IS 331
Database Design, Management and Applications
Fall 2015

Course Syllabus

Instructor: Chris Markson
Class Times: MW 11:30a-12:55pm
Office Hours: Wednesday 1:00-2:30pm,Thursday 10:30a-12:00pm, or by appointment

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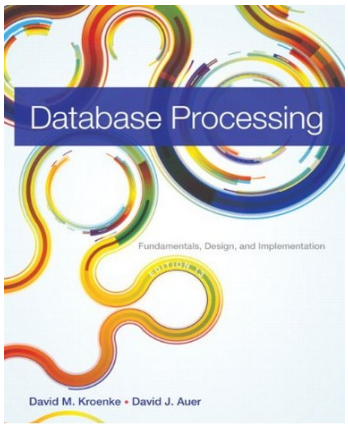
Office: 4th floor GITC, Co-Lab

Prerequisites: **Completion of a 100-level GUR course in computing, such as IS118 or CS101 or CS104 or CS113. (**It is also assumed that students have some basic familiarity with Microsoft Office (2007 or 2010), particularly Microsoft Access.)

Required Texts:



Textbook: **D. Kroenke and D. Auer, DATABASE PROCESSING: FUNDAMENTALS, DESIGN & IMPLEMENTATION, 13 Edition, Pearson/Prentice-Hall, 2013. ISBN: 10: 0133058352 or 13: 978-0133058352** (Earlier editions of this text will NOT satisfy the course requirements - only purchase and use the current edition, which has a copyright date of 2012).

Class URL: We will be using Moodle, an open source Learning Management System at NJIT, for the posting of projects and class resources and other class announcements. Important information regarding assignments, lectures, exams, etc. will be made on Moodle in addition to being announced and/or distributed in class. All students will be held accountable for items posted on the site whether or not it is announced in class, and whether or not they attended any particular class. Students are obligated to log into Moodle on a near-daily basis, and to keep current.

Course Description: "*We are drowning in data!*" *- CIO of a fortune 100 company*

Modern organizations generate huge amount of data on a daily basis and are in constant need for the **database** technology to organize, store, retrieve, share and analyze large-scale data. Hiding behind the scene, database technology serves as the backbone for many "hot" technologies such as ERP, CRM, Web-based systems, Dashboard & Scorecard, and Data Warehouses. Since database plays such a crucial role in business operations of any modern organizations, an IS professional must understand how to plan, design, implement and manage database systems.

This course gives students extensive, pragmatic experience in designing, building, querying, updating, maintaining and managing relational databases, using the Structured Query Language (SQL). We will start our journey by analyzing what database is and why it is superior to other data management methods. We will then conduct logical and physical database design. SQL will be extensively covered, and students will design and implement sophisticated SQL queries invoking self-joins, outer joins, correlated sub queries and related concepts. Hands-on experience will be gained by working with actual databases using industry-standard database management systems such as Oracle.

Expected Course Competencies:

By the end of this course, students should be able to:

1. Analyze information needs that ought to be supported by database management systems.

2. Identify, analyze, and propose solutions to organizational issues involved in data management.

3. Apply the fundamentals of database design, including conceptual, logical, and physical design.

4. Understand the structure of a relational database management system.

5. Normalize (& de-normalize) data.

6. Use SQL to implement, manage and query a database

7. Design and implement a modern relational database system using Oracle DBMS
8. Know the basics of advanced DB topics such as non-relational database, ERP and data warehouse

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Course Structure:

The structure of the course will be mostly lectures. Discussion during the lecture portion is strongly encouraged and will be reflected in your class participation grade. Hands-on lessons may be part of the lecture. <u>Students are encouraged to bring their laptops to class.</u>

Assignments: We will have weekly assignments. They will be posted on Moodle with a due date.

Grades for late assignments will be reduced by an additional 10% for each day beyond the deadline. Assignments that are more than 2 days late will receive no credit.

Grade:

Assignments	30%
Midterm Exam	30%
Final Exam	35%
Class Participation	5%

Policy on Collaboration/ Cheating: Every assignment is a 'home-mini-exam.' The NJIT Honor Code will be strictly upheld. Students found cheating/collaborating/plagiarizing will be **immediately** referred to the Dean of Students and the NJIT Committee on Professional Conduct and subject to possible Disciplinary Probation, a permanent marking on the record, **possible dismissal and a grade of 'F' in the course**. **All submitted assignments are carefully checked for similarities, and plagiarism and guilty students will be identified and referred to the Dean of Students for disciplinary action.**

TENTATIVE CLASS SCHEDULE

Below are the TOPICs covered in the course. Remember one of the keys to success in IS331 is your own self-discipline - your goal should be to maintain currency each week, and NEVER fall behind! (***Note: this is the topical curriculum model for the course, though we reserve the privilege to modify and adjust attributes of this table (topics, dates, etc.) for the benefit of the course.)***

Date	Topics	You Will Know:
Week 1	Introduction:	*Who am I, who are you, and What are we going to do?*
	Database Intro.	*What is data? A Brief History of Data Management*
Week 2	Database Development Process	*Why Database? How to build a database? A look ahead*
	Conceptual Design (I)	*What is conceptual design? ERD Terminology*
Week 3	Conceptual Design(II)	*Advanced Concepts in ERD*

	Conceptual Design(III)	*More on ERD*
Week 4	The Relational Model: Data Structure	*What is a relation?* *Relational Model Terminology* *[**HANDS-ON**] How to create & Store relations in MS Access*
	The Relational Model: Data Integrity	*What's all this fuss about "keys"?* *[**HANDS-ON**] linking tables in MS Access*
Week 5	Logical Design: From ER to Relational Model	*How to turn my ER Model into tables?*
	Normalization	*How to design GOOD databases?*
	MIDTERM EXAM	
Week 6	Relational Algebra (I) Relational Algebra (II)	*Why "Algebra" is not really as scary as it sounds*
Week 7	Relational Algebra (III)	*[**HANDS-ON**]Query-by-Design in MS Access*
	Intro to SQL	*[**HANDS-ON**] Use SQL in Oracle to create tables*
Week 8	SQL Basics	*[**HANDS-ON**] Single table Queries & aggregation*
	SQL: More Advanced Commands	[***HANDS-ON***] *Query using multiple tables, Cross Join*
Week 9	Oracle PL/SQL	[***HANDS-ON***] *PL/SQL*
Week 10	Non-relational database	
Week 11	Non-relational database	
Week 12	Data Warehouse Dashboard	*Why data warehouse?* *How to **visualize** your data to best understand it?* *[HANDS-ON] Use Tableau to build Dashboards*

Final Exam Period	**Final Exam**