STAT 6289.10 – Database Management using Python

(Spring 2024)

Course and Contact Information

- **Meeting Time:** Wednesday 3:30 PM – 6:00 PM
- **Location:** Rome 351

Instructor

- **Name**: Fang Jin
- **Email**: fangjin@gwu.edu
- **Instructor Office Hours**: Wednesday 2:30 PM – 3:30 PM
- **Office:** Rome 769

TA

TA Name:
Email:
TA Office Hours:
TA Office Location: Rome 7th floor TA office.

Course Description

- This course has two components: (1) database management system, and (2) database handling using Python.

- In the database management system part, we will learn database concepts, database design, and management, such as how to create, store, modify, retrieve, and handle data from a database.

- In this class, we will learn not only traditional relational database such as MySQL, but also currently popular Non-relational database, for example, MongoDB.

- Besides introducing database design and manipulation, we will learn how to use Python to interact with databases, including table-based relational database, and flexible NoSQL databases dealing with documents.

Learning Outcomes

As a result of completing this course, students will be able to:

- Design and implement a relational database; understand the fundamental principles of the relational data model; Formulate an Entity-Relationship (ER) diagram as conceptual design of database requirements; Map ER diagrams to relational schemas.

- Formulate a correct relational algebra expression to answer a query using a query language such as SQL that involves select-project-join, negation, union, intersection, minimum/ maximum, and a limited form of counting

- Design and implement a non-relational database;

- Perform statistical analysis on databases.
- Manage database operation proficiently;
- Using Python to interact with databases; Apply database theory to practice by creating a database application using a commercial database product

Course Prerequisites:

STAT 6201

Suggested References Books:

- **Database Systems: A Practical Approach to Design, Implementation, and Management** (6th Edition) by Thomas Connolly, Carolyn Begg.
  ISBN-13: 978-0132943260; ISBN-10: 0132943263

- **Database Management Systems** (Third Edition) Raghu Ramakrishnan and Johannes Gehrke. Publisher**:** McGraw-Hill College
  ISBN-10**:** 0071230572; ISBN-13**:** 978-0071230575

Grading Policy: The final grade for this course will be based on the following categories:

Homework	50%	Individual work. Will release around 5 homework
Pop up Quiz	20%	Around 4 quizzes will be released in the class. Each quiz accounts 5%. Close book quiz. Students must follow quiz instructions.
Homework Presentation	5%	Each student can choose to present one of their homework in the class.
Final project	25%	Each 2 member team is expected to carry out a design/implementation project. The final project will release in the class.

- ALL HWs **MUST** be submitted to the blackboard **before the class**. **Late submission will deduct 20% every day.**

Class Design

The class time will be divided into lecture session and lab session.

✧ First two hours will be lecture session.

✧ The last half an hour will be lab session. The purpose is to get familiar with database manipulation and python programming in order to interact with databases.

It is expected that students spend 2.5 hours in classroom on lecture plus eight hours of independent learning per week.

Course Schedule: The table (below) provides the initial distribution of topics discussed over the weeks in the semester. **This schedule is tentative and subject to change**. The homework release and quiz depends on the course flow.

Week	Date	HW Release	Content
1	1/17		Course Introduction; Introduction to Database; Database Environment
2	1/24		Database System Design Lifecycle Physical Database Design
3	1/31		Relational Model Relational Algebra and exercise
4	2/7	HW 1	Conceptual Database Design Entity Relationship Modeling
5	2/14		SQL: Data Manipulation
6	2/21	HW 2	Advanced SQL query and data manipulation
7	2/28		Normalization
8	3/6	HW 3	Constrain; Trigger; Indexes;
9	3/13		Spring Break
10	3/20		Views; Subquery; Relational model for storage and retrieval of information Statistical data analysis of database
11	3/27	HW 4	Python programming to interact with database
12	4/3		Non-relational database introduction MongoDB – Environment Data modeling
13	4/10	HW 5	Create database Modeling Embedded Relationships
14	4/17		Query document, text search
15	4/24	<Final Project>	Final Project Presentations

Grading Distribution

✧ The usual grading scale will be used. This scale may be curved to raise student grades at the instructor's discretion.

[94, 100] A, [90, 94) A- , (87, 90) B+ , [83, 87] B, [80, 83) B- , (77, 80) C+ , [73, 77] C

 [70, 73) C-, (67, 70) D+ , [63, 67] D, [60, 63) D-, <60 F

University policies

Academic Integrity Code

Academic integrity is an essential part of the educational process, and all members of the GW community take these matters very seriously. As the instructor of record for this course, my role is to provide clear expectations and uphold them in all assessments. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and otherwise violate the Code of Academic Integrity. If you have any questions about whether or not particular academic practices or resources are permitted, you should ask me for clarification. If you are reported for an academic integrity violation, you should contact the Office of Student Rights and Responsibilities (SRR) to learn more about your rights and options in the process. Consequences can range from failure of assignment to expulsion from the university and may include a transcript notation. For more information, please refer to the SRR website (https://studentconduct.gwu.edu/academic-integrity), email rights@gwu.edu, or call 202-994-6757.

University policy on observance of religious holidays

Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three weeks of class, the student must inform faculty in the first week of the semester. For details and policy, see "Religious Holidays" at provost.gwu.edu/policies-procedures-and-guidelines.

Use of Electronic Course Materials and Class Recordings

Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Please contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Academic support
Writing Center

GW's Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online at gwu.mywconline.

Academic Commons

Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at academiccommons.gwu.edu.

Support for students outside the classroom

Disability Support Services (DSS) 202-994-8250

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services at disabilitysupport.gwu.edu to establish eligibility and to coordinate reasonable accommodations..

Counseling and Psychological Services 202-994-5300

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. healthcenter.gwu.edu/counseling-and-psychological-services.

Safety and Security

- In an emergency: call GWPD 202-994-6111 or 911
- For situation-specific actions: review the Emergency Response Handbook at: safety.gwu.edu/emergency-response-handbook
- In an active violence situation: Get Out, Hide Out, or Take Out. See go.gwu.edu/shooterpret

Stay informed: safety.gwu.edu/stay-informed