CSCI 6622 — Databases — 13 Fall

Course Objectives

By the end of this course you should know:

- the basic terminology of relational databases.

- how to design an Entity Relationship Schema and relate this to a relational DBMS.

- how to design and create a relational database.

- how to write SQL code to query the database.

- normalization and schema refinement.

- the basics of database security.

Instructor contact information

Barun Chandra, 932-7089, Buckman 244, bcdefend-1@yahoo.com This is the email address you should use for this course and for any questions you might have for me as graduate coordinator. If you need to send me an "official email" which might need to be forwarded to other faculty or staff at UNH or need to give my email address to a prospective employer etc, please use my official UNH email address: bchandra@newhaven.edu

Office Hours

To be announced.

Prerequisites

Knowledge of a programming language.

Books

Text book: Fundamentals of Database Systems, Elmasri & Navathe, Sixth Edition, Benjamin/Cummings. The library has two copies of the 5th edition on reserve (one on closed reserve and one on one week reserve) and some copies of earlier editions which can checked out.
Reference book: Database Management Systems, Ramakrishnan & Gehrke, Third Edition, McGraw Hill. The library has one copy of the current 3rd edition on reserve. The library also copies of the earlier 2nd edition which can be checked out.
Reference book: Database System Concepts, Silberschatz, Korth & Sudarshan, Fifth Edition, McGraw Hill. The library has one copy on reserve.
Reference book: Concepts of Database Management, Fifth Edition, Philip J. Pratt, Joseph J. Adamski, Thomson Course Technology, ISBN: 0-619-21529-1. The library has a copy of this book on closed reserve.
Reference book: Database Systems, C.J.Date. On one week reserve. An earlier edition can be checked out.
Reference book: Database Systems, O'Neil. (There is a 2nd edition of this book, but the one in the library is the first edition). On one week reserve and also available for check out.
Reference book: A First Course in Database Systems, Ullman and Widom. On one week reserve.
The library also has numerous other books on databases which can be checked out.

Course Requirements

3 assignments (which will also include some SQL programming), 3 quizzes, course project (in which you will design, create a and implement a database and write queries on it), final. There will be no midterm. The quizzes and the final will be open book, open notes. The quizzes will be about 45 minutes in length.

Programming Requirement

There is no required programming for the course. Some of the extra credit problems will be programming problems, which you are free to do in C, C++, Java or in any other programming language.

Course Project

The project will be assigned halfway through the trimester and will be due towards the end of the trimester.

Grades

Homeworks(25%), project(15%), quizzes(25%), final(35%).

Extra Credit Problems

I will assign a number of extra credit problems; you should turn these in the week of the final. Unlike the required problems, you will get no partial credit for an extra credit problem i.e. either it is completely correct or it is wrong, so there is no point in handing in a weak or incomplete submission. In terms of your course grade, the extra credit problems have a fairly small impact: I only look at how many extra credit problems you have done if you are right on the borderline of two grades, and if you have done some your grade can go up. Hence the required problems should get a much higher priority then the extra credit problems. There will be quite a lot of extra credit problems, so you should pick only those which look interesting to you.

To get an A+ grade

In order to get a grade of A+, in addition to getting an excellent score on all the required work you must do 3 extra credit problems, or do a presentation and do a nice job of that.

Late and Incomplete Policy

All work is due at the beginning of class on the due date. The rule for late assignments is as follows:

- Assignments handed up to a week late: late penalty of 10%.

- Assignments handed more than a week but less than two weeks late: late penalty of 50%.

- Assignments handed more than two weeks late will not be accepted.

If you have completed some problems and not others by the due date, please turn in the problems you have finished. You will not be assessed the late penalty on the problems you turn in on time. No Incompletes will be given for the course. These policies will be strictly enforced.

A Friendly Reminder about Plagiarism

Sharing ideas about assignments is acceptable, even encouraged. The writing of the assignments or programs, however, should be strictly an individual affair. The following will all be considered as cases of plagiarism: 1. One student does the work and another copies the work. 2. Two students write an assignment together. 3. A student gets some material from a book or the internet and does not say where it came from. 4. A student turns in a program and output, and the output is not from that program. If you have any questions about what is an acceptable level of collaboration, please ask me. Any case of plagiarism will result in *failing the course for any student who is involved in it.*
Some of you may be coming from institutions where plagiarism is not taken seriously. It is taken seriously at UNH, and certainly taken seriously by me. I enforce the plagiarism policy strictly. If you are ever thinking about cheating, please keep one thing in mind: in the past, in classes I have taught, more people have recieved a failing grade because of plagiarism than for any other reason.

Appropriate and professional behavior in class

- Cell phones: either switch off your cell or put it on silent mode, and if you need to answer a call, please leave the classroom.

- Don't text or read email or surf the web during class.

- Please try to be on time; students who are regulary late for class disturb their fellow students and leave a strongly negative impression on the instructor.

Powerpoint presentations

The lectures will use powerpoint presentations. I will email you the presentation before the lecture. So the first thing I need from you is your email address: please send me an email saying which course you are taking so I will find out your email address.

Blackboard

The powerpoint lectures will also be put on blackboard; you should familiarize yourself with blackboard.

Yahoo email/Gmail address

I will also be emailing you Microsoft Access database (.mdb) files. Many email systems (eg: newhaven.edu, many employer based email addresses) will not accept .mdb files for security reasons. In addition to your regular email address, you also need to let me know of an email address which will accept .mdb files. If you don't have a yahoo email/gmail address, I suggest you get one for the purposes of this course. Alternatively, I will also put these databases on blackboard, so you can download these from there.

Getting Microsoft Access

You can get a free copy of Microsoft Office, which includes Microsoft Access. You need to go to Information Services: the office is located on the Main floor in Echlin, right next to the UNH Id office. Once there, you show them your UNH Id and pick up the software.

Homework Guidelines.

Paper and pencil problems guidelines

For the non-programming ("paper and pencil") problems, you have to submit hard (paper) copies - **email submissions will not be accepted**.

You will loose points if you don't follow these guidelines:

- All work is to be done using a word processor i.e. your homework should not be handwritten. The exception to this is if there are complex formulae or complex figures; it is OK to do these by hand.

- All work has to be submitted in the correct order (i.e. problem 1 before problem 2 before problem 3 ...) and should be neatly stapled.

- You don't need to copy the question on your answer sheet; you only have to write the answer.

- Please read the question carefully and answer only what is being asked for, no more and no less. As an example, supposed you are asked to give a brief answer as to the difference between a stack and a queue. What your answer should say is that a stack is LIFO and a queue is FIFO. Here are some examples of what **you should not do:**

    - Start quoting from the textbook as to what stacks are and what queues are.
    - Start explaining why stacks are useful and where they are used.
    - Give a long explanation as to why data structures are wonderful.

    If you do any of the above, and include a lot of material which is not directly relevant to what the question is asking, you will loose points.

- When a question asks for an answer and says "no explanation neccessary," if you need to do some calculations etc, do them on a separate sheet of paper. For example, if I tell you that a queue has the elements $5, 3, 8, 2, 6$, and I ask you to tell me what will be the third element dequeued (no explanation neccessary), all I expect to see on your answer sheet is 8, *and nothing else.*

- If you are getting information from a book or a web site (see the policy on plagiarism) you should attribute it, understand what is written, and then write the answer in **your own words.**

SQL problems guidelines

For the SQL problems in both the homeworks and the project, you have to read the guidelines carefully; these will be given as part of the HW.

Buying CD-ROMs

You will need to buy at least 3 CD-ROMs; one for HW1, one for HW2, one for the course project. The library sometimes sells CD-ROMs.

Optional Presentations

What is this

If you choose to do this, you select a topic and give about a 20 minute talk about this topic to the class, near the end of the trimester. The idea is that you can learn more about a topic which interests you and then teach the rest of the class what you have learnt. You don't have to write a project report, but you do have to me a hard copy of your presentation and a disk/CD-ROM containing your powerpoint presentation.

Team or individual

You can either do this individually or in a team of two. If you do it in teams, both members of the team have to make the presentation i.e. each team member should do about half the presentation. Both team members will receive the same grade. I would strongly encourage you to do the presentation in a team. As an incentive to doing this, I will grade a team presentation using the same standard as used with a solo presentation.

What you need to do

If you do decide to do a presentation, please email me your topic anytime before week 8: you need to let me know whether you are doing this by yourself or in a team, and provide me with a title.

Preparing a good presentation takes a long time, and I want you to think through clearly whether or not you will have the time to do it. Once you commit to doing a presentation, I expect you to follow through and do it, and to do a good job. Please do not tell me that you are going to do a presentation till you are absolutely sure that you are going to do it, and that you will put in the time and effort to do a good job. If you tell me you are doing a presentation, and then either back out at the last minute or do a weak job on the presentation, I am going to get a strongly negative impression of you.

If you want to re-use a part of a presentation which you did in another class, you need to come and meet me and we can discuss the situation. Unless you tell me otherwise, my expectation is that that you are creating a brand new presentation for this course.

How will this affect your grade

If you choose to do this, and *if you do a good job of this (with a score of 16/20 or better)*, the presentation score will replace both your weakest homework score and your weakest quiz score. If your presentation score is less than 16/20, it will not help your course grade. This means that it is only worth your while to do a presentation if you are going to put in enought time and effort into researching the topic to be able to put together an interesting and informative talk.

What your presentation SHOULD NOT BE is a collection of text/bullet points which you have got from the web site or a book, but of which you have only a hazy understanding. Not only will this not help your grade, but *if I find that your presentation has been taken from the web or a book without attribution, this will be considered a case of plagiarism, and you will get a "F" for the course.*

How I will grade it

Your presentation grade will be based on the mastery you display over the topic, how well the presentation is delivered, and how much the other students learn from it.

Possible Topics

The topic is up to you, but obviously has to have some connection to this class; however, I will allow a good deal of leeway in the sense that it can be about something which we don't cover at all in this class but which is connected to databases. Also, the topic should be something which is not going to be covered in the class.

You are also welcome to look through the textbook at topics we are not covering and pick your topic from that.

Here are some suggested topics, though you are free to choose outside this list:

ORACLE architecture, SQL server architecture, ORACLE security, SQL server security, SQL injections, data warehousing, data mining, web connectivity for databases, multimedia databases, GIS, biological databases, object oriented databases, distributed databases, deductive databases, indexing, file organizations, query evaluation, parallel query evaluation, query optimization, external sorting, concurrency control through locking, database crash recovery.

<div align="center">**Tentative Syllabus**</div>

This is tentatively the list of topics which I plan on covering.

Week 1 Chapter 1: Introduction. Chapter 3: Relational Model.

Week 2 Chapter 3: Relational Model, Chapter 4: SQL DDL

Week 3 Chapter 4: SQL DDL. Chapter 5: SQL DML, QBE

Week 4 Chapter 5: SQL DML, QBE

Week 5 Chapter 5: SQL DML

Week 6 Chapter 5: SQL DML, Views. Chapter 7: ER Model.

Week 7 Chapter 7: ER Model.

Week 8 Chapter 9: ER to Relational mapping.

Week 9 Chapter 15: Schema Refinement and Normal Forms: 2NF, BCNF.

Week 10 5.2, 26.1: Constraints, Assertions, Triggers. 24.1, 24.2: Security: Discretionary Access control.

Week 11 24.3: Security: Mandatory Access control. 5.3: More on views. Chapter 13: SQL programming.

Week 12 Student Presentations. Time permitting, we will also briefly discuss some other topics like 15.6: 4NF, Chapter 17: Indexing or Chapter 21: Transactions, Concurrency and Recovery.

Week 13 Final.

<div align="center">**Tentative Homework and Quiz Schedule**</div>

- Homework 1 - handed out on week 2, due on week 4, covers material from weeks 1, 2, 3.

- Quiz 1 - on week 5, covers same material as HW 1.

- Homework 2 - handed out on week 5, due on week 7, covers material from weeks 4,5,6.

- Quiz 2 - on week 8, covers same material as HW 2.

- Homework 3 - handed out on week 8, due on week 10, covers material from weeks 7,8,9.

- Quiz 3 - on week 11, covers same material as HW 3.

- Project - handed out on week 6, due on week 12.

- Extra Credit Problems - due on week 13.

- Final - week 13.