

IS 331

Database Design, Management and Applications

Fall 2014, Session 451

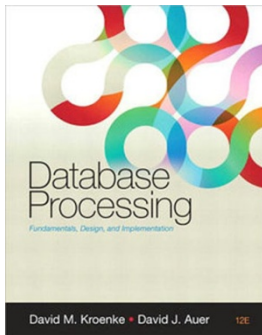
Course Syllabus

Instructor: Professor Lin Lin
Class Times: Distant Learning
Office Hours: Tuesday/Friday: 1 – 2 pm or by appointment.

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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:



D. Kroenke and D. Auer, *DATABASE PROCESSING: FUNDAMENTALS, DESIGN & IMPLEMENTATION*, THIRTEENTH Edition, Pearson/Prentice-Hall. (You may use 12th Edition, which is not significantly different from this 13th edition).

Class URL: We will be using Moodle 2, 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 subqueries 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

Course Structure: This course is delivered online. Therefore, we will count heavily on the use of PowerPoint slides and forums as the main teaching and communication tools. Although you are encouraged to study at your own pace, course lectures are uploaded

to the Moodle on a weekly basis at each Sunday night. For your convenience, there are two versions of the course lectures. The traditional version contains two sets of “Dr. Lin – Free” PowerPoint slides per week that correspond to two “brick-and-mortar” lecture sessions. For those of you who prefer to follow a traditional, two-lecture learning schedule, you might find this approach natural. An alternative version is the “webinar” style lecture with my narration of the slides. If you do not mind listening to my babbling, and have the patience to wait for me to finish, these clips could give you a more detailed view at some of the topics. In order not to bore you with long recordings, these clips are organized by learning topics rather than by session. Each learning topic (clip) is less than 5 minutes. If you need to quickly go through a set of slides to understand what is covered, the traditional PowerPoint would be your choice. If you want to further “zoom in” to slide pages that you do not understand, you could listen to the recordings. In addition, I would strongly encourage you to use the course forums to ask me questions and let me know your concerns.

Assignments: We will have weekly assignments. They are posted on Moodle each Sunday night and are due at the beginning of class on next Monday. **No credit will be given for late assignments turned in after the deadline.** If you have an emergency and cannot meet the deadline, you must contact me before the deadline.

Grade:

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

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Total	100%

Letter grades will be assigned approximately as follows (the grades may be curved):

Marks	Letter Grade
90% and above	A
80% to 89%	B
70% to 79%	C
60% to 69%	D
Below 60%	E

**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.*)

<u>Date</u>	<u>Topics</u>	<u>You Will Know:</u>	<u>Readings</u>
Week 1	<u>Introduction:</u>	<i>Who am I, who are you, and What are we going to do?</i>	
	<u>Database Intro.</u>	<i>What is data? A Brief History of Data Management</i>	Ch.1
Week 2	<u>Database Development Process</u>	<i>Why Database? How to build a database? A look ahead</i>	PowerPoint slides
	<u>Conceptual Design (I)</u>	<i>What is conceptual design? ERD Terminology</i>	Ch.5, pp. 155-164
Week 3	<u>Conceptual Design(II)</u>	<i>Advanced Concepts in ERD</i>	Ch 5, pp.164 - 171
	<u>Conceptual Design(III)</u>	<i>More on ERD</i>	Ch 5, pp.172 - 191
Week 4	<u>The Relational Model: Data Structure</u>	<i>What is a relation? Relational Model Terminology [HANDS-ON] How to create & Store relations in MS Access</i>	Ch. 3, pp. 100 - 112
	<u>The Relational Model: Data Integrity</u>	<i>What's all this fuss about "keys"? [HANDS-ON] linking tables in MS Access</i>	Ch. 3, pp. 100 - 112
Week 5	<u>Logical Design: From ER to Relational Model</u>	<i>How to turn my ER Model into tables?</i>	Ch. 6
	<u>Normalization</u>	<i>How to design GOOD databases?</i>	Ch 3, pp 112 - 131
MIDTERM EXAM !!!			
Week 6	<u>Relational Algebra (I) Relational Algebra (II)</u>	<i>Why "Algebra" is not really as scary as it sounds ☺</i>	PowerPoint slides
Week 7	<u>Relational Algebra (III)</u>	<i>[HANDS-ON]Query-by-Design</i>	

	<u>Intro to SQL</u>	<i>in MS Access</i> [HANDS-ON] <i>Use SQL in Oracle to create tables</i>	Ch.7,
Week 8	<u>SQL Basics</u>	[HANDS-ON] <i>Single table Queries & aggregation</i>	Ch2, pp 31 - 73
	<u>SQL: More Advanced Commands</u>	[HANDS-ON] <i>Query using multiple tables, Cross Join</i>	Ch.2, pp 73 - 82
Week 9	<u>Oracle PL/SQL</u>	[HANDS-ON] <i>PL/SQL</i>	Oracle Textbook
Week 10	<u>Non-relational database</u>		
Week 11	<u>Non-relational database</u>		
Week 12	<u>Data Warehouse Dashboard</u>	<i>Why data warehouse?</i> <i>How to visualize your data to best understand it?</i> [HANDS-ON] <i>Use Tableau to build Dashboards</i>	Ch. 13 Ch. 13

(DATE TBD)	Final Exam
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