CMSC 362: Theory of Databases (3 credits)
Spring 2023

Instructor: Robert Marmorstein (marmorsteinrm@longwood.edu) 434-395-2185
Lecture/Lab: 9:30am-10:45am (TR) Stevens 118
Office Hours: 1:00pm-1:50pm MTWRF (Stevens 109)
Course Web Site: http://marmorstein.org/~robert/Spring2023/cs362.html
My schedule is posted near my office door. To make an appointment, please check the schedule to see which times I am free, then contact me by e-mail and list some possible times we could meet.

Course Description:
A course covering the theory and practice of modern databases design and implementation. Topics include relational and hierarchical database design, database query languages, update consistency, and distributed databases.

Prerequisites:
CMSC 262 is a prerequisite for this course.

Course Objectives:
At the end of the course, the successful student will be able to:

– Create a relational database and perform SQL queries against it

– Use ER-models, schema diagrams, and other representations to design a database.

– Normalize databases for performance and correctness

– Explain the advantages and disadvantages of different database systems, including relational databases and NoSQL databases

Textbook and Other Resources:
The textbook for this class is "A First Course in Database Systems" by Jeffrey D. Ullman and Jennifer Widom (3rd edition).

Course Requirements:
Your grade will depend on successful completion of programming projects (50%), homework assignments and quizzes (25%), participation (5%), and the midterm and final exams (10% each).

Grading Policy:
Late work will not be accepted unless you have a serious medical or family emergency which prevents you from completing the assignment on time. In such cases, you do not need a doctor's note, but you must send me e-mail within twelve hours of the assignment due date to explain your circumstances and to make arrangements for the work to be completed.

Grading Scale:	100-91: A		90:	A-
89:	B+	88-81:	B	80:	B-
79:	C+	78-71:	C	70:	C-
69:	D+	68-64:	D		
63 or lower: F	(There is no grade of D- in this course)			

Attendance:
I expect you to attend class unless you are sick or engaged in a school-sponsored sport or extracurricular activity. Please do NOT come to class if you are sick. Instead, contact me within 12 hours of the absence to check whether you've missed any work and then make arrangements to get

notes from another student in the class. You should also check the course web site for announcements, new assignments, and other important updates.

I will rely primarily on your honor for enforcement of the attendance policy. However, I will keep a record of your attendance as required by Longwood policy. In accordance with campus policy, missing more than 10% of scheduled class time (5 class sessions) to unexcused absences may, at my discretion, result in loss of one letter grade and missing 25% of class or more (14 sessions), whether excused or not may result in an automatic failing grade.

Collaboration:
Exams and quizzes are to be completed entirely on your own. You may discuss the homework and lab projects with other students subject to these restrictions:

1. You should turn in only work which YOU have typed or hand-written.
The work you submit should, in general, be either your own original work or material which I have provided and you have modified without help from others. You MAY assist other students or get assistance with simple problems like syntax errors, but you may NOT copy large blocks of code from each other. A good guideline of what "large" means is that changes that involve one or two lines of code are usually okay, but copying more than three complete statements is usually too much.

If you are working in an assigned group, you may turn in one copy of the assignment for all the members of your group as long as you are careful to make sure that the name of each group member appears in a comment at the top of the files to which they contributed.

2. You may NOT copy code electronically from other students or the Internet.
This doesn't mean you can't look online for help with a project. It just means that you shouldn't copy/paste or download code and turn it in as your own. You must re-type any code you find (again subject to the three line limit).

*You may not share code with other students using flash drives, cell phones, e-mail, web sites, floppy disks, CDs, or **any other** electronic storage or communication device unless you are both assigned to the same group for a project. You may not print out copies of your code to share with other students (personal copies or copies for other students in your group are fine).*

3. You must give proper attribution.
Whenever you receive help or use an online resource, you should comment your code to give proper credit. A simple comment like "/ based on http://codewarrior.com */" is fine. This comment should go directly above or directly after the place that you used the resource or received help to make it clear which parts of your program are not entirely original.*

4. You are responsible for securing your code.
Helping other students to cheat is also cheating. Furthermore, it is your responsibility to make sure that other students do not use your work to cheat. Be careful with who you allow to access your computer or account. Report any missing files, flash drives, or other devices that contain your work to me promptly.
Infractions of these policies will be dealt with harshly under the Longwood Honor Code. Any student convicted of an honor offense involving this class will automatically receive a final course grade of **F** in addition to any penalties imposed by the Honor Board. You should consider all work in this class to be pledged work, whether or not the pledge appears on the assignment.

Food and Drink:
You may bring non-alcoholic beverages, including soft drinks, to class. However, please do not eat in class (it distracts me and the other students). Violations of this policy will be considered an unexcused absence. I occasionally grant exceptions to this rule for students who must otherwise forgo lunch or have medical needs that require them to eat in class. If you feel that you need such an exception, you must make arrangements with me in advance (that is, before bringing food to class).

Cell Phones and Laptops:
Cell phones, music players, and laptops are to be turned off and put away during class, except as needed for the lab sessions. Violations of this policy will be considered an unexcused absence.

Tentative **Course Schedule:**

Week 1: Jan. 12	**Introduction, The Entity-Relationship Model**	
	Read Syllabus	
Week 2: Jan. 17-19	Data Models and SQL	
	Read Chapters 1 and 2	
	Lab 1 (SQL Review) Due	
Jan. 19	**Last Day to Add/Drop classes**	
Week 3: Jan. 24-26	Keys, Constraints, and Normal Forms	
	Read Chapter 3	
Week 4: Jan. 31-Feb. 2	High-level Models, Entity-Relationship Diagrams	
	Read Chapter 4	
	Lab 2 (Constraints and Data Definition) Due	
Week 5: Feb. 7-9	The Relational Algebra	
	Read Chapter 5	
	Midterm Review Packet Due	
Week 6: Feb. 14-16	Catchup and Review, **Midterm Exam**	
Week 7: Feb. 21-23	Advanced SQL Queries and Joins	
	Read Chapter 6	
Week 8: Feb. 28-Mar. 2	Catchup and Review	
	Lab 3 (Aggregate Queries) Due	
Mar. 6-10	**Spring Break: No Class**	
Week 9: Mar. 14-16	Applications of Databases	
Week 10: Mar. 21-23	Views, Indexes, and Transactions	
	Read Chapter 8	
	Lab 4 (Databases in Web Programming) Due	
Mar. 29	**Deadline to withdraw without an F**	

Week 11: Mar. 28-30   SQL Schemas and Stored Procedures
Read Chapter 9
Lab 5 (Indexes and Triggers) Due

Week 12: Apr. 4-6   Database Administration, Security and Authorization
Read Chapter 10

Week 13: Apr. 11-13   NoSQL Databases: MongoDB

           Apr. 18   **Symposium Day: No Class**

Week 14: Apr. 20   Project Work Week
Lab 6 (NoSQL Databases) Due

Week 15: Apr. 25-27   NoSQL Databases (Continued)
Final Review Packet Due

           May 3   **Final Exam (Wednesday, 11:30am – 2:00pm)**