CAS CS 460: Introduction to Database Systems
Boston University, Spring 2026

Syllabus

Description
This course covers the fundamental concepts of database systems. Topics include data models (ER, relational, and others); query languages (relational algebra, SQL, and others); implementation techniques of database management systems (index structures, concurrency control, recovery, and query processing); management of semistructured and complex data; distributed and noSQL databases.

Prerequisites
CAS CS 112 or the equivalent, with a grade of C or better.

Instructor
David G. Sullivan, Ph.D. (dgs@bu.edu, CDS 839, 665 Commonwealth Ave.)
Office hours for all of the course staff will be on the course website (see below).

Teaching Fellow (TF) and Teaching Assistants (TAs)
TF: Karan Vombatkere (kvombat@bu.edu)
TAs: Alice Han (alicehan@bu.edu), Dawson Maska (dawsonwm@bu.edu)

Course Assistants (CAs): see the course website for their names and contact info.

Lectures and Labs
lectures: MWF, 10:10-11:00 am, COM 101
lab: a weekly session; see your schedule for the time and location

Midterm Exams
You must be able to take the midterm exams, which will be held during lecture on Friday, February 27, and Friday, April 10, in locations to be announced.

Course Website: https://cs-people.bu.edu/dgs/courses/cs460
In addition, announcements and some course materials will be posted Blackboard.

Requirements and Grading
1. Five problem sets (25% of the final grade)
2. Two midterm exams (30%) and a final exam (35%)
3. Participation (10%; see below)

To pass the course, you must have a passing average on the problem sets and a passing average across the three exams.

Course Materials
- **Required:** CS 460 Coursepack. This contains all of the lecture notes for the course. More details will be provided in class and in Lab 0.
- **Optional**: *Database Systems: The Complete Book (2nd edition)* by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (ISBN 978-0131873254, Pearson Prentice Hall, 2009). This book is *not* required.
- **Required:** The Top Hat Pro platform. More details will be provided in class.

Collaboration Policy
You are strongly encouraged to collaborate with one another in studying the lecture materials and preparing for quizzes and exams.

Problem sets will primarily involve *individual-only* problems that you must complete on your own. We may occasionally include a *pair-optional* problem that you may complete either alone or with a partner.

For both types of problems, you may discuss ideas and approaches with others, but such discussions should be kept at a high level and should not involve actual details of the code or of other types of answers. **You must complete the actual solutions on your own** (or, in the case of a pair-optional problem, alone or with a partner).

Rules for working with a partner on pair-optional problems:

- You may *not* work with more than one partner on a given assignment. (However, you are welcome to switch partners between assignments.)
- **You may *not* split up the work and complete it separately.**
- **You must work together** (at the same computer or via a Zoom meeting) for all problems completed as a pair, and your work must be a collaborative effort.
- You and your partner must *both* submit the same solution to each problem that you did as a pair, and you must put your partner's name at the top of the file.

Academic Misconduct
We will assume you have carefully read and understood BU's academic conduct code:
http://www.bu.edu/academics/policies/academic-conduct-code
You should also carefully review the CS department's page on academic integrity:
http://www.bu.edu/cs/undergraduate/undergraduate-life/academic-integrity

Prohibited behaviors include:

- using all or part of someone else's work, even if you subsequently modify it
- viewing all or part of someone else's work (except for work that you and your partner do together on a pair-optional problem)
- showing all or part of your work to another student (except for work that you and your partner do together on a pair-optional problem)
- giving another student access to your laptop unless you monitor their usage
- consulting solutions from past semesters, or those found online or in books
- using ChatGPT, GitHub Copilot or other forms of generative AI when writing code or solving other types of problems on the homework assignments
- posting your work where others can view it without your permission, even after you complete the course
- receiving assistance from or collaborating with others during an exam, or using materials other than those that are explicitly allowed
- failing to ***power off and put away*** all devices during an exam, including phones, watches, and ear buds.

Incidents of academic misconduct may be reported to the Academic Conduct Committee (ACC), and the ACC may suspend/expel students found guilty of misconduct. ***At a minimum, students who engage in misconduct will receive a score of 0 on the assignment or exam in question.***

Other Policies

Writing queries: Several problem sets will require you to write database queries. When writing a query, ***you must limit yourself to aspects of the query language that we have discussed in lecture, unless the problem indicates otherwise.*** At a minimum, failure to do so will result in a score of 0 for the corresponding problem.

Late problem sets: Problem sets must be submitted by the date and time listed on the assignment (typically by 11:59 p.m.). There will be a 10% deduction for submissions up to 24 hours late. **We will <u>not accept</u> any homework that is more than 24 hours late.** Plan your time carefully, and don't wait until the last minute so you will have ample time to ask questions and obtain assistance from the course staff.

Pre-lecture preparation: To help you prepare for lecture, you will often be required to read or review some online materials. You may also be required to complete an online quiz to demonstrate that you have completed the preparation. Your work on these quizzes will not typically be graded for correctness, but it should demonstrate that you have adequately prepared for lecture. The pre-lecture tasks must be submitted by the specified date and time. **Late pre-lecture work will not be accepted**.

Your *participation grade* will be based on three things: (1) the pre-lecture and in-lecture questions on Top Hat, (2) lecture attendance taken using Top Hat, and (3) lab attendance. You will receive full credit for participation if you earn at least 85% of the points on Top Hat, make 85% of the lecture-attendance votes, and participate in at least 85% of the lab sessions. For a given component, if you end up with x% where x is less than 85, you will get x/85 of the possible points.

Absences: The above participation policy is designed to allow for occasional absences due to illness or other special situations. We will record the lectures and make the recordings available to everyone. If you need to miss a lecture for any reason, you should simply watch the recording for that lecture as soon as possible after it is posted. In addition, you should keep up with the pre-lecture tasks and the current assignments. **Please do not email your instructor for absences of this type.**

Laptops: Students taking CS courses are expected to have a laptop capable of running a currently supported version of Microsoft Windows, Mac OS X, or Linux. See this page for more info: https://www.bu.edu/cs/undergraduate/undergraduate-life/laptops

The final exam will replace your lowest problem-set grade if doing so helps your final grade. The final exam will also replace your lowest midterm-exam grade if doing so helps your final grade. Regardless of whether any such replacements occur, the final exam itself will always count for at least 35% of the final grade.

The final grades are *not* curved. The performance of the class as a whole is taken into account in assigning letter grades, but this can only improve your grade, not harm it.

Extensions and makeup final exams will only be given in *documented* cases of serious illness or other emergencies. We do not give makeup midterm exams; if you need to miss one, your grade for it will be replaced by your final-exam grade (see above).

You cannot redo or complete extra work to improve your grade. Incompletes will not be given except in extraordinary circumstances.

Schedule (tentative)

week	lecture dates	topics, exams, assignments, and special dates
0	1/21, 1/23	Course overview and introduction Database design and ER diagrams The relational model *No labs this week.*
1	1/26, 1/28, 1/30	The relational model (cont.) Relational algebra and SQL
2	2/2, 2/4, 2/6	SQL (cont.) Storage fundamentals; record formats *2/2: last day to add a class* **Problem Set 1, part I due on 2/3**
3	2/9, 2/11, 2/13	Index structures Implementing a logical-to-physical mapping **Problem Set 1, part II due on 2/10**
4	**2/17**, 2/18, 2/20	Query processing Semi-structured data and XML *No lecture on 2/16 (Presidents Day)* ***Lecture on 2/17 (Monday schedule)*** **Problem Set 2 (all) due on 2/17**
5	2/23, 2/25, 2/27	XML queries Transactions and schedules *2/24: last day to drop without a 'W'* **Midterm 1 on 2/27**
6	3/2, 3/4, 3/6	Transactions and schedules (cont.) **Problem Set 3, part I due on 3/5 (Thursday)**
		Spring break
7	3/16, 3/18, 3/20	Concurrency control
8	3/23, 3/25, 3/27	Concurrency control (cont.) **Problem Set 3, part II due on 3/24**
9	3/30, 4/1, 4/3	Distributed databases and replication Map-reduce *4/3: last day to drop with a 'W' or change to Pass/Fail* **Problem Set 4, part I due on 3/31**
10	4/6, 4/8, 4/10	Map-reduce (cont.); NoSQL **Midterm 2 on 4/10**
11	4/13, 4/15, 4/17	NoSQL (cont.); recovery and logging
12	4/22, 4/24	Recovery and logging (cont.) *No lecture on 4/20 (Patriots Day)* **Problem Set 4, part II due on 4/21**
13	4/27, 4/29	Two-phase commit; wrap-up and review **Problem Set 5 (all) due on 4/28** *5/1-3: Study period*
14		**Final exam on Friday, May 8 from 9-11 am** ***Please plan your travel accordingly.***