Shanghai New York University
Engineering and Computer Science Department

Course Outline
Databases, CSCI-SHU 213, 4 Credits
Fall 2019
Professor Ratan Dey
Tues 5:15 PM to 6:30 PM and Thurs 5:15 PM to 6:30 PM; Room No. Pudong_712

To Contact Professor:

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Office Hours: Tuesday 03:00 PM to 04.30 PM and Open Door Policy (if you see me in my office and I'm available, you can talk/discuss with me); Other times by Appointment. To make an appointment, please send an email mentioning CSCI-SHU 213 in subject line. Don't forget to include your name and NYU ID in the body of the email.

Course Pre-requisites: CSCI-SHU 210, C- or better. Discrete math recommended.

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), physical database design, query languages, query processing and transaction management techniques, NoSQL Databases, and brief Introduction to Big Data.

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.
5. Using NoSQL databases and understanding differences between Relational and NoSQL databases.

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 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
Seventh Edition/Sixth Edition
Avi Silberschatz, **Henry F. Korth** , **S. Sudarshan**
McGraw-Hill
ISBN 978-0078022159 (Seventh Edition)
ISBN 978-0073523321 (Sixth Edition)
http://www.db-book.com/
Copies are on reserve in the library.

Course requirements:

Tests: There will be about five (5) quizzes, a midterm exam, 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 Node.js, PHP, C#, Python, or Java with MySQL, Oracle, PostgreSQL, MongoDB, or SQLServer. (Other host languages or DBMS may be allowed, but please check with me first.)

You will be responsible for mastering enough in 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 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: There will be about 6-8 homework assignments. Homework 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 counts only for a small percentage of your grade, it is essential that you do these homeworks and understand the solutions. You may work with classmates (groups of up to 2 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. There will be quizzes based on the homework assignments and lecture materials. Many of the exam questions will be based concepts from the homework assignments.

Class Attendance and Participation: Students are expected to attend all scheduled classes unless the instructor explicitly informs the class that other ways of doing the work are acceptable. Students are also expected to participate during the class discussion. Attendance will be noted and popup quizzes may be administrated during the classes. You are expected to attend at least 90% of all scheduled classes to get full credit on Class Attendance and Participation.

Grading: Your grade will be based primarily on your scores on the homework, exams, quizzes, class attendance and participation, and the course project. You may work with classmates on the homework assignments, but be sure that you understand all the material. Grades will be computed roughly as follows:

Final score = 0.25*project + 0.25*(Midterm exam grade) + 0.3*(Final exam grade) + 0.05*(quiz average, dropping lowest quiz) + 0.10*homework + 0.5*(attendance and participation).

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

Grades will be determined using the following scale:

A   95-100
A-   90-94
B+ 87-89
B   83-86
B-   80-82
C+ 77-79
C   73-76
C-   70-72
D+ 67-69
D   63-66
F   less than 63

You must get a grade of D or better to complete the course.

Policy on Academic Dishonesty:
Students are expected to read and understand the university's policy on academic integrity as laid out in the Undergraduate Bulletin. Plagiarism and cheating will be penalized.

Homework assignments will be done individually or with a partner. If specified in the assignment description, you *may* work on homework assignments with a partner (in this case, name of the partner should be included).

You may work on the course project with a partner, 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.

Policy on Make-up of Absence from Class due to illness: When students are ill, they are expected to notify professors in advance of class, if at all possible. Students should negotiate with professors the time and place for make-up of assignments, tests and/or examinations missed. In cases where students are seriously ill and will miss more than a week of classes, the Office of Health and Wellness should be contacted so that the student's other professors may be contacted. The Office off Health and Wellness will not verify medical absences of under a week.

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 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Please contact Academic Resource Center for assistance in registering.

Tentative Schedules (will be updated later):

Date	Topic	TextBook	HW/Quiz	Project
Tues 9/03	Introduction	Chap 1		
Thurs 9/05	Entity-Relationship Model	Chap 7.1 to 7.5	HW1 posted	
Tues 9/10	Relational Model	Chap 2		
Thurs 9/12	ER and Relational Model	Chap 7	HW2 posted	
Tues 9/17	SQL	Chap 3		
Thurs 9/19	SQL	Chap 3		
Tues 9/24	SQL	Chap 3	Quiz1 on ER	Part 1 posted
Thurs 9/26	SQL	Chap 3	HW3 posted	
9/30-10/4	National Holidays	No Classes		
Tues 10/8	No Classes	Work on Project		
Thurs 10/10	Intermediate SQL	Chap 4		Part 1 due
Tues 10/15	Advanced SQL	Chap 5 (Procedures and Triggers)	Quiz2 on SQL HW4 posted	
Thurs 10/17	Review Midterm Syllabus			Part 2 posted
Tues 10/22	Midterm	ER, Relation Model and SQL		
Thurs 10/24	Application Development	Chap 5.1,9.1.9.2,9.3		
Tues 10/29	PHP/Python/Flask/ Review Midterm	Notes		Part 3 posted
Thurs 10/31	Relational DB design	8.1,8.2,8.3	HW5 on RD Design posted	
Tues 11/05	Storage	Chap 10		
Thurs 11/07	Transactions	Chap 14	Quiz3 on SQL (HW4)	Part 2 due
Tues 11/12	Concurrency	Chap 15.1 to 15.5		
Thurs 11/14	Concurrency		Quiz 4 on RD design and HW5; HW6 on Transaction posted	
Tues 11/19	Indexing/Hashing	Chap 11.1 to 11.3, 11.6,11.8		Project's Progress report due

Thurs 11/21	Indexing/Hashing		HW7 posted	
Sun 11/24	Query Processing	Chap 12		
Tues 11/26	Query Processing	Chap 12	Quiz 5 on Transaction and Concurrency; and/or Quiz5 on Indexing/Hashing	
Tues 12/03	NoSQL Databases MongoDB			
Thurs 12/05	MongoDB hands on, Introduction to Big Data			Part 3 due
Tues 12/10	Final Exam Review			
Thurs 12/12	Project Demo by appointment			
Final Exam Week	Final Exam	Final exam date will be announced later.	**Please DON'T Make Any Travel Arrangements**	