Data Management (Web-Based)

Instructor:	Clint Tuttle
TA	See Canvas for name and contact info (only in the case if there is a TA)
Hours:	This course is self-paced, online. There are no scheduled meetings times
Communicating:	**All** correspondence and questions go through Slack (not email)

Course Description

Look around yourself right now and try to find something that hasn't had data associated with it at some point in its existence. Your computer, your enrollment in this course, and even your human existence have all generated digital data. Databases are used to electronically store and organize large data sets. Behind every e-commerce websites, for example, online trading brokerages, Amazon.com, online auctions, etc., databases play a significant role in managing the data that supports the business model. Besides, many companies implement their entire workflow (i.e., how tasks are executed and routed using business rules) between or within organizations using databases and stored procedures (or triggers). Therefore, the knowledge of how databases are designed and implemented as well as how data is managed within an enterprise, are fundamental to information management or systems professionals.

This course helps you understand the basic concepts and structure of a database. We will also discuss how to properly model and design a database so that the data can be easily accessed and manipulated through a database management system (DBMS). Among the major database technologies, this course focuses on introducing the relational database management system, which is based on the relational data model and dominates the market since 1980s. The course also covers the NoSQL alternative of database technology, analytics functions used to analyze data, and also how to connect a "front-end" webpage to the database or "back-end".

A better understanding of the design and structure of a database system will give you an edge in your career because a centralized database is core to any ERP systems used by the Fortune 500 companies and plays a significant role in their operational activities. Besides, according to numerous online polls, SQL is the most important data processing tool next to python and R for data scientists. Being proficiency at SQL coding will increase your job market value considerably if you move forward in any career.

Course Objectives – Upon completion of this course would will be able:

- Properly design a relational database in a normalized form based on any given business model
- Use modeling software to depict your database model in an Entity Relationship Diagram (ERD)
- Use Structured Query Language (SQL) to manipulate a database and the data it contains
- Use Oracle Analytics functions to do deeper analysis on given data
- Use Oracle's procedural language (PL/SQL) to create procedures, functions, and triggers
- Write basic read queries using a NoSQL database like mongo db.
- Connect a SQL or NoSQL database to a front-end "CRUD" application

Course Times

This course never meets in person, has no scheduled lectures, and is self-paced but note that there is an overall deadline when you need to complete the course. This deadline will be communicated to you by your department or program officials. Please important see *Course Administration Notes* below

Accessing the Course

Login to the learning management system, Canvas, at: https://utexas.instructure.com/

Course Administration Notes

- This course is a custom program offered for admitted Master of Science students in the McCombs School of Business in partnership with University Extension. Please direct all administrative and registration questions to MSPORegistrar@mccombs.utexas.edu.
- Please do not contact University Extension with any course related questions or reference their calendars for course registration information.
- <mark>This course is self-paced and follows a custom calendar. The first day students may begin the course is **January 9, 2023**. The last possible day to <u>complete</u> the course is **May 26, 2023**.</mark>
    - If you complete the course prior to the last class day, please note that once a final grade is assigned, it is not possible to change the grade or drop the course.

Required Resources

- **Required Textbook:** Murach's Oracle SQL and PL/SQL for Developers (2nd Edition)
  Author: Joel Murach   Publisher: Mike Murach & Associates   ISBN-13: 978-1890774806

- **Other Readings and Class Slides:** Other required readings and videos outside of the textbook will be provided for free on Canvas. Class Slides will also be available through Canvas.

Required Software:

No software needs to be purchased for this class. All software is free online.

- **Database/Programming software:**
    - ***SQL Developer*** - You will need to download the Oracle client application (SQL Developer) to your own computer. Windows, Mac, & Linux versions of the client app are available for free online. Details about the Oracle client download/install process will be provided within the course. The Swat Shop can help if you experience any problems installing the Oracle client.
    - Other software: Later in the semester students will need to install ***MySQL Connector*** and ***XAMPP/MAMP*** in order to complete the Web Application Development lab. Also, students will be using ***Tableau*** Student edition to complete an Analytics basics lab and ***Mongo Compass*** for a Mongo lab. Details on how to install this will be posted.
- **Modeling software:** You'll also need to use modeling software. We recommend ***Lucidchart*** or Microsoft Visio. NOTE: Lucidchart works for either Mac or PC and is a SaaS product requiring no download/install. Visio is fine if you already have it or prefer it. Visio is downloadable for free through the *McCombs Software wiki* but we recommend ***Lucidchart***

Expectations to succeeding in this course:

Diligence, Persistence, and Curiosity are key factors to succeed and we expect them of everyone. Since this course is self-paced and online, you have the sole responsibility to manage your time, continuously put in the time to learn and solve problems, and also do your own research to learn. While this course will give you the foundational information and challenges to learn all about data management, you must possess your own drive and curiosity to succeed. Learning to exhaust all resources, figure things out, and continuously learn is the greatest skill for any MIS professional. Complex problem solving can help you succeed at anything regardless of skill level.   If you practice these concepts, you'll learn a great deal

Grading Criteria

This course is based on the following weight averages:

Type	Weight	Details
Participation	5%	All practice quizzes count towards "Participation"
Quizzes	20%	~7 Unit Quizzes
Assignments	25%	~10 Assignments or Labs
Mid-term	25%	Covers material from the start of the course until the end of Views
Final Exam	25%	Non-cumulative. Only covers material post Exam 1

Course Grading Scale

This class will use the following plus/minus grading system. Please note that rounding on final grades is not automatic. e.g. If you earn an 89.6 in this class, that's a B+ and does not automatically get bumped to a 90 or A-

Final Grade	Final Letter Grade		Final Grade	Final Letter Grade
93 – 100	A		73 – 77	C
90 – 93	A-		70 – 73	C-
87 – 90	B+		67 – 70	D+
83 – 87	B		63 – 67	D
80 – 83	B-		60 – 63	D-
77 – 80	C+		0 – 60	F

Course Outline:

#	Sections	Learn Objectives
1	Intro to System Architecture and Database Structure	• System Architecture (i.e. Client/Server) • How Relational Databases are structured
2	Database Design	• Conceptual & Logical Design • Normalization
3	Implementing a database	• Introduction to SQL • DDL • Indexes and Sequences • DML - INSERT, DELETE & UPDATE
4	SQL Basics	• SELECT from a single table • Filtering/Sorting (WHERE, ORDER BY) • Join tables in FROM clause
5	SQL Advanced	• Summarizing Data with GROUP BY • Subqueries • Data Types and Functions • Creating Views and their purpose
6	PL/SQL	• Introduction to PL/SQL and procedural coding • Stored Procedures and User-Defined Functions
7	Application Development with a Database	• Front-end development overview • Back-end development
8	Data Warehousing, ROLAP, and Analytics	• Data warehouse design and ETL • Data Analytics and ROLAP
9	Beyond SQL	• Issues with RDBMS • Active Databases (Triggers) • OODB, Graph DB, and ORM Tools • Database Security Design and Implementation (DCL) • NoSQL and MongoDB