Course Syllabus
CS432 (01): Database Systems
Fall 2016

Instructor and Teaching Assistant

Instructor: Weiyi Meng
Office: P08, Engineering Building
Lecture hours: 1:10pm – 2:10pm (MWF)
Lecture classroom: SW 202, Student Services Wing
Office hours: 4:45pm – 5:45pm on Monday & Wednesday, or by appointment
Email: meng@binghamton.edu
Webpage: http://www.cs.binghamton.edu/~meng/meng.html

Teaching assistant: Nivedita Patil
Office: G25, Engineering Building
Office hours: 10:15am – 11:15am, Tuesday & Thursday, or by appointment
Email: npatil6@binghamton.edu

Course Description

Association between data elements and data models; entity-relationship, relational, and object-oriented. Relational database design techniques. Formal and commercial query languages. Introduction to query processing, transaction management, and concurrency control.

Prerequisite

CS432 assumes students have mastered:

1. Java
2. Basic data structures such as hash tables, search trees.
3. Basic algorithm complexity analysis such as big O.

Course Objectives

This course is designed to provide a solid foundation and background in database systems. In particular, upon successful completion of this course, you will be able to:

- Demonstrate an understanding of the relational data model and the entity-relationship model.
- Demonstrate an understanding of the database design process and theory as well as the ability to perform database design. This process includes conceptual design (E-R diagram), logical design based on the relational model, table normalization, and internal design.
- Demonstrate an understanding of basic relational database operations and the ability to use SQL at expert level.
- Demonstrate the ability to develop application programs on top of database systems.
- Demonstrate an understanding of the key components of DBMS, including query processing and optimization, transaction management and recovery, concurrency control.

Textbook

No textbook is required but the following book will be used as the primary reference book:

- Database Systems by M. Kifer, A. Bernstein, and P. M. Lewis, second edition

The instruction will be primarily based on the instructor's Lecture Notes, which can be downloaded from your course account on blackboard.

Reference Books

- Fundamentals of Database Systems (6th edition), by R. Elmasri, and S. Navathe
- Oracle10g Programming – A Primer by R. underraman
- Database Systems: An Application-Oriented Approach (2nd edition) by M. Kifer, A. Bernstein, P. Lewis
- Principles of Database and Knowledge-base Systems (Volume I and II), J. Ullman
- Database System Concepts, H. Korth and A. Silberschatz
- Database: Principles, Programming, Performance, O'Neil and O'Neil
- A First Course in Database Systems, Ullman and Widom

Main Topics

The topics are arranged according to the lecture notes, not according to the textbook.

- Chapter 1: Introduction
- Chapter 2: ER Model
- Chapter 3: Relational Model
- Chapter 4: Transform ER Schema to Relational Schema
- Chapter 5: Table Normalization
- Chapter 6: Relational Algebra
- Chapter 7: SQL
- Chapter 8: PL/SQL
- Chapter 9: ORDB
- Chapter 10: Index Structures and Index Creation
- Chapter 11: Query Processing
- Chapter 12: Transaction Management
- Chapter 13: Concurrent Control

Lecture Notes

Lecture Notes for each chapter, in Powerpoint format, will be posted on blackboard before lectures. I recommend that you print lecture notes beforehand and bring them to class so you can take notes easily. *Lecture notes do not substitute for class attendance*, since (i) they will not be complete and (ii) significant parts of lectures, including discussions and in-class exercises, may not come from the class notes.

Grading

1. Your grade will be based on

• Six homework assignments	24% (4% each)
• Two projects	31% (12% for Project 1 and 19% for Project 2)
• Midterm exam	15% (in 7th week)
• Final exam	30%

2. <u>Exams.</u> Exams will be in class, closed notes, and closed book, unless otherwise specified (unlikely). The Final Exam will primarily cover the materials that were not covered in the Midterm Exam. However, for the Final Exam, even if we do not explicitly test the materials covered by the Midterm Exam, we expect that you can recall and utilize the most fundamental and important information introduced in earlier chapters.

You must take each Exam during the one time that we give it; we will not give makeup Exams.

3. Assignments

- Much of what one learns in this course comes from solving problems.
- Start working on each assignment early.
- Most questions require both knowledge of the material and problem solving ability.
- If you don't know how to solve a problem, don't give up.
- Make sure that you understand the questions.
- See if you can solve a problem for some simple cases, and then try to find a general solution.
- Try again on the next day.

Be clear and neat in your write-ups. Readability of the programs and solutions is as necessary as correctness. Expect to lose points if you provide a badly written and unclear "correct" solution.

Late assignments may sometimes be accepted with penalty, which will typically be 5% per day late. We will not accept assignments more than 3 days after the due date.

4. Programs and the project. Please make an effort to make your programs easy to understand and grade. Grading all assignments in this course is very time consuming! All programming assignments should have:

   1. For the program:
      - A general explanation of the design, and why it is correct.
      - The classes used and their interaction.
      - The code should also be well commented.

   2. For each class in your program
      - An explanation of the purpose of the class, and the methods it includes.

   3. For each method (function)
      - A description of the purpose of each function and an explanation of how it works.
      - A description of the purpose, and the assumptions made about each parameter of a function.
      - A comment for every variable declaration.

Programs must be written in Java. Make sure a program compiles and runs correctly.

Please make every effort to program and debug your code on your own. Use Google to learn about compiler and runtime error messages. Please begin your assignments early and expect to encounter challenges.

A demo is required for Project 2. Demo schedule, requirement and preparation will be announced on blackboard.

5. Grading disputes, regrading and missing grades.

In this course, we commonly give partial credit to partially correct answers. Should you dispute a partial credit, please be aware that we will not re-grade a single question in an assignment or an exam. ALL partial credits of the work will be re-examined. The new grade may be higher, lower, or stay the same. This new grade will not be changed.

No regrading can be requested two weeks after the date when graded work is returned to students.
Your grades will be posted on Blackboard. Please check your status on blackboard periodically and make sure that there are no missing grades or errors. A missing grade at the end of the semester will indicate that the work has NOT been done.

Academic Honesty Expectations

Please review the academic honesty document and make sure that you understand it! The link is at: http://www.binghamton.edu/watson/about/honesty-policy.pdf. Cheating and copying will NOT be tolerated.

- Each programming or theoretical assignment should start with the following statement:

"I have done this assignment completely on my own. I have not copied it, nor have I given my solution to anyone else. I understand that if I am involved in plagiarism or cheating I will have to sign an official form that I have cheated and that this form will be stored in my official university record. I also understand that I will receive a grade of **0** for the involved assignment for my first offense and that I will receive a grade of **"F" for the course** for any additional offense."

- Each exam and quiz will have a first page with the following statement:

"I understand that if I am caught copying or talking during the exam, I will have to sign an official form that I have cheated and that this form will be stored in my official university record. I also understand that I will receive a grade of 0 for the involved exam."

Your homework assignment or exam will not be graded unless the statement above is followed by your signature.

Collaboration on Assignments

Students are encouraged to help one another and to form study groups. In Computer Science, you can learn more from your peers than from your instructors and teaching assistants. As long as the help is appropriate, please be generous with your time and expertise when helping fellow students. Doing so is good for you and good for them. You are free to discuss assignments *in general terms* with one another. However, please do not show your work directly to other students. Each student must complete your assignments *individually* (unless indicated otherwise by the instructor). Each of you must write your own code, and you must write up all solutions individually. Students submitting solutions (including code) that are determined to be "too similar" are likely to be punished equally and harshly. We can tell whether you have done the work on your own, so please do the work on your own.

Managing Stress

If you are experiencing undue personal or academic stress at any time during the semester or need to talk with someone about a personal problem or situation, I encourage you to seek support as soon as possible. I am available to talk with you about stresses related to your work in my class. Additionally, a wide range of campus resources is available to provide help, including:

- Dean of Students Office: 607-777-2804
- University Counseling Center: 607-777-2772
- Interpersonal Violence Prevention: 607-777-3062
- Office of International Student & Scholar Services:607-777-2510

Class and Labs Attendance

Attendance is required and attendance will be checked regularly. If you are not present when attendance was checked it will be counted as missing the class. You may miss a total of three classes without a verifiable valid excuse. After that your final grade will be reduced by 2 points for each missing class. If you miss six or more additional (beyond three) classes you automatically fail the class. Please inform the instructor ahead of time by email for any expected or excused absence.

Computers and Other Electronic Devices

You are not allowed to use your laptop/notebook/tablet computers during class unless explicitly permitted. Cell phones must be turned off or in vibrate alert mode during class.