Instructor: James Markulic
Lecture: 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.
5. To communicate effectively through oral presentations and written documents.

Course Grade Components:

- Homework Assignment: 35 points
- Midterm Exam: 15 points
- Term Project 30 points
- Final Exam: 20 points
- Extra Credit Database Project: 30 points (bonus)
  (requires prior approval from professor)

Maximum numeric course grade would be 100 points. Therefore, for a student who achieves full points in attendance, homework, midterm and final exams, doing the course project will only further his or her learning and understanding but would not contribute towards the total course grade. For a hypothetical student who achieves 80 points in attendance, homework, midterm and final exams, doing the course project could maximally contribute 20 points towards his or her course grade.

Grading policy:

· Top 25% of the class or overall course score >=90: A
· Next top 25% of the class or overall course score >=85: B+
· Next top 25% of the class or 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.

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:

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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.

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.

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.

Step 4. Create a brief project report (no length requirement imposed) addressing the following grading criteria:

1) the size of the datasets you manage to (re-)organize in your project;
2) the clarity and logic soundness of the database model design you propose for the data
3) management problem, 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; 4) the data querying performance you can accomplish via using an DBMS of your choice over your established dataset.
5) Performance related information regarding indexing, primary key issues, etc…

You are expected to submit the project report, as well as the complete copy of your established database to Moodle by The 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. To coordinate between the teams so that no particular dataset will be used multiple times between multiple teams, you are encouraged to use Moodle's forum function to chat and self-organize. In case more than one team works on the same dataset, grading will favor the team that delivers the most impressive project outcome. To reduce potential competition between teams, you are strongly recommended not to work on common datasets.

There will be a special project assignment. Every student is required to criticize three other projects according to the presented content. Comments should be developed according to the grading criteria specified in Step 4 of the project requirement. Even though there is no length requirement for the submitted comments, detailed comments will be encouraged.

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) An interface to the database and appropriate (P)SQL to identify geospacial calculations and Inverse Weighted Difference routines

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.

The grading criteria will be based upon:

1) the number of years of environmental monitoring data covered in your database;
2) the number of environmental monitoring elements covered in your database;
3) the complexity and suitableness of the relationships modeled in your database;
4) the correctness of your calculation results;
5) the richness of your cumulative exposure derivation mechanism, mainly the amount of environmental monitoring data points your program would retrieve to derive the cumulative exposure output of each human subject;
6) the computational efficiency of your program in deriving the exposure data and the presentation of the output.

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	Intermediate SQL
7	Advanced SQL
8	Mid-Term Exam (TBD)
9	Entity Relation Model
10	Relational Database Design
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.

Extra Credit Project (optional)**:**

Extra Credit Assignments will be made available on request.