Instructor: James Markulic
Lecture: In Class or Distance Learning
Office Hour: By appointment
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Course textbook:

- Avi Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concept, McGraw- Hill, ISBN 0-07-352332-1, 6th edition.

Supplementary readings (Not Required):

- A First Course in Database Systems (3rd edition) by Ullman and Widom.
- Database Systems: The Complete Book (2nd edition) by Garcia-Molina, Ullman, and Widom
- Database Management Systems (3rd edition) by Ramakrishnan and Gehrke.
- Fundamentals of Database Systems (6th edition) by Elmasri and Navathe.
- P. Rob, C. Coronel, S, Morris DATABASE MANAGEMENT: DESIGN, IMPLEMENTATION, AND MANAGEMENT 10e (Tenth Edition), Thomson/Course Technology – Cengage Learning. ISBN 13: 987-1-111-96960-8. (in case you do not have basic database concepts and knowledge.)

Course Description:

This course introduces the foundations of database systems, focusing on data modeling, query design, and applications. It provides an understanding of the issues in designing and managing database systems as an essential organizational resource. The components of enterprise data management are covered, with a strong emphasis on data modeling as well as the DBLC (Data Base Life Cycle). Implementing a database using SQL is an art and a science and will be addressed in the course. Data warehousing and data mining issues will also be examined.

Class Communication Space/Learning Management System:

We will be using Moodle, a state-of-the-art, open source, Learning Management System (LMS), and is nationally/internationally the fastest-growing LMS. We will be using this system for online sections of the class, where I will be posting additional resources as needed throughout the semester. The PowerPoint slides for each lecture will be available for download in Moodle.

Course Goals:

At the end of the course, you should be able to develop a set of business requirements and implement a database that fulfills those requirements.

1. To understand the design and development issues regarding databases and enterprise database management.
2. To convert a set of requirements into an effective database structure.
3. To obtain a strong conceptual foundation of the underpinnings of database design and enterprise database management.
4. To implement a database using some commercial database management systems, such as using SQL within MS/SQL Server. Oracle and MySQL are also allowed as well as using the NJIT Oracle instance; however, MS/SQL is recommended. Please discuss with the professor before using other options.
5. To communicate effectively through oral presentations and written documents.

Course Grade Components:

- Homework Assignments: 45 points
- Midterm Exam: 10 points
- Term Project 25points
- Final Exam: 15 points
- Attendance 5 points (DL classes will have the Project worth 30 points)

Grading policy:

· Overall course score >=90: A
· Overall course score >=85: B+
· Overall course score >=80: B
· Overall course score >=75: C+
· Overall course score >=70: C
· Overall course score >=60: D
· Overall course score <60: F

Once assignments are graded, you will not be able to resubmit the assignment. Make sure that you are submitting the correct files and that it has been properly tested before submitting it for grading.

Assignments will automatically have 1 letter grade deducted for every 2 weeks that then are late. For example, an assignment submitted 2 weeks late will have a B as the highest possible grade. An assignment 4 weeks late will have a C as the highest possible grades.

Requirement for Term Project Deliverable

This mini-project is a database design and redesign task. Details and data will be provided during the semester

Since a limited number of datasets will be provided, grading will be assigned in high favor towards the best performing team. The second performing team will be graded in comparison to the best performing team and so on. Some example datasets are as follows.

The data for the project can be found on the class Google Drive:

IS631Google Drive

There are csv files on the drive. You should select one of them for your project. The drive also contains data definition information you will need to normalize your data. You may also select a dataset not included in the Google Drive, but approval from the professor is necessary before using data you select. There is also a file on the drive that provides latitude and longitude by zip code if you select a dataset without goespacial data.

Executing the project involves performing the following four task steps.

Step 1. You are expected to download the raw datasets.

Step 2. After examining the data characteristics exhibited by the dataset, you are asked to propose a data model suitable for capturing the data elements and their relationships. Your model must also be in the 3rd normal form. Please note that the data provided is not the complete dataset as identified in the data definition. You will need to decide which tables you need to create and which ones you do not.

Step 3. Implement your proposed data model through (re-)organizing your downloaded data using a DBMS of your familiarity. NJIT software library offers licenses of multiple DBMS products that you can get for free as a registered student. MS SQL server is recommended but not required. For this part you must submit the DDL to create the new tables as well as the DML to move the data into the new tabes

Step 4. Create a brief project report the following grading criteria:

1) The 3rd normal form of the dataset you chose for the project. You can create an ERD using software such as SQL Server Management Studio. Included in this should be creating primary and foreign keys
2) Any issues, additions or changes you needed to make to the data to get it into the 3rd Normal Form.
3) management problems, including the business rules you choose to model and implement in your database design;
4) how you handle missing and unexpected data elements in the dataset
5) Performance related information regarding indexing, primary key issues, etc…
6) Summary/statistical data such as:
    a. total number of records
    b. distribution of data by state, type or other category
    c. rankings
    d. min/max and average data
    e. other analytical queries as you deem appropriate

Step 5

The goal of your project is to generate the locations of the nearest location included in the database. The expected system should include:

1) A front end for data input and output (sample will be provided)
2) A Stored Procedure to retrieve the data requested by the front end. The stored procedure must accept latitude, longitude and the number of rows to return as input and minimally provide site name, address, latitude, longitude and distance from the input latitude and longitude.

The geospacial data types must be added to the database and the fields populated based on the latitude and longitude data in the original data.

You are expected to submit the project report, as well as the complete copy of your established database to Moodle by the due dates on Moodle. Each team is expected to deliver a 5-10 minutes' brief presentation regarding your project outcomes and achievements via Camtasia or YouTube. Demos of your organized database and the query results will be a strong plus. All presentation materials and links to your presentations need to be uploaded to Moodle by the due date.

The size of a team should be between 1 – 3 people. Grading will be assigned according to the quality of work completed and the number of people working in the team. There will be no favoritism against or towards smaller or larger teams. If you are not sure about the suitability of your project topic, please double confirm with me through email.

The grading criteria will be based upon:

1) The completeness of your normalization
2) Effort and robustness of statistical queries on the database you develop
3) the computational efficiency of your program (front end and stored procedure) in deriving the exposure data and the presentation of the output.
4) The completeness of your report and presentation. A short paper and/or presentation without detail will not receive a high grade

Our Strict Policy on Collaboration/Cheating:

Every assignment/project is to be regarded as an examination. The NJIT Honor Code will be upheld. A description of the NJIT Honor Code is available for your review at http://www.njit.edu/academics/honorcode.php. Students found cheating or collaborating or plagiarizing will be **immediately** referred to the Dean of Students and the NJIT Committee on Professional Conduct and subject to Disciplinary Probation, a permanent negative marking on their record, **possible dismissal and a definite grade of 'F' in the course. All submitted assignments are carefully checked for similarities, and plagiarism and guilty students will be identified. This also includes use of instructor materials no matter how they were provided to you.**

Policy on Submission of Assignments/Projects : The format of submission will be announced with each assignment/project. Assignments and projects are to be posted in Moodle.

Our Strict Policy on Lateness of Submission: Every assignment/project will have a due date, and all submissions **are expected to be** made by this due date. **Assignments submitted after the due date will not be accepted regardless of any reason you might have.**

Below are the TOPICs covered in the course and the related TEXTBOOK readings. Remember one of the keys to success in IS631 is your own self-discipline - your goal should be to maintain currency each week, and NEVER fall behind!

For DL Classes, this is meant as a guideline to keep you on track for completing the material. You are free to complete project early; however, point will be taken off for work submitted past the Moodle due dates.

Week #	Topic(s)
1	Introduction to Database Systems
2	Entity Relation Model
3	Relational Database Design
4	Introduction to Relation Models and Relational Algebra
5	Intro to SQL
6	Intro to SQL - Continued
7	Intermediate SQL
8	Mid-Term Exam (TBD)
9	Intermediate SQL - Continued
10	Advanced SQL
11	Transaction Processing
12	Final Exam and Class Project Presentations

Note: 1. Details of the mid-term and the final exam will be announced later.

2. The syllabus may be changed to be adjusted to provide better educational services. In such a case, the changes will be announced in advance.