90-838: Database Management for Policy Analytics
Fall 2021
Sections A, B

Instructor:
Karyn Moore karyn@cmu.edu
Office Hours & Location: See Course Contacts on Canvas Website.

Teaching Assistants:
TAs, office hours & their locations will be posted on Course Website for each TA by end of first week.

Meeting Times:

Section A – Tuesday, Thursday, 8:35AM – 9:55AM, Hamburg Hall 1206
Section B – Tuesday, Thursday, 10:10AM – 11:30AM, Hamburg Hall 1206

Class Web Site: canvas.cmu.edu

Textbooks

Required: Oracle 12C: SQL, Joan Casteel, Cengage Learning, 2016,
ISBN-13: 978-1-305-25103-8. ***Used for required readings and assignments*.**

Additional material from other sources will be provided by the instructor.

Course Description

This semester-long course on database management systems is intended for students studying data analytics in non-technical graduate degree programs. The course provides these students a solid understanding of concepts, and development of skills relevant for the efficient and successful management, access, and analysis of small or big data captured by relational database systems. In addition to coverage of important theories and concepts, students will develop knowledge of and skill in using the Oracle 12C Database Management System, a relational database management platform utilized by many organizations. Students will also be introduced to PostgreSQL, a powerful, open-source, object-relational database system.

Topics covered include fundamental concepts of database management systems; the relational model including relational algebra; SQL and Advanced SQL including query optimization and tuning; conceptual data modeling using UML, logical database design, physical database organization and data access methods; and data preprocessing for analytics.

Course Objectives

This course covers all the important components for relational databases relevant for data analytics. This includes the design, implementation, and efficient access of data captured in relational databases. At the end of this course, you will be able to:

- Demonstrate a comprehensive understanding of the relational data model.
- Construct useful and efficient queries using Structured Query Language (SQL).
- Leverage an understanding of database performance and data access methods to identify and implement various approaches to improve query performance.
- Create conceptual & logical database models using the UML diagramming notation.
- Implement physical database design with SQL.
- Use a sophisticated interface, Oracle SQL Developer, to interface with the RDBMS.
- Use the command line to interface with the RDBMS.
- Use SQL to merge and clean disparate data sources for analysis.
- Validate and verify query results using SQL and visualizations.

Course Structure

The class meetings consist of lectures, discussions, and in-class labs.
The course lecture content is organized as follows:

I. Relational Databases and the Relational Data Model (2 weeks)
   - Relational Data Model including Relational Algebra

II. Database Queries with SQL (8 weeks)
   - Basic and Advanced Select Queries including subqueries, regular expressions, analytic functions, aggregate queries and enhanced aggregation.
   - Data Manipulation and Data Definition Queries
   - Querying the Data Dictionary

III. Database Design & Query Optimization (4)
   - Entity Relationship Diagrams
   - Conceptual and Logical Design
   - Physical Design including file organizations and indexes
   - Query Optimization including data access methods and query explain plans

Course Schedule

Please refer to the separate document titled **Course Schedule at a Glance** (posted to Course Website) for a listing of weekly lecture topics, labs, and assignments. Assignment due dates and exam/quiz dates are also posted in that document.

Student Evaluation

Your performance in this course is determined by a combination of assignments, preparatory assignments (Prep Work), three exams and one quiz. Participation points can be earned as well. Final grades are based on the following weights:

• Prep work (7)	14%	Completed in advance of lectures
• Assignments (9)*	45%	Complete after lectures
• Exams (3)	36%	80-minute in-class exams**
• Quiz (1)	5%	40-minute in-class quiz**
Total	**100%**	

**** Late Passes: three (3), 24-hour late passes can be used on three of these nine assignments. A pass extends the due date by 24 hours. Passes cannot be combined. When working with a partner or group, the late pass is assessed on everyone.***

***** Exams and quizzes are open notes, open book, closed computer.***

Participation: You will have the opportunity to earn up to 1 additional point on your **final** course score from regular participation (50% or more participation). Participation can take the form of asking or answering a question during lecture, posting questions or comments to the lecture discussion board, and/or participating in in-class exercises.

Final letter grades are assigned to your body of work in this course according to the following scale:

A+	97% to 100%	Exceptional
A	93% to 96%	Excellent
A-	90% to 92%	Very Good
B+	87% to 89%	Good
B	83% to 86%	Acceptable
B-	80% to 82%	Fair
C+	77% to 79%	Poor
C	73% to 76%	Very Poor
C-	70% to 72%	Minimal Passing
R	less than 70%	Failing

The average grade in a core Heinz course is expected to be 3.33-3.4, equivalent to a B+. This expected average reflects the degree of difficulty and breadth of coverage for a core course. I do not apply any curve when determining students' final letter grades.

Late Homework Policy, and Make-up Exams

Assignments

Normally, late homework is not accepted without prior approval. If you have an extenuating, circumstance (illness, accident, unexpected family matter, etc.), notify me as early as possible and I will take that into consideration.

You will have THREE late passes you can use on any single individual assignment (not the prep work) The late pass allows you to submit the assignment work up to 24 hours after the due date and still receive full credit. You may not combine two or more late passes on one assignment. When working with a partner or group, the late pass is assessed on everyone.

Exam & Quiz Dates

You are expected to take all three (3) exams, and one (1) quiz at the times indicated on the Course Schedule. If you are unable to take the assessment when scheduled, notify me of your reason as far in advance of the scheduled date as possible. I may not be able to accommodate your request but will consider it.

Policy on Collaboration and Cheating

Excluding assignments that are assigned as group work, the work you submit should reflect individual effort.

Cheating includes but is not necessarily limited to:

1. Submission of work that is not your own for papers, assignments, lab exercises, or exams.
2. Submission or use of falsified data.
3. Theft of or unauthorized access to an exam, current or previous.
4. Use of an alternate, stand-in or proxy during an examination.
5. Use of unauthorized material including textbooks, internet material, notes, or computer programs in the preparation of an assignment or during an examination, unless otherwise indicated.
6. Supplying or communicating in any way unauthorized information to another student for the preparation of an assignment or during an examination.

7. Collaboration in the preparation of a solution to a problem unless expressly allowed by the assignment.
8. Plagiarism which includes, but is not limited to, failure to indicate the source with quotation marks or footnotes where appropriate if any of the following are reproduced in the work submitted by a student:
    a. A graphic element.
    b. A proof.
    c. A phrase, written or musical
    d. Specific language.
    e. An idea derived from the work, published or unpublished, of another person.
    f. Program code or algorithms.

If you are unsure about what is acceptable collaboration, you should first consult with me.

Penalties for Cheating

Penalties imposed are at my discretion. In this class, the penalty imposed can be any of the following depending on the violation:

- zero on the assignment
- a letter reduction on final course grade (final grade of A- becomes B-)
- a failing grade in the course

Regardless of the penalty imposed, all incidents of cheating are reported to the Associate Dean. Additional penalties may be imposed.

Managing Stress and Obtaining Support

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking some time to relax. This will help you achieve your goals and cope with stress. If you experience any academic stress, difficult life events, or feelings like anxiety or depression, I strongly encourage you to seek support. ***Consider reaching out to a friend, faculty, or family member you trust for help getting connected to the support that can help***. On campus, Counseling and Psychological Services (CaPS) is here to help.
Contact them at: ***412-268-2922; or*** **http://www.cmu.edu/counseling/**

If you or someone you know is feeling suicidal or in danger of self-harm, call someone immediately, day or night: *CaPS: 412-268-2922;* http://www.cmu.edu/counseling/
Re:solve Crisis Network: 888-796-8226
If the situation is life threatening, call the police: On campus: CMU Police: 412-268-2323
Off campus: 911

Respect for Diversity

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

Disability Accommodations

If you have a disability and are registered with the Office of Disability Resources, I encourage you to use their online system to notify me of your accommodations and discuss your needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at access@andrew.cmu.edu.

Classroom Expectations Related to Covid

In order to attend class meetings in person, all students are expected to abide by all behaviors indicated in A Tartan's Responsibility, including any timely updates based on the current conditions.

In terms of specific classroom expectations, whenever the requirement to wear a facial covering is in effect on campus, students are expected to wear a facial covering throughout class. Note: the requirement to wear a facial covering is in effect for the start of the Fall 2021 semester. If you do not wear a facial covering to class, I will ask you to put one on (and if you don't have one with you, I will provide you one or direct you to a distribution location on campus, see https://www.cmu.edu/coronavirus/health-and-wellness/facial-covering.html). If you do not comply, you will be referred to the Office of Community Standards and Integrity for follow up, which could include student conduct action. Finally, please note that sanitizing wipes should be available in our classroom for those who wish to use them.

Classroom Etiquette

As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone's learning experience if your cell phone, pager, laptop, etc. makes noise or is visually distracting during class. For this reason, your mobile devices should be silenced and not used during class.

You ARE permitted to use your laptop during class for in-class exercises or to take notes for THIS course only. If you are using your laptop to take notes, please sit in the last few rows of the classroom so you are less likely to create a distraction for others in the class. I reserve the right to call on anyone using a laptop to answer a question at any time during the lecture. Failure to answer the question will result in an assessment of negative participation points.

*NOTE – **the exams and quizzes are open book and notes, but closed computer**. You will not be permitted to access your notes during the exam if they are stored in your computer. Hardcopy of the lecture handouts will always be provided by the instructor at each class meeting for note taking.*

Please limit your peer conversations during class. If you must chat with your neighbor, please sit at the far corners of the room to be less distracting. I may ask you to leave the class if I find your repeated conversations distracting.

You may record classroom activities ONLY for personal, educational use, or for the educational use of another student currently enrolled in the class. **You must first obtain my permission prior to recording any lecture**. The recording may not be further copied, distributed, published, or otherwise used for any other purpose without my express written consent. All students are advised that classroom activities may be taped by students for this purpose.

I will make every attempt to start each lecture promptly at the scheduled start time. I appreciate your efforts to arrive on time for every lecture.