CS 6400 DATABASE SYSTEMS CONCEPTS AND DESIGN

CS-6400-O01 — Summer 2026

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Several additional TAs: will be introduced on Piazza
(Please note, any private communications must be addressed to "Instructors" on Piazza. Messages not sent to "Instructors" or received via email or Canvas messaging will be ignored.)

Office hours: Probably Wednesday evenings, 7-8pm ET (details TBD)

If you desire a printed copy of this syllabus, please use the "Print" function in your web browser to print it or save it as a PDF.

Required text

Elmasri & Navathe: Fundamentals of Database Systems. 7th Edition. Pearson 2016.

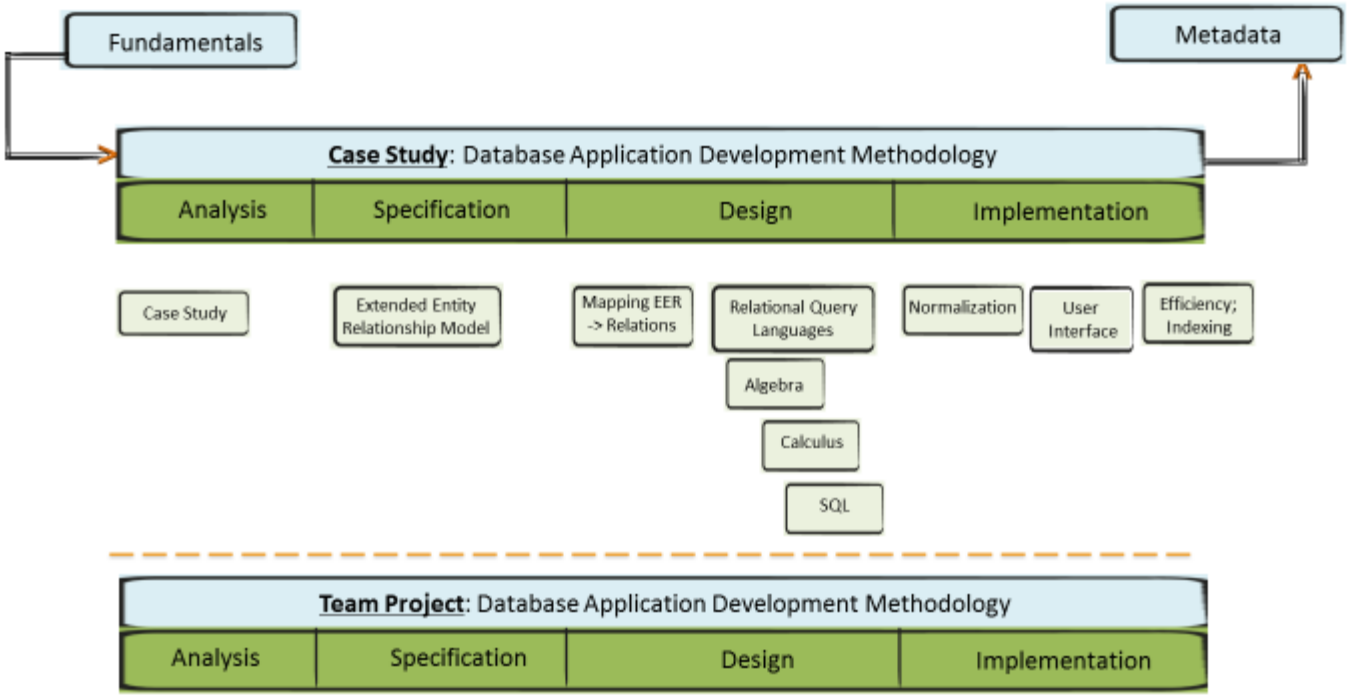
> Please respect the intellectual property and hard work of the textbook authors and purchase a licensed copy of the text. A downloaded PDF from the Internet is **NOT** a legal copy of the text.
> Prior editions of the text are not supported in this course.
> **Due to numerous ISBNs created for this text, any edition listed as the 7th edition is acceptable, but be aware page numbering may differ between US and International editions.** ***To avoid confusion, please refer to section numbers and not page numbers.***

Supplementary course materials will be provided within lectures or the learning management system.

Please be sure you are familiar with the additional course policies not covered in the syllabus. (These will not be available until the course start date).

Overview

We believe in learning-by-example and learning-by-doing.
This course presents an example of applying a database application development methodology to a major real-world project. All the database concepts, techniques and tools that are needed to develop a database application from scratch are introduced along the way when they are needed. In parallel - slightly delayed - learners in the course will apply the database application development methodology, the techniques and the tools to their own major class team project.
In addition to the development methodology, techniques and tools learned in this course will include the Extended Entity Relationship Model, the Relational Model, Relational algebra, calculus and SQL, database normalization, efficiency and indexing. Finally, techniques and tools for metadata management and archival will be presented.



Prerequisites

Learners should be familiar with at least one scripting or programming language, e.g. PHP, Python, Java, or be willing to rapidly gain proficiency with one. Some familiarity with software engineering concepts and Git/source control will be helpful. Willingness to learn basic system administration/database administration tasks is necessary. Flexibility and readiness to work remotely with team members is a must.

Learning Outcomes

At the end of this course the learner will:

- Understand and apply the concepts of data independence, database and database management system architecture, and the role and placement of a database management system the application stack
- Understand and apply the theoretical foundation of relational databases and query languages to create SQL data structure definitions and queries that meet identified requirements
- Create a relational database application, including the requirement analysis, specification, design and implementation of relational database applications
- Evaluate alternative internal schema structures and create indices for efficient database operation

This course is a graduate-level introduction to database systems. Advanced topics in databases (such as query optimizers, NoSQL databases, DBMS implementations, etc.) will not be covered. Students interested in creating a database management system from scratch should consider CS 6422: Database System Implementation.

Grading Summary

Please note that this is a <u>summary</u> of how the total course grade is determined, and that there may be additional conditions or requirements for each component that are described within their individual assignment(s) that must also be fulfilled for that to apply to this calculation.

Exams	50%	• Exam 1 - 12.5% • Exam 2 - 12.5% • Exam 3 - 12.5% • Exam 4 - 12.5%
Team Project	35%	• Phase 1 – 10% • Phase 2 – 10% • Phase 3 – 15%

Participation	15%	• Onboarding Exam – 1.25%
		  ◦ *The onboarding exam will stay open on Canvas for 10 days after its original due date.*
		  Late submissions will incur a 10% penalty per day.
		  The highest score (inclusive of any penalty incurred) on the onboarding exam will be kept.
		• Team Formation Survey – 1.25%
		• Teammate Evaluation – 12.5%

Please note: If your team assessment for a phase of the project indicates that you did no work on that phase, and we do not see evidence of contributions from you towards that phase, you may receive a reduced grade or even a zero for that phase, and it will be your responsibility to justify why you should share the grade that your team earned.

No grades in this course will be curved (normalized against the class' mean/average grade) and course grade totals are **<u>not</u>** rounded up.

<u>Final Letter Grade Equivalents</u>

Please note that final letter grade ranges are at the discretion of the instructor; those listed here are given as a general guideline and are the default for many Georgia Tech courses. ***Georgia Tech does not issue any plus or minus grades, only full letter grades.***

Greater than or equal to	Less than	Letter Grade Equivalent
90	100	A
80	90	B
70	80	C
60	70	D
0	70	F

<u>Exam readings and lectures</u>

All chapters listed are for the 7th edition of the textbook. Prior editions are not supported in this course.

	Topic	Textbook chapter readings	Lectures

Exam 1	Intro, ER, EER	1, 2, 3 (except 3.8), 4 (except 4.6)	Course overview Fundamentals of Databases Extended Entity-Relationship Model
Exam 2	Relational algebra and calculus, EER mapping	5, 8, 9	EER Relational Mapping Relational Query Languages: Algebra & Calculus
Exam 3	SQL	6, 7	Relational Query Languages: SQL
Exam 4	Functional dependencies, normalization, file organization, indexing	14 (except 14.6, 14.7), 15.1, 15.2, 16 (except 16.2.3, 16.8.3, 16.10, 16.11), 17 (except 17.4 and 17.5)	Normalization Efficiency ** Metadata is a bonus lecture and will not be covered on any exam*
Methodology lectures primarily cover how to apply the concepts covered in other lectures, and their content will not be a component of any exam. However, viewing the methodology lectures will assist in understanding those concepts better which will improve exam performance!			

Project readings and lectures

All chapters listed are for the 7th edition of the textbook. Prior editions are not supported in this course.

	Deliverable	Textbook chapter readings	Lectures
Phase 1	Analysis & Specification: • IFD (10%) • EER Diagram (40%) • Data formatting (5%) (attributes, domains) • Constraints (5%) • Task Decomposition (10%) • Abstract code (30%)	1, 2, 3, 4	Methodology I: Analysis Methodology II: Specification
	Design: • (revised) EER diagram • EER to Relational mapping. (25%)		Methodology III: Design

Phase 2	• SQL Create Table statements (25%) • Task designs w/abstract code that refers to EER replaced w/SQL that refers the relations (50%)	5, 6, 7, 9	Methodology III: Design [SQL]
Phase 3	Implementation: • Evaluation of completed functionality demonstrated by your team, incorporating inserts, updates, deletes, and queries • Specific criteria will be provided later this semester	10, 11, 14, 15.1, 15.2, 16, 17	Methodology IV: Implementation

Due dates and deadlines

It is your responsibility to be aware of all due dates and ensure assignments are submitted before they are due. All assignments will generally have a deadline at 11:59pm ET.

Late work/missing submissions

Late work is not accepted in this course. Failure to submit an assignment on time due to misunderstanding the due date or forgetting about the assignment will not be a valid excuse and makeup work or submissions for full or partial credit is unlikely. Any makeup opportunities, if they are provided at the discretion of the instructional team, may incur a penalty of at least 15% total (for example, a 15 point reduction on a 100 point assignment, not 15% of what was scored).

Team assignments

Due to their nature, we are unable to provide accommodations (which usually includes any ODS-approved ones) or extensions for group assignments. Should you experience a personal emergency that impacts a group deliverable, it is your responsibility to inform your teammates that you are unavailable as soon as possible so that they are given ample time to work around your potential absence. In the same vein we strongly recommend planning, organizing, and starting a group assignment right after it opens; should an emergency befall one of your teammates a few days before something is due, we will not be able to provide any accommodation as adequate time had already been provided (usually on the order of weeks) to complete any work prior to the unexpected emergency.

Planned absences

Please be aware of any work, personal, vacation, family, or travel plans (including disruption to travel) that may conflict with the course schedule. Due to the size of this class, any request for an individual exception to the course schedule (such as taking an exam earlier or later) due to a non-emergency conflict cannot be accommodated, should not be requested, and will be automatically denied if requested. If you have an unavoidable conflict and cannot work around the course schedule, you should drop it and consider taking it in a future semester. Note that some limited types of absences **are** allowed with proper advanced notice, and further details can be found in the Institute catalog: http://www.catalog.gatech.edu/rules/4/.

Communications

We will be using Piazza as a forum. Please submit all of your course-related questions through Piazza. Please also make sure to read all Piazza postings, or you may miss important information about the course and the project. You should check Piazza every day throughout the semester. When posting private messages on Piazza, make sure to post to the "Instructors" group (not an individual) or your post will not be considered officially received.

Please do not contact the course staff via email, Canvas messages, Slack, or any medium other than Piazza. There may be people with names similar to the instructional team in the GT directory, so to avoid any accidental miscommunication, email should be avoided. Other communications channels are not monitored by all members of the course staff at the same frequency as Piazza. Therefore, any communications received outside of Piazza may be ignored or discarded.

Office Hours

Office hours will be held. All students are strongly encouraged to either watch in real time, or watch the recording, as information given during the office hour may not be presented separate from the office hour.

A note about email forwarding

We use external sites, such as CATME, Zoom, and Piazza in this course. We will register your GT username-based email (ex: gpburdell3@gatech.edu) with those external resources. If you have email forwarding configured for your GT account, we are not responsible if emails from external sites do not reach you! Emails from these sites are safelisted on GT's email servers, so to avoid missing any kind of communication, we recommend disabling email forwarding and using your GT email as a regular email account.

A note about Georgia Tech accounts and passwords

Students are encouraged to configure the required password self-reset questions on Passport, along with configuring multi-factor authentication, retrieving their rescue codes and, if feasible, setting up an alternative multifactor authentication option. An inaccessible GT account due to any of these not being configured (or an unavailable multifactor device without any available alternative) will not be treated as an emergency by the instructional team.

Academic honesty

All Georgia Tech students are expected to uphold the Georgia Tech Academic Honor Code.

Plagiarism

Plagiarism is considered a serious offense. You are not allowed to copy and paste or submit materials created or published by others, as if you created the materials. All materials submitted and posted must be your own original work or, on team assignments, the work of your team. Material generated using AI-based assistance (such as Copilot or ChatGPT) should not be directly used, indirectly used, or submitted as original work. Any background materials you use, including interactions with AI assistants, should be cited. Use of any previous semester course materials, such as tests, quizzes, homework, projects, videos, completed assignments from previously enrolled semesters, comparable work from a different course, or any other similar materials, is prohibited in this course.

Academic dishonesty for teamwork

If evidence of plagiarism is discovered on a team submission, all team members will be considered responsible for the offense, therefore, it is important that all team members are vigilant and remove any suspected plagiarized materials prior to submitting a team assignment. Collaboration between teams is not allowed, and if evidence of this is discovered, will be treated the same as any other form of academic misconduct.

Prohibitions on sharing your work

To help prevent academic dishonesty, you may not make any of your work from this class publicly available. If we discover that you have, we reserve the right to issue you a final grade of "Incomplete" until you make your work unavailable.

Diversity and Disability Statement

Georgia Tech welcomes students with disabilities into the Institute's educational programs. The Institute promotes efforts to provide equal access and a culture of inclusion without altering the essential elements of coursework.

Disability accommodations

Students experiencing academic barriers due to disability or chronic medical conditions should not hesitate to contact the Office of Disability Services at disabilityservices.gatech.edu or call the office at 404.894.2563 or in person at Smithgall Student Services Building, 353 Ferst Drive, Suite 221. Disability Services offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and Disability Services. It is important to the Georgia Institute of Technology to create inclusive and accessible learning environments consistent with federal and state law.

If you have already registered with the Office of Disability Services and have obtained an accommodation letter, please contact us via Piazza to discuss implementing your accommodations.

A note about the video lecture example database

The GT Online database in the lecture videos is a simplified example for educational purposes. The database schema implies that sex is the same as gender, and that the only possibilities are male and female. This unintentional simplification does not accurately reflect the world at large.

Personal and medical emergencies

While it is highly unlikely this will apply to you, we recommend reviewing this section several times so that you are aware of it in the event you experience a personal or medical emergency!

We understand that unplanned emergencies can and will occur. However, failing to promptly inform us of a personal or medical emergency you experience hinders our ability to accommodate you. (Be aware, while disruption to travel plans is unfortunate, we do not consider it an emergency situation, as it is considered part of your responsibility to ensure travel and vacation plans do not conflict with the course schedule.)

Qualifying emergencies

For individual assignments we will only provide make-up opportunities or extensions under the following circumstances:

- Hospital admission or serious medical illness leading that has been appropriately documented

and judged by the instructional team as preventing you from preparing adequately for the assignment and/or totally unable to complete an assignment
- Serious illness (requiring hospital admission) in your immediate family
- Death in your immediate family **or** second-degree relatives (ex: aunts, uncles, grandparents, etc.)

How and when to notify us

Note that unless you are incapacitated and completely, physically unable to communicate with anyone, you are expected to inform us of your emergency situation as soon as possible through a private post to "Instructors" on Piazza, and provide documentation if it is available. While we understand you may be dealing with a crisis, taking a few minutes to let us know your status sooner rather than later will allow us to help determine and plan appropriate accommodations for your situation. Notifying us of a personal or medical emergency after it has occurred and after a due date has passed or assignment grades have been released may receive limited or no accommodation. In the event your emergency has left you physically incapable of communicating with anyone, you must inform us within seven (7) **calendar** days from the resolution of your emergency (so, for example, a situation that ends on 10/1 must be communicated to us by 10/7), after that point, any requests will be administratively denied and no accommodation will be granted.

Documentation

Documentation must be provided by an appropriate health official for medical emergencies. For other situations, appropriate documentation must also be provided if requested. It is at the discretion of the instructional team whether the provided documentation is acceptable.

Excluded assignments

No extensions can be provided for the Team Formation Survey, the Onboarding Exam, or Team Evaluations. Plenty of time is given to complete these assignments, and they take very little time to complete, so should an emergency occur shortly before the assignment is due, we will not be able to provide any accommodation as adequate time had already been provided to complete them prior to the unexpected emergency. It is in your best interest to complete these types of assignments as soon as they open.

Alternative mechanisms

While we have instituted our own process in order to be able to expedite and quickly resolve emergency situations, you may instead choose to utilize the assistance of the Dean of Students (https://studentlife.gatech.edu). Should you choose to open a request with them, you are still expected to notify us as soon as possible after making your initial request following the guidelines previously described under "How and when to notify us". Failure to notify us may result in a limited or less than optimal accommodation. Please be aware that the Dean of Students' process generally takes much longer for them to acknowledge and to resolve, and that we are unable to discuss accommodations until they have provided a resolution and confirmation for your situation. If you are enrolled in more than one class, it is recommended to follow both our procedure and notify the Dean of Students so that they may coordinate with your other instructors.

If broader circumstances are affecting your ability to participate

These procedures are meant for one-time occurrences or emergencies of a short nature as described under "Qualifying emergencies" where one or two instances of make-up work are anticipated. If you are experiencing a prolonged situation such as ongoing work/life issues, unusual life events, or other difficulties that prevent you from participating in the course at your best academic ability, we recommend contacting your academic advisor and the Dean of Students office as they can provide

assistance at an institutional level that course instructors cannot provide.

Please be aware that requesting one-time accommodations due to a chronic condition (whether physical or mental) cannot be granted without coordination through the Office of Disability Services (mentioned previously in this syllabus) and you will be redirected to them for additional support. We are not allowed to grant any accommodations to students under these circumstances that have not been approved by ODS, and ODS accommodations are not retroactive, so if this applies to you, these must be pre-arranged.

Additional course policies

Additional policies regarding this course that are beyond the scope of this syllabus have been published on Canvas. It is your responsibility to review those policies and be aware of them, especially policies regarding examinations. Any violations of these policies may result in grade penalties and/or referral for improper academic conduct, even if you were unaware of the policy you violated.