriate deduction. Grading is to be followed by Cooper Union’s policy.

### **Outline**

A general weekly outline is described below, however it is subject to change.

Week 1: Intro and Overview of Database Concepts

* R&G Chapter 1

Week 2: Intro to Database Design (and Applications)

* R&G Chapters 2 and 3

Week 3: The Relational Data Model

* R&G Chapter 3 and 4

Week 4: SQL

* R&G Chapter 5
* Problem Set 1 assigned

Week 5: The Access Layer: ORMs and Programming with Databases

* Discussion about final projects

Week 6: Transactions and Concurrency Control

* R&G Chapters 16, 17

Week 7: Physical Database Design

* R&D Chapter 20
* Problem Set 1 collected

Week 8: Intro to NoSQL

* Problem Set 2 assigned

Week 9: Indexing and Query Evaluation

* R&G Chapters 8, 12
* Final project proposal due

Week 10: A Practical Look at MySQL (behind the scenes)

* Chapters 9, 10, 11

Week 11: A Practical Look at NoSQL, Behind the Scenes NoSQL

* Problem Set 2 collected

Week 12: Big Data in Databases

Week 13: Open Topic/Guest Lecture

Final Exam: Dec 11?

Final Project Presentations: Dec 18?

### **Collaboration Policy**

For problem sets and paper readings, students are allowed to discuss answers with other students, but must write up their own answers and list collaborators. Simply copying solutions from other students is never allowed. For the group project students will work in teams and hand in only one written report. Note that I will know if students are copying or cheating.