



Course Syllabus * FALL 2019

INST 327 – Database Design and Modeling Section 0101 [Tuesday/Thursday]

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.

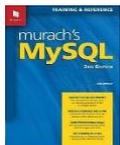
After successfully completing the course you will be able to:

- 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: <https://umd.instructure.com/courses/1273853>

Textbook:



Murach's MySQL
Murach, J.
Third edition (2019)
ISBN: 9781943872367

Physical copies are available via campus bookstore. For ebooks:

<https://www.murach.com/shop/murach-s-mysql-3rd-edition-detail>

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

Software (install on your laptop): <http://dev.mysql.com/downloads/installer/>

- MySQL Community Server v8 (alternative XAMPP, see ELMS homepage)
- MySQL Workbench v8

We will often work through SQL examples during lecture. Please bring your laptop to class, with sufficient charge. The number of outlets in the classroom may be minimal.

Pamela Duffy

Use ELMS for messages

Office: HBK 4120K

[pronouns: she/her/hers](#)

Class Meets

0101: TTH 2:00-2:50PM

PHY #4221

Office Hours

Posted on ELMS course site

Teaching Assistant

Duncan Squires

Academic Peer Mentors

See Office Hours link on ELMS course site

Prerequisites

Pre-requisite: INST126,
CMSC122, or CMSC106

Pre- or co-requisite:
INST201, INST301

Course Communication

Slides, practice problems, assignments, quizzes, and other information will be posted on ELMS. Important information will be communicated via the Inbox, Announcements, and Discussion.

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

Communicate with me via ELMS inbox.

Email subject headings should begin with “INST327: “. Otherwise, they are likely to get lost in Junk Mail.

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

Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics such as:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit www.ugst.umd.edu/courserelatedpolicies.html for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

Course Policies

- Attend class and arrive on time
- Bring a charged laptop to class
- Participate in class
- Monitor ELMS daily; adjust settings as needed to ensure receipt of all notifications
- Follow course calendar activities:
 - Read chapters and execute examples before the lecture
 - Complete quizzes as assigned
 - Review practice problems before in-class labs
 - Complete labs in class and submit via ELMS
 - Submit all individual and team assignments via ELMS on time
- All team members must participate in the team project

Additional University Resources

You are expected to take personal responsibility for your own learning. This includes acknowledging when your performance does not match your goals and doing something about it. Everyone can benefit from some expert guidance on time management, note taking, and exam preparation, so I encourage you to consider visiting <http://ter.ps/learn> and schedule an appointment with an academic coach. Sharpen your communication skills by visiting <http://ter.ps/writing> and schedule an appointment with the campus Writing Center. Finally, if you just need someone to talk to, visit <http://www.counseling.umd.edu>.

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.

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.

Office Hours, Topic Clinics, Group Project Support

For extra clarification of a lecture topic, lab exercise, quiz, or assistance with a homework assignment, please come to office hours. NOTE: A schedule will be posted with timeslots for team project support. Support appointments will be scheduled via Google sheets and timeslots must be reserved in advance. At least two team members must attend support appointments.

Course Activities and Assessments

- *Lectures:* You are expected to complete the assigned reading 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:* Quizzes will test your comprehension of class readings and lectures. Quizzes are individual work. They will cover the readings and will be due by 11:59 PM on the date indicated in ELMS. Some quizzes may have a 30-minute time limit from when you begin the quiz.
- *Lab Exercises:* There will be in-class lab exercises as noted in the schedule. You will receive these practice problems ahead of time and should preview them before class, but you must execute them in class with instructor assistance as needed. You will submit your work via ELMS and will receive a completion grade. Most lab exercises will be done with your project team but must be submitted individually.
- *Homework Assignments:* There will be several assignments, each of which will include multiple questions. The questions will be practical tasks, such as writing SQL queries, constructing a view, normalizing a table, or developing a stored procedure. The assignments are individual work. Although you may consult with your classmates 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 ELMS. Completed assignments will be submitted via ELMS. Timely submission of the completed assignments is essential. The due date of each assignment will be stated explicitly in ELMS. If an assignment due date is a religious holiday for you, please let the instructor know as soon as the assignment is announced so that an alternate due date can be set for you.
- *Team Project:* Students will work in 4 to 5-person teams to design and build a non-trivial relational database. Project-related work is central to this course; the project accounts for 40% of graded work. The project will involve identifying an end-user need for a relational database, determining the requirements for the database, developing a deadline-oriented plan for building the database, 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. Teams will choose their topics from a list of possible project topics.
- *Mid-term Exam:* A mid-term exam will be administered to test students' understanding of data modeling and relational database concepts, as well as their SQL skills. The mid-term exam may include textual questions such as those that ask for definitions of and comparisons between data modeling and relational database concepts, as well as query challenges. Some of the questions may be related to students' work on the team project.
- *Final Exam:* A final exam will be administered to test students' understanding of data modeling and relational database concepts, as well as their SQL skills. The final exam may include textual questions such as those that ask for definitions of and comparisons between data modeling and relational database concepts, as well as query challenges. Some of the questions may be related to students' work on the team project.

Grades

Your course grade is determined by your performance on the learning assessments in the course. Assessment scores will be posted on ELMS. 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 submitted in writing within one week of receiving the grade.

A few assignments will allow slightly late submission for a percent deduction on the score. In such cases, the cut-off times and associated penalties will be indicated in the assignment. 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!

This table illustrates the percentage weight of each assessment towards your final grade.

| Component | Percentage |
|---------------------------------|------------|
| Lab Exercises | 5% |
| Quizzes | 5% |
| Assignments | 20% |
| Team Project | 40% |
| <i>Project Plan</i> | 3% |
| <i>Project Proposal</i> | 5% |
| <i>Proposal Peer Review</i> | 2% |
| <i>Progress Report</i> | 5% |
| <i>Final Project</i> | 20% |
| <i>Team Member Peer Reviews</i> | 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 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 ELMS for current information and deadlines.)

| Wk | Session | Date | Topics | Reading | Non-Project Work | Project Work |
|----|---------|-----------|---|------------------------------------|--------------------------------------|--|
| 1 | 1 | 8/27, T | Introduction, Class structure, and Tests / Team Project Process | Project Files | Q1 | |
| | 2 | 8/29, TH | Relational Database Concepts / Software Installation | Appendix A, Appendix B / Chapter 1 | MySQL/XAMPP server & MySQL Workbench | |
| 2 | 3 | 9/3, T | 5- SELECT from a single table | Chapter 3 | Installation Checkpoint | |
| | 4 | 9/5, TH | L1 - LAB: SELECT & MySQL Workbench | Chapter 2 | L1, Q2, Software installed/tested | |
| 3 | 5 | 9/10, T | 6- Relationship types / Joins | Chapter 4 | Q3 | |
| | 6 | 9/12, TH | 7- UNION / L2 - LAB: Multiple table SELECTs | | L2 | Form teams; Team Contracts |
| 4 | 7 | 9/17, T | 8- INSERT, UPDATE, DELETE / Team Project Work: Project Plan & Schedule | Chapter 5 | Q4 | |
| | 8 | 9/19, TH | L3 - LAB: INSERT / UPDATE / DELETE | | L3 & A1: Queries | |
| 5 | 9 | 9/24, T | 9- Aggregate functions & Summary queries / 10- Subqueries | Chapters 6 & 7 | Q5 | Project Plan due 9/23 11:59 PM [Develop preliminary project plan & schedule] |
| | 10 | 9/26, TH | Subqueries (cont) / L4- LAB: Summary / Subqueries | | L4 | Project Standup #1 & Team Evaluation #1 |
| 6 | 11 | 10/1, T | 11- Data Types / Functions | Chapters 8 & 9 | Q6 | |
| | 12 | 10/3, TH | L5- LAB: Data Types & Functions | | L5 & A2: CRUD | |
| 7 | 13 | 10/8, T | 13- Normalization, Dependencies, Relationships | Chapter 10 | Q7 | |
| | 14 | 10/10, TH | 13a- Normalization: Discussion & Class Exercise / L6- LAB: Normalization; DB Evaluation | | L6 | |
| 8 | 15 | 10/15, T | 12- Midterm Review | | | |
| | 16 | 10/17, TH | MIDTERM EXAM / Team Project Work | | | |

| Wk | Session | Date | Topics | Reading | Non-Project Work | Project Work | |
|-------------------|---------|-----------|---|------------------|--|---|--|
| 9 | 17 | 10/22, T | 14- Entity-Relationship Diagrams | Chapter 10 | Q8 | Project Proposal due 10/23 11:59 PM [Detailed Project Plan] | |
| | 18 | 10/24, TH | Database Creation (cont) / L7- LAB: ERD | Chapter 11 | L7 | Project Standup #2 & Team Evaluation #2 | |
| 10 | 19 | 10/29, T | 16- Views; Indexes / 17- Stored Program Development | Chapters 12 & 13 | Q9 | | |
| | 20 | 10/31, TH | Stored Program (cont) / L8- LAB: ERD Creation & Team Project Work | | L8 A3: Normalization (11/1) | | |
| 11 | 21 | 11/5, T | 18- Transactions, Concurrency, & Locking / 19- Stored Procedures | Chapters 14 & 15 | Q10 | Peer Review of Proposal due 11/4 11:59 PM [Access Peer Team Proposal] Project Standup #3 & Team Evaluation #3 due 11/5 | |
| | 22 | 11/7, TH | Stored Procedures (cont) / L9- LAB: Stored Programs | | L9 | Project Reflection due 11:59 PM, extra credit | |
| 12 | 23 | 11/12, T | 20- Functions, Triggers, & Events in depth | Chapters 15 & 16 | Q11 | Project Progress Report due 11/11 11:59 PM [Report project progress] | |
| | 24 | 11/14, TH | ETL, Sample Data Strategies / L10- Data Import | Chapter 19 | L10 & A4: Views & Stored Programs | Project Standup #4 & Team Evaluation #4 | |
| 13 | 25 | 11/19, T | 21- Database Backup, & Restore | Chapter 18 | Q12 | | |
| | 26 | 11/21, TH | 22-Database Administration & Security / L11- LAB: Backup/Restore & Reverse Engineer | Chapter 17 | L11 | | |
| 14 | 27 | 11/26, T | Team Project Work: Forward Engineering, Data Strategies, & Data Import | | | | |
| | - | 11/28, TH | THANKSGIVING BREAK - NO CLASS | | | | |
| 15 | 28 | 12/3, T | Team Project Work: Sample Data / Queries & DB Backup/Restore | | | | |
| | 29 | 12/5, TH | Review for final exam & Course Wrap-up / Team Project Work: Final Delivery & Report | | A5: Database Administration (optional) | Project Standup #5 & Team Evaluation #5 / Project DB & Final Report due 12/6 11:59 PM | |
| FINAL EXAM | | | | | | | |