

CMSC 362: Theory of Databases (Spring 2025)
<https://marmorstein.org/~robert/Spring2025/362.html>

Lecture (Stevens 118): 11:00am – 12:15pm TR

Instructor: Dr. Robert Marmorstein, 395-2185, marmorsteinrm@longwood.edu

Office Hours (Stevens 109): MWRF 3:00-4:00pm or by appointment

Note: To make an appointment, check the schedule outside my office door, then send me a Slack message or e-mail with your availability. In general, I need about 24 hours notice to be able to schedule a meeting.

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. **3 credits.**

Prerequisites:

CMSC 262 is a prerequisite for this course.

Course Student Learning Outcomes:

By the end of the course, the successful student will be able to:

- Create a relational database and perform SQL queries against it
- Describe a database design using ER-models, schema diagrams, and other formal representations
- Normalize databases for performance and correctness
- Explain the advantages and disadvantages of different database systems, including relational and NoSQL databases

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-	78-71:	C
79:	C+	70:	C-
69:	D+	68-64:	D

63 or lower: F
(There is no grade of D- in this course)

Grade Weights:

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).

Course Structure and Student Expectations: This is a lecture oriented theory class with significant programming projects. We will meet twice a week for 75 minutes each period (a total of two and a half hours each week). You should expect to spend additional time, outside of class, completing the projects, reading tutorials and other resources, and preparing for tests and quizzes. The amount of time this requires will vary from week to week, but you should expect this to take around one to two hours each week on average.

Course Requirements: Your grade will depend on your successful completion of projects, a final exam, participation, homework assignments, and quizzes.

Major Assignments:

Note: Due dates for the major assignments of the class can be found at the end of this syllabus on the tentative course schedule.

Projects: There will five or six projects in this course focused on specific skills and topics of the course. See the tentative schedule below for projected due dates.

Homework Assignments and Quizzes: I give unannounced pop quizzes in class. You should prepare for these quizzes by making sure you have done the assigned reading for each class before coming to lecture (see the reading guide in the tentative schedule)

Homework assignments will be submitted as hard copies to my office. If I am not in, you may slip them under the door. Electronic copies of handouts, which you may print if you lose your hard-copy handout, and links to other readings and resources will be made available on the course web site.

I do not use Canvas for this course. Electronic submission will be through the submit system at <https://marmorstein.org/~robert/submit/>

Midterm Exam: The midterm exam will be a closed-notes, closed-book test given in class on **Thursday, Feb. 20th**. A study guide will be provided and collected before the exam.

Final Exam: The final exam will take place on **Thursday, May 8th at 8am**. I will hand out the exam in **Stevens 118** and it will be due to my office by the end of the exam period. It will be a comprehensive final covering all topics of the course. A study guide will be provided and collected before the exam, but the exam will be closed book and closed notes.

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 twelve 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 and the Honor Code:

All work in this class should be considered to be pledged work. I take the honor code very seriously and will report suspected honor code violations to the honor board – even for a first offense. Any violation of the honor code in this class will result in a grade of **F** for the course in addition to any penalties imposed by the honor board.

However, I do not view the honor code as a punitive tool. It is also a guardian that enables healthy collaboration and research – as long as you know and follow the rules. To that end, here are some principles you should follow in this class:

1. You **MAY** collaborate on homework problems as long as you:

- a. *write down (or type) your own answers in your own words* and
- b. *give credit to those with whom you have collaborated.*

To give credit, simply write the names of others you have worked with in the margin of your handout.

2. You **MAY NOT** collaborate in ANY way on tests and quizzes.

Tests and quizzes must be completed entirely on your own. All tests and quizzes will be taken closed-book and closed-notes and you should not discuss them with anyone but me.

3. You **MUST** give proper credit to sources you use in your work (both on your paper and other course assignments).

In this class, you must cite **any** sources you use, including articles, tutorials, interviews, books, web pages, graphics, videos, songs, charts, and other forms of print or electronic media.

4. You **MAY** ask me for help during office hours.

Information I provide to you during office hours or lecture does not need to be cited unless it comes from an external source (for example, if I point you to an article on the web, you do not need to cite me, but SHOULD cite the web site).

Plagiarism is a form of cheating that involves taking credit for someone else's work. Students often don't realize that citing a source by adding it to a bibliography page is not enough – you must also clearly indicate WHERE in your paper or project you used the borrowed material. The easiest way to do this is by adding either a footnote or endnote, but can also use “in-text” citations.

The Longwood library has some good materials about how to avoid plagiarism at this link: <https://libguides.longwood.edu/c.php?g=1144855&p=8355762>.

Generative AI systems such as ChatGPT and Google Bard by their inherent nature produce results that use intellectual work scraped off the Internet without proper attribution. As such, use of these systems implicitly commits plagiarism. You **MAY NOT** use these systems in any way on work you turn in for this class. You **MAY** use these to generate examples for your own exploration and learning as long as you are careful to keep that work separate from anything you turn in.

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. Similarly, using the lab systems for anything other than class-related activities during lecture is forbidden.

Disability Accommodations Policy: If you have an approved accommodation for a disability through the Accessibility Resources Office (ARO), you should arrange to meet with me during the first week of class to discuss how we can address your accommodation without drawing attention to you or disrupting the course. If you have an accommodation to take your exams in an alternative location (such as the distraction reduced environment), you must make arrangements with me at least 24 hours before each exam so that I can provide a copy of the exam to ARO. In general, I do not extend accommodations to students who have not been officially approved by ARO. However, if you have a medical condition (such as a broken leg), I may be willing to extend temporary accommodations while you negotiate with ARO.

Additional Policies: Information about additional resources, such as the campus intellectual property statement, accessibility resources, mental health resources, and information on how to report crimes and sexual misconduct can be found at:

<http://www.longwood.edu/academicaffairs/syllabus-statements/>

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). ISBN: 978-0-13-600637-4

Tentative Course Schedule:

Week 1: Jan. 16

Introduction, The Entity-Relationship Model
Read Syllabus

Jan. 20

No class: Martin Luther King Jr. Day

Week 2: Jan. 21 - 23

Data Models and SQL
Read Chapter 1 (p. 1 - 12) and Chapter 2 (p. 17 - 62)
Lab 1: SQL Review (Due Jan. 23)

Jan. 23

Add/Drop deadline (by 5pm)

Week 3: Jan. 28 - 30

Keys, Constraints, and Normal Forms
Read Chapter 3 (p. 67 - 120)

Week 4: Feb. 4 - 6

High-level Models, Entity-Relationship Diagrams
Read Chapter 4 (p. 125 - 170)
Lab 2: Constraints and Data Definition (Due Feb. 6)

Week 5: Feb. 11 - 13

Advanced Relational Algebra

	<i>Read Chapter 5 (p. 205 - 238)</i> Midterm Review Packet Due
Week 6: Feb. 18 - 20	Catchup and Review, Midterm Exam Lab 3: Aggregate Queries (Due Feb. 18)
Week 7: Feb. 25 - 27	Advanced SQL Queries and Joins <i>Read Chapter 6 (p. 243 - 306)</i>
Feb. 25	Symposium on the Common Good Day
Week 8: Mar. 4 - 6	Applications of Databases Lab 4: Databases as a Web backend
Mar. 10 - 14	Spring Break: No Class
Week 9: Mar. 18 - 20	Advanced Constraints and Triggers <i>Read Chapter 7 (p. 311 - 337)</i>
Week 10: Mar. 25 - 27	Views, Indexes, and Transactions <i>Read Chapter 8 (p. 341 - 365)</i> Lab 5: Views, Indexes, and Triggers (Due Mar. 27)
Week 11: Apr. 1 - 3	SQL Schemas and Stored Procedures <i>Read Chapter 9 (p. 372 - 412)</i>
Apr. 2	Deadline to withdraw without an F (by 5pm)
Week 12: Apr. 8 - 10	Database Administration, Security and Authorization <i>Read Chapter 10 (p. 425 - 443)</i>
Week 13: Apr. 15 - 17	NoSQL Databases: MongoDB and Redis
Week 14: Apr. 22 - 24	NoSQL Databases: Cassandra
Week 15: Apr. 29 - May 1	Final Exam Review Final Review Packet Due (Apr. 29) Lab 6: NoSQL Databases (Due May 1)
May 8	Final Exam (Thursday, 8:00am - 10:30am)