CSCI-2541 Database Systems

Course and Contact Information

Course: CSCI-2541w -- Database Systems
Semester: Spring, 2019
3 credit hours
Lecture duration: 2.5 hours, Lab duration: 75 minutes

Instructors

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Catalog Description

Design of relational database systems and big data database systems. Relational query languages including SQL, relational schema design and implementation of relational database applications. Introduction to data analytics and information processing systems. Introduction to Not just SQL (NoSQL) database systems, types of NoSQL databases, design of NoSQL databases, NoSQL database applications. Team-software development, integration and testing. Co-requisite CSci 2113, Pre-requisite: CSci 1311.

Required Textbooks:

- No required text.
- Online resources will be provided for the topics covered in this course.
    - Notes will be posted online, at www.seas.gwu.edu/~bhagiweb/cs2541
    - Online resources for NoSQL databases: www.mongodb.com , aws.amazon.com/dynamodb
    - Online SQL book:
- Recommeded references
    - Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 7th Edition, Pearson, 2015.
    - Abiteboul, Suciu, and Buneman. *Data on the Web*. Morgan Kaufman

Learning Outcomes

Upon completion of this course students should:

- Design and evaluate relational database schemas, apply normalization techniques.
- Understand formal relational query languages, and understand and write queries in SQL.

- Experience programming in SQL using commercial relational database management systems.
- Able to build web applications, including both front end and backend, using different types of database systems to solve real world problems.
- Understand different types of NoSQL databases, design and use NoSQL databases and experience application development for NoSQL systems.
- Work in teams to design, program, integrate and test a database application.
- Improve technical writing skills, and write technical reports.
- Give an oral presentation and demonstration of a software project.

Class Schedule

Week	Topic	Text	HW/Project		Lab
			Out	Due	
1	Course Overview and Introduction to Relational DB Model		HW1		Web Front End development skills: HTML, CSS
2	Formal Query Languages: Relational Algebra & Calculus		HW2	HW1	Javascript, PHP
3-4	SQL Language and Programming in SQL.		HW3	HW2	MySQL, PHP
5	Theory of relational database schema design, and normal forms.		HW4; Project 1	HW3	MySQL
6	The ER model and ER-to-Relational Mapping. Review of Relational Model		HW5	HW4	MySQL
7	Exam 1, and Topics in relational databases: Views, Security, Recovery, Indexing		HW6	HW5	Project 1 discussions and status check
8	Overview of file management and indexing in database systems.		HW7	HW6	JDBC, JSON
9	Spring break				
10	Information retrieval systems and search engines. Introduction to data analytics (data mining) and Big Data Management Systems (BDMS).		HW8	Project 1; HW7	NoSQL Databases
11-12	NoSQL database systems: key-value, document store, column, graph.		Project 2, HW9	HW8	NoSQL DBs
13	NoSQL Databases		HW10	HW9	NoSQL DBs
14	Advanced Topics and Summary			HW 10	Project 2 discussion
NOTE: In accordance with university policy, the final exam (Project 2 demos) will be given during the final exam period and not the last week of the semester					

Assignments and Grades

Grading

- 35% homeworks, lab assignments, in-class exercises/quizzes and class participation. No late homeworks will be accepted, except with documented medical or family emergencies.
- 32% Exams (two exams)
- 33% Project (there will be two project phases, each has a deliverable and graded separately).
- You have one week after a grade (for an assessment) is posted to contact the instruction team. After that your assignment/assessment will not be regraded.

University Policies

University Policy on Religious Holidays

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance.
2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations.
3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities

Support for Students Outside the Classroom

Disability Support Services (DSS)
Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: gwired.gwu.edu/dss/

Mental Health Services 202-994-5300
The University's Mental Health Services offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations confidential assessment, counseling services (individual and small group), and referrals. counselingcenter.gwu.edu/

Academic Integrity Code

Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. In this course, there is no collaboration of any kind (online resources, sharing code, etc.) permitted on the assignments or exams. For the project, no collaboration is allowed between teams. Violation of this policy is at least a zero on the assignment but a more harsher sanction may be sought. For the remainder of the code, see: studentconduct.gwu.edu/code-academic-integrity and https://www.cs.seas.gwu.edu/academic-integrity-policy