INST 123 – Introduction to Relational Databases
Section 0101

Instructors:
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Course Description and Learning Outcomes

INST 123 is a 3-credit GenEd Distributive Studies Scholarship in Practice course. It is an introduction to relational databases for students with no previous programming experience. This course provides a means for students of diverse backgrounds to successfully learn how to store, retrieve, and maintain data in relational databases. Students are not expected to have any computer programming experience.

Topics include a brief comparison of database systems with an emphasis on relational databases, fundamental relational database concepts, and data types. It also includes technical approaches to accessing information stored in relational databases, including problem analysis, query creation, and execution, as well as debugging techniques. Students will implement solutions by learning and using the Structured Query Language (SQL) and a relational database management system (RDBMS) to populate and query a series of sample databases. This is a hands-on course; students will be writing, analyzing, and testing SQL queries. The overall objective of this course is to provide a foundational understanding of relational databases, the methods through which the information housed in such databases can be efficiently accessed and maintained, and the process of working with information professionals to design and implement relational databases to meet the information needs for a wide variety of subjects.

After successfully completing the course, you will be able to:

- Explain relational database principles, concepts, and holistic data-set oriented programming methods;
- Create user-oriented database queries using the Structured Query Language (SQL);
- Develop SQL views, functions, and stored procedures by applying SQL programming concepts;
- Test and assess the quality of SQL procedures;
- Write useful in-code comments and other documentation;
- Describe 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;
- Explain how the use and design of relational database systems reflect broader social and organizational structures and the related ethical and equity issues.

Class Meets
Tues & Thurs
Time: 9:30 – 10:45 AM
Location: SQH 1120

Office Hours
To be posted on ELMS

Teaching Assistants
Harsh Mehta

Academic Peer Mentors
LeLe Befikadu
Ayesha Shafquat
Aviva Moshman
Betzalel Moskowitz
Yomi Omogbehin

Prerequisites
Pre-requisite: none

Course Communication
Use ELMS for messages to instructors, TA, and AMPs.

Email subject headings should begin with "**INST123:** ".

Slides, practice problems, assignments, quizzes, and other information will be posted on ELMS. 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.

Required Resources
Course Website: https://umd.instructure.com/courses/1277883
Textbook:

Practical SQL: A Beginner's Guide to Storytelling with Data (2018)
DeBarros, A.
ISBN: 9781593278274

Physical copies are available via the campus bookstore. Ebooks are available via multiple sources. Additional readings and resources will be assigned. These materials will be announced in class and be available via ELMS.

Software:
- PostgreSQL (https://www.postgresql.org/) and PgAdmin (installed as part of PostgreSQL package).
  - **VCL option:** We are currently working with the iSchool OIT to make a Virtual Computer Lab (VCL) image available with the required software. When the image is available, students will have the option of using an instance of the image to run the software mentioned above, instead of requiring installation and execution on their own computers. More information will be available on ELMS as we make progress.

- Turning Point: Clickers are NOT required; you may use the phone or laptop app.
  - Download and install "Turning Point."
  - Visit the Students section of clickers.umd.edu for details.

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

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, arrive on time, and actively participate
- Bring a charged laptop to class
- Monitor ELMS daily; adjust settings as needed to ensure receipt of all notifications
- Follow course calendar activities:
  - Keep up with assigned reading and execute examples before the lecture
  - Complete worksheets, homework, and 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 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.

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.

Office Hours, Topic Clinics, Group Project Support

For extra clarification of a lecture topic, lab exercise, or quiz; or assistance with a homework assignment, please come to office hours. In addition to the instructor's office hours, there will be peer mentor office hours which will be announced via ELMS.

Course Activities and Assessments

As a Scholarship in Practice course, activities and assessments are designed to support the semester-long Team Database Optimization project. Activities gauge your understanding and expertise of the SQL skillset and readiness to perform the related project stage. Activities and assessments that <u>directly</u> support the project are tagged with *SiP* both in this section and in the course syllabus.

- *Lectures:* You are expected to complete the assigned reading before class time. Lectures will be interactive; please arrive in class on time and prepared to participate. You may have your laptops open during lectures but only for class activities such as note-taking, referencing an e-copy of the book, or running class exercises in MySQL Workbench.

- *Quizzes (5% of final grade):* Quizzes will test your comprehension of concepts covered in the reading. Quizzes are individual work. They will cover the readings for the week. Most quizzes will become available one week before the Tuesday class on the relevant reading and will be due on Monday. Quizzes will have a 30-minute time limit from when you begin the quiz. The lowest grade is dropped.

- *In-class Learning Checks (5% of final grade):* We will use learning checks during the Tuesday class session each week (via Turning Point questions) to make sure that you are keeping up with the content. The learning checks will be an assessment of your comprehension of the material being covered. You can do well if you pay attention in class and keep up with the reading. The lowest grade is dropped.

- *Lab Exercises (5% of final grade):* In-class lab exercises provide practice of the skills necessary for a comprehensive understanding of SQL and the successful completion of the team project. You will receive these practice problems ahead of time and should preview them before class, but you must execute them in class with the instructor's or peer mentor's assistance as needed. You will submit your work individually via

ELMS and will receive a completion grade. Most lab exercises will take place on Thursdays and be done with your project team to foster team cohesion.

- *Homework Assignments (20% of final grade):* There will be several assignments, each of which will include multiple questions. Most of the questions will be practical tasks, such as debugging SQL queries, writing SQL queries, inserting or updating data, or constructing a view. The assignments are individual work. Although you may consult with your teammates, 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 ELMS, and 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 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 that an alternate due date can be set for you.

- *Team Database Optimization Project (35% of final grade):* Students will work in 5-person teams to analyze a small sub-optimal relational database and re-design the database to solve the problems with the original database. As a Scholarship in Practice course, project-related work is central to this class. The project will involve defining the team structure and responsibilities for individual team members, identifying issues with the chosen relational database, determining the requirements for optimizing the database, developing a deadline-oriented plan and schedule for building the database, designing the logical specifications, creating and populating the database, and developing queries/views that will showcase the capabilities of the database for fulfilling the identified user needs. Students will choose their teams or be assigned to teams by the instructor. Teams will choose their topics from a list of possible project topics. Central to this project will be team management and team interaction; project deliverables throughout the semester will include assessment of team function as well as the software development. Academic Peer Mentors (AMPs) will act as team mentors throughout the life cycle of the project.

- *Exams (30% of final grade):* Two exams will be administered to test student 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 questions in each exam will 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 a late submission. Please read all submission instructions carefully!

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

Component	Percentage
In-class Learning Checks: ~12, lowest grade dropped	5%
Lab Exercises: ~10, lowest grade dropped	5%
Quizzes: ~12, lowest grade dropped	5%
Assignments	20%
Team Project	35%
Team Contract *2%*	
Project Stand-ups (4) *3%*	
Project Proposal *5%*	
Proposal Review *2%*	
Progress Report *5%*	
Peer Reviews (4 reviews) *3%*	
Final Deliverable & Report *15%*	
Exams (2)	30%

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 team 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.)

The class meets twice a week for 75 minutes per session.

Week	Session	Date	Topics and Classwork	Readings	Homework	Team Project Assignments
1	1	1/28, T	Introduction: Syllabus, Course Expectations	Syllabus & ELMS Site		
	2	1/30, TH	Introduction to PostgreSQL and PgAdmin	See ELMS		
2	3	2/4, T	Creating Your First Database	Chapter 1		Introduction of Team Project Process
	4	2/6, TH	LAB: Postgres Setup & Creating a DB		PostgreSQL Setup	Team Formation Survey
3	5	2/11, T	Exploring Data with SELECT	Chapter 2		
	6	2/13, TH	LAB 1: Creating Queries (SELECT)			Form teams; Students without a team will be assigned to a team
4	7	2/18, T	Data Types	Chapter 3		Work with team to assign roles and responsibilities
	8	2/20, TH	LAB 2: Using Data Types		All software configured and tested **Assignment 1:** Simple Queries	Submit Team Contract
5	9	2/25, T	Importing and Exporting Data	Chapter 4		
	10	2/27, TH	LAB 3: Data Import and Export			
6	11	3/3, T	Math and Statistics with SQL	Chapter 5		
	12	3/5, TH	LAB 4: Using Math to Understand Data		**Assignment 2:** Data Types | Data Import/Export	
7	13	3/10, T	Joining Tables Midterm Review [Chapter 1-5]	Chapter 6		
	14	3/12, TH	**MIDTERM EXAM**			
8		3/16-20	Optional Reading: PostgreSQL from the Command Line	Chapter 16	**SPRING BREAK**	
9	15	3/24, T	Designing Tables	Chapter 7		
	16	3/26, TH	LAB 5: Multi-Table Queries | Designing Tables		**Assignment 3**: Math in Queries | Multi-Table Queries	Project Proposal due **Friday, 3/27, 11:59 PM** (Detailed project plan and proposal)
10	17	3/31, T	Grouping and Summarizing	Chapter 8		Project Standup #1 [Status of Project]
	18	4/2, TH	LAB 6: Grouping & Summarizing		**Assignment 4:** Designing Tables |Summary & Subqueries	Meet with Team Mentor to discuss Proposal and clarify next steps.
11	19	4/7, T	Modifying Data: The CUD in CRUD	Chapter 9		

	20	4/9, TH	LAB 7: CUD – Modifying Data			Peer-review of Proposal due **Friday, 4/10, 11:59 PM** (Assess another team's proposal)
12	21	4/14, T	Statistics in SQL | Working with Dates & Times	Chapters 10-11		Project Standup #2 [Status of Project]
	22	4/16, TH	LAB 8: Statistics in Data | Dates & Times		**Assignment 5**: C*UD |Statistics	Meet with Team Mentor to discuss Peer-review and clarify next steps.
13	23	4/20, T	Advance Queries	Chapter 12		
	24	4/23, TH	LAB 10: Advanced Queries		Assignment 6:	Project Progress Report due **Friday, 4/24, 11:59 PM** (Report project progress)
14	25	4/28, T	Mining Text to Find Meaningful Data	Chapter 13		Project Standup #3 [Status of Project]
	26	4/30, TH				Meet with Team Mentor to discuss Progress Report and clarify next steps.
15	27	5/5, T	Views |Maintaining the database | Telling the Story Behind Your Data	Chapters 15, 17, & 18		
	28	5/7, TH	In-class work on Project			
16	29	5/12, T	Final Project Stand-Up | Exam Review	Chapters 6-13, 15-18		- Project Report due **Tuesday, 5/12, 11:59 PM** (Report project work) - Project Standup #4 [Review of Project/Mini Presentation]
FINALS WEEK			**FINAL EXAM** (Date and time: Check at https://app.testudo.umd.edu/soc/exam/ after mid-semester).			