INST 327 - Database Design and Modeling
Shady Grove Spring 2020 - Syllabus

This syllabus is subject to change throughout the semester. Check Canvas (ELMS) for the current version.

Course Description and Learning Outcomes

A broad introduction to relational database systems , this course will provide students with a combination of conceptual understanding and technical practice. Students will learn about the relational model, which provides the logical framework for designing and querying relational databases. Students will also learn important technical and conceptual approaches to database design, including user-oriented design, requirements analysis and specification, entity relationship modeling, and normalization. Students will put these fundamentals into action by learning and using the Structured Query Language (SQL) and a database management system (DBMS) to build, populate, and query a working database.

After successfully completing the course you will be able to:
- Create user-oriented database queries using the Structured Query Language (SQL);
- Described the relational model as a logical system for structuring data for retrieval;
- Translate user needs into functional database requirements by using entity relationship models that conform to the relational model;
- Build a working relational database using a database management system (DBMS);
- Normalize and de-normalize a relational database to optimize performance;
- Identify security issues in databases and develop approaches to address them.

Required Resources

Course Website: TBD Canvas URL
Textbook: https://www.murach.com/shop/murach-s-mysql-3rd-edition-detail

Murach's MySQL
Murach, J.
Third edition (2019)
ISBN: 978-1943872367

Additional readings and resources may be assigned as needed. Extra material will be announced in class and via Canvas.

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Class Meets:
Fridays
(8:00 am to 10:45 am)
Shady Grove Bldg IV - 2335
Jan 31 to May 15

Teaching Assistant:
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Prerequisites:
INST126, CMSC122, or CMSC106
Pre- or corequisite: INST201, INST301

Course Communications:
Slides, practice problems, assignments, quizzes, and other information will be posted on Canvas. Important information will be communicated via the Inbox, Announcements, and Discussion areas.

Customize your alerts to ensure that you receive notifications via your preferred email account.

Communicate with me via Canvas inbox or directly to mramagem@umd.edu

Email subject headings should begin with "INST327:"

When corresponding about the team project, always include the team number in the email.

Core Software:

- Laragon https://laragon.org/ (alternative to XAMPP, WAMP, and MySQL Community Server)
- MySQL All-In-One (careful) http://dev.mysql.com/downloads/installer/
- MySQL Workbench 8 (GUI Interface) https://dev.mysql.com/downloads/workbench/

Extra Software:
- Amazon AWS RDS - https://aws.amazon.com/education/awseducate/ (request access as a Student)
  - UMD is a partner institution. Type "University of Maryland" in school name (this is the equivalent of UMD College Park - note Shady Grove is not an option)
- MySQL Community Server 8 https://dev.mysql.com/downloads/mysql/ (optional via installer)
- Navicat MySQL - https://www.navicat.com/en/sponsorship/education/student

Additional Resources:
- Murcah's Sample databases (from Appendix A & B) https://www.murach.com/register-for-downloads?return=https://www.murach.com/shop/murach-s-mysql-3rd-edition-detail
- Additional websites, services, and materials will be added throughout the semester

We will often work through SQL examples during lecture. Please bring your laptop to class, with sufficient charge.

Course Activities
- *Textbook Chapters / Lectures:* It is expected that you will read and study assigned textbook chapters prior to class time. Lectures will be interactive; please arrive in class on time and prepared to participate. You may have your laptops open during lecture but only for class activities such as note-taking, referencing an e-copy of the book, or running class exercises in MySQL Workbench.

- *Quizzes:* Online and in-class quizzes will test your comprehension of readings and lectures. Quizzes are individual work. They will cover the readings for that week. All quizzes, including any that is done in-class, will be administered on Canvas. In-class quizzes will require being physically in the classroom at the time of the quiz. **Quizzes will be open book and unannounced with a 30 minute time limit.**

- *Lab Exercises:* There will be several in-class lab exercises. You will usually receive these practice problems before class and should preview them before class, but you must execute them in class with instructor or peer assistance as needed. You will submit your work via Canvas. Some lab exercises will be done as part of your work with your project team.

- *Homework Assignments:* There will be four assignments over the semester, each of which will include multiple questions. Most of the questions will be practical tasks, such as writing SQL queries, normalizing a table, or developing a stored program. The assignments are individual work. Although you may consult with your classmates, the peer mentors and the instructor to develop general approaches to solving questions, you must work individually while you build, type, test and debug your answers. Assignment questions will be available on Canvas. Completed assignments will be submitted via Canvas, as well. Timely submission of the completed assignments is essential. The due date of each assignment will be stated clearly in the assignment description. If an assignment due date is a religious holiday for you, please let the instructor know as soon as the assignment is announced, so an alternate due date can be set for you.

- *Team Project:* Students will work in teams to design and build a non-trivial relational database throughout the semester. Project-related work is central to this course, and a big portion of your final grade is based on the project. The project will involve identifying an end-user need for a relational database, reviewing and evaluating an existing, non-optimal database aimed at addressing the identified need, determining the requirements for the database, developing a deadline-oriented plan for building the database, and designing the logical specifications, building and populating the database, and developing queries/views that will showcase the capabilities of the database for fulfilling the identified user needs. Students will be assigned to teams by the instructor. The teams will choose their topics from a list of possible project topics.

- *Mid-term Exam:* An in-class mid-term exam will be administered on Canvas to test students' understanding of data modeling and relational database concepts, as well as their SQL query developing skills. The mid-term exam may include conceptual questions such as those that ask for definitions of and comparisons between data modeling and relational database concepts, as well as query challenges that test students' SQL skills. Some of the questions may be related to students' work on the team project.

- *Final Exam:* An in-class final exam will be administered on Canvas to test students' understanding of data modeling and relational database concepts, as well as their SQL query developing skills. The final exam may include conceptual questions such as those that ask for definitions of and comparisons between data modeling and relational database concepts, as well as query challenges that test students' SQL skills. Some of the questions may be related to students' work on the team project.

Policy on Academic Misconduct
- Cases of academic misconduct will be referred to the Office of Student Conduct irrespective of scope and circumstances, as required by university rules and regulations. It is crucial to understand that the instructors do not have a choice of following other courses of actions in handling these cases. There are severe consequences of academic misconduct, some of which are permanent and reflected on the student's transcript. For details about procedures governing referrals and possible consequences visit http://osc.umd.edu/OSC/Default.aspx.
- It is very important that you complete your own assignments, and do not share any files or other work. The best course of action to take when a student is having problems with an assignment question is to contact the instructor. The instructor will be happy to work with students while they work on the assignments.

University of Maryland Code of Academic Integrity
- The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://shc.umd.edu/SHC/Default.aspx.

Special Needs

- Students with disabilities should inform the instructors of their needs at the beginning of the semester. Please also contact the Disability Support Services (301-314-7682 or http://www.counseling.umd.edu/DSS/). DSS will make arrangements with the student and the instructors to determine and implement appropriate academic accommodations. Students encountering psychological problems that hamper their coursework are referred to the Counseling Center (301-314-7651 or http://www.counseling.umd.edu/) for expert help.

Course-Related University Policies

- UMD's Office of Undergraduate Studies has developed a guide to provide students with resources and information relevant to participation in a UMD course. You can access the guide at http://www.ugst.umd.edu/courserelatedpolicies.html.

Names/Pronouns and Self Identifications

- The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more. Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all your fellow Terps.

Grading

- Your grade is determined by your performance on the assessment components in the course. All assessment scores will be posted on Canvas. If you would like to discuss your grade, or have questions about how something was scored, please schedule a time with the course TA. Grade disputes must be turned in within one week of receiving the graded work. They must be submitted as a written document in which you indicate the graded work, an explanation of what you believe was misgraded, and an explanation for why you think it should be given a different score. For any re-grade request, the entire assignment will be regraded, and your score may go up or down according to what changes are made for rectifying grading errors.
- Some (not all), graded work may allow slightly late submission for a percent deduction on the score. In such cases, the cut-off times and associated penalties will be indicated within the assignment. Cut-off dates and times for percent deductions are absolute, and cannot be relaxed retroactively due to any reason, including technical issues, such as those with your computer or submission problems on Canvas. **To avoid unexpected complications, complete and submit your work well in advance of the due dates and times.** Assignments submitted beyond the final due date will not be accepted and you will receive a zero. Not all assignments will allow for late submission; please read all submission instructions carefully.

Scores on each component will be combined to produce a single overall score for each student as follows:

Component	Percentage
Quizzes 🏁	5%
Lab exercises 🏁	5%
Assignments 🏁	20%
Team Project ⚠	40%
Project Team Report	*3%*
Project Proposal	*5%*
Proposal Review	*2%*
Progress Report	*5%*
Final Database and Report	*20%*
Peer Evaluation	*5%*
Mid-term Exam 🏆	15%
Final Exam 🏆	15%

Letter grades will be assigned using the following scale

Grading Scale									
A+	≥ 97%	B+	≥ 87.00%	C+	≥ 77.00%	D+	≥ 67.00%		
A	≥ 93.00%	B	≥ 83.00%	C	≥ 73.00%	D	≥ 63.00%	F	<60.0%
A-	≥ 90.00%	B-	≥ 80.00%	C-	≥ 70.00%	D-	≥ 60.00%		

Note: There is no automatic rounding: for example, an A- is at least 90.00, not 89.5 or 89.9. However, I may choose to round up, taking attendance, class participation, and group contributions into account. There will be no rounding up if you have missing or late assignments.

Course Schedule *(This schedule is for planning purposes and may change. See Canvas (ELMS) for current information and deadlines.)*

Sess	Date	Topics	Reading Due	Work
1	Jan 31	* Introductions, surveys, course goals, software installs, relational db concepts * Amazon RDS	Appendix A & B	* Install Murach sample db * Install Laragon (or equivalent) * Amazon AWS - RDS
2	Feb 7	* Installation checks - all systems go * SELECT data retrieval	Chapter 1 Chapter 2 Chapter 3	Software installed, configured, and tested
3	Feb 14	* Team Project Overview * JOINS * C.R.U.D operations	Chapter 4 Chapter 5	Intro Team Projects
4	Feb 21	* Form Teams * Aggregate functions * Summary Queries & Subqueries * Project Plan Draft Instructions	Chapter 6 Chapter 7	Teams Formed / Assigned 🏁Assignment 1 due
5	Feb 28	* Data Types & Functions	Chapter 8 Chapter 9	
6	Mar 6	* Midterm Review * Open session Chap 1 ~ 9 concepts		🏁Assignment 2 due ⚠**Team Project Draft Due** (prelim project proposal)
7	Mar 13	* **Midterm Exam** * Project Plan Final Instructions 🎯 Student Feedback / Surveys		🏆 **Midterm Exam (1st half of class)**
-	Mar 20	SPRING BREAK 3/15 to 3/22 (relax & enjoy)		
8	Mar 27	Database Design, ER- Diagrams Databases, Tables, Indexes,	Chapter 10 Chapter 11	⚠**Team Project Plan Due** **(detailed project plan)**
9	Apr 3	Creating Views	Chapter 12 Chapter 13	🏁Assignment 3 due
10	Apr 10	Transactions, Concurrency, Locking, Stored procedures	Chapter 14 Chapter 15	
11	Apr 17	Triggers & Events	Chapter 16	⚠**Team Project Progress Report** (report project progress + db)
12	Apr 24	DB Admin: Security, Backups, and Restores	Chapter 17 Chapter 18 Chapter 19	🏁Assignment 4 due
13	May 1	In class group work on Team Project		
14	May 08	Final Exam Review		⚠**Team Project Due** (final report + db)
15	May 15	* FINAL EXAM * Team Project Peer Evaluations		🏆 **Final Exam (1st half of class)** ⚠**Project Peer Eval**