

New York University Polytechnic School of Engineering
Computer Science and Engineering Department
Course Outline

CS-UY 3083 Introduction to Database Systems

Fall 2017

Professor Frankl

Mon & Wed Mon, Wed 4.30 PM - 5.50 PM at 370J 202

To contact professor: [mailto: pfrankl@nyu.edu](mailto:pfrankl@nyu.edu)

2 Metrotech Center, Room 10.006

Phone: 646-997-3870

Office hours: Thurs 2:30 to 3:30; other times by appointment. To make an appointment, send e-mail, including a few times when you're available. **Remember to include your name. Please put "CS 3083" in the subject line.** Or, just drop by my office; if I'm free I'll meet with you on the spot.

TAs: Office hours to be determined

office hours at the big round table; see announcements re times

Course Pre-requisites : CS 2134 (Data Structures and Algorithms), C- or better. MA 2314 (Discrete math).

Course Description This course introduces database systems and their approach as a mechanism to model the real world. The course covers data models (relational, entity-relationship), database design, query languages, as well as database management system issues including indexing, query processing algorithms, and transaction management techniques

Course Objectives :

1. Gain understanding of data modeling techniques and ability to design relational databases
2. Learn to use SQL to create database tables, modify their contents, and execute queries.
3. Develop ability to design and implement a moderately complex web-based database application program.
4. Understand how database management systems work, including indexing techniques, query processing algorithms, and transaction management techniques.

Course Structure

Most of the material will be presented in lectures. Reading assignments from the text book and weekly or bi-weekly homework assignments will reinforce this material. Students will be required to learn to use a database management system and to write web application code through self-study; pointers to resources and some basic instruction for this will be provided. *Lecture notes, homework assignments, and announcements will be posted on NYU-Classes. Please check frequently for updates.*

Readings

The recommended text for the course is:

Database System Concepts

Sixth Edition

Avi Silberschatz, Henry F. Korth , S. Sudarshan

McGraw-Hill

ISBN 0-07-352332-1

<http://www.db-book.com/>

Copies are on reserve in the library.

Course requirements

Tests: There will two midterm exams and a final exam.

Course project: A programming project involving design and implementation of a web database application. This will require substantial effort. The project will include design, implementation, and testing of application code for business logic and user interface. Implementation in Python, PHP, C#, or Java with MySQL, Oracle, or SQLServer. (Other host languages or DBMS may be allowed, but please check with me first.)

You will be responsible for mastering enough SQL, HTML, and Python/Flask (or other acceptable host language) to allow you to do this project. An overview of PHP or of Python Web/Database modules will be presented in lectures, but self-study will also be expected. You may do the project alone or with a partner.

The assignment will be done in three or four parts through the semester and will be based on specifications provided. In some cases you will use solutions provided for earlier parts as the basis for later parts.

Homework assignments will reinforce the material covered in the lectures and in the text book. Some will be "paper and pencil" exercises and some will involve programming in SQL. Although these count directly for only a small percentage of your grade, it is essential that you do them and understand the solutions. You may work with classmates (groups of up to 5 people) on the homework assignments, unless otherwise noted, but be sure that you understand all the material. *It is unlikely that you will do well on the exams and the project if you do not understand how to solve problems like the homework exercises. Many of the exam questions will be based concepts from the homework assignments.*

Grading: Your grade will be based primarily on your scores on the exams and the course project.

Grades will be computed roughly as follows:

- Exam grade = weighted average of three exams with weights 0.40, 0.35, 0.25 for your best, middle, and worst exams, respectively.
- Final score = $\max((0.25 \cdot \text{project} + 0.65 \cdot (\text{exam grade}) + 0.10 \cdot \text{homework}, 0.05 \cdot (\text{attendance}) + 0.25 \cdot \text{project} + 0.60 \cdot (\text{exam grade}) + 0.10 \cdot \text{homework})$

I may tweak the formula a little, for example, by slightly changing the weights.

Policy on Academic Dishonesty:

Please review the NYU School of Engineering Policy on Academic Dishonesty

<http://engineering.nyu.edu/academics/code-of-conduct/academic-dishonesty>

In this class, you *may* work on homework assignments with groups of up to 5 students. If you do so, the names of all members of the group should be included. You may work on the course project with a partner or a three person team, but each person on the team must demonstrate that they've done a substantial part of the implementation. (More details later). You may use or adapt publicly available code in your project (such as templates for generating html

or sample code distributed to the class), but you may **NOT** copy code from other students, copy code from previous years' course projects, or outsource code development to a third party.

Moses Center Statement of Disability

If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities at [212-998-4980](tel:212-998-4980) or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor. Please do this at the start of the semester.

TENTATIVE SCHEDULE

date	topic	textbook	project/HW
Wed 9/5	Intro	Chapter 1	
Mon 9/10	Entity-Relationship Model	7. 1 to 7.5	
Wed 9/12	Relational Model	2	HW 0
Mon 9/17	Converting ER to relational	7, continued	
Wed 9/19	SQL	3	HW 1 (ER model)
Mon 9/24	SQL	3	
Wed 9/26	SQL	3	HW 2a due 9/27
Mon 10/1	SQL	3	
Wed 10/3	SQL	3	HW 2b (ER --> relational + basic SQL) due
Tues 10/9	SQL	4	
Wed 10/10	Review, Q&A		HW 3 due
Mon 10/15	MIDTERM 1	covers ER model, relational model, SQL	
Wed 10/17	more SQL: universal quantification; outer joins		Project Part 1 (ER diagram) due
Mon 10/22	Application Development	5.1, 9.1, 9.2, 9.3	
Wed 10/24	Python/ Flask overview	notes	HW 4 due (advanced SQL)
Mon 10/29	Relational DB design, Storage	8.1 to 8.3, 10 (overview)	Project Part 2 due ; Project Parts 3 & 4 posted
Wed 10/31	Transactions	14	HW 6 (App programming) due * Must be done individually
Mon 11/5	Concurrency	15.1 to 15.5	

Wed 11/7	Review, Q&A		HW 5 due (relational DB design)
Mon 11/12	MIDTERM 2	More SQL, application development DB design theory	
Wed 11/14	Concurrency		Project Part 3 (more queries, some application code, plan and schedule for group work) due
Mon 11/19	Indexing/Hashing	11.1, 11.2, 11.3, 11.6, 11.8	
Wed 11/21	NO CLASS: THANKSGIVING BREAK		
Mon 11/26	Indexing/Hashing		HW 7 (concurrency) due
Wed 11/28	Query Processing	12	
Mon 12/3	Query Processing		Part 4 (application code, etc) due; Project Demo/Test sessions by appointment
Wed 12/5	TBD		
Mon 12/10	TBD		HW 8 due (indexing & query processing)
Wed 12/12	TBD		
TBD	Final Exam	Covers whole semester	Do not make any plans to leave town before the end of the final exam period until our exam date is determined by the registrar