

INTRODUCTION TO DATABASE SYSTEMS

Course Syllabus: CS 4332 — Fall 2015

OVERVIEW

Introduction to database concepts, data models, file structures, query languages, database management systems.

Topics we will cover include:

- Modeling data so it can be stored and used effectively
- The relational database model
- Creating databases based on these data models
- Storing, updating, and querying data in a relational database with SQL
- Accessing the database from applications
- Transactions and data integrity
- Current directions in databases (NoSQL, key-value stores, etc.)

The primary objective of this course is to provide you with a good foundation for modeling data and building data-driven applications. To that end, we will spend significant time on data modeling — understanding the data involved in a problem and translating that understanding to a database design — and integrating the database into live applications particularly for web delivery).

COURSE LOGISTICS

Number	CS 4332
Title	Introduction to Database Systems
Credits	3
Prerequisites	CS 3358 (Data Structures)
Lectures	Thursdays 6:30–9:20 p.m.
Classroom	Alkek 102 (San Marcos) Avery 364 (Round Rock)
Web site	TRACS

INSTRUCTOR

Michael Ekstrand

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	Avery 464-X (Round Rock)	
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Office Hours	Mondays	10:30–11:30 a.m.
	Tuesdays	3:30–5 p.m.
	Wednesdays	3:30–4:30 p.m.
	Thursdays	4:30–6 p.m.
	(in Round Rock on days I teach from there)	
	Other times by appointment (in-person or remotely)	

TEXTBOOK AND RESOURCES

Primary Text

This will be our primary textbook for the course.

Fundamentals of Database Systems, 7th Edition, by Elmasri and Navathe
(Pearson; ISBN 978-0-13-397077-7)

The course schedule will reference this text for the readings, and I recommend that you read it if you will benefit from an alternate presentation of the material, or if you would like to read about additional topics not covered in lecture. However, you will not be tested on details found only in the textbook.

Optional Text

I recommend this book if you would like a printed reference for SQL, the language that we will be using to interact with the database.

SQL in a Nutshell, 3rd Edition, by Kline (O'Reilly; ISBN 978-0-596-51884-4)

Online Resources

There will be a variety of online resources that we use for the semester. The primary ones are:

- [SQL As Understood By SQLite](#)
- [PostgreSQL Reference Manual](#)
- Python-related documentation
 - [Python documentation](#)
 - [PsycoPG2 database adapter](#)
 - [Flask web framework](#)
- Online Q&A sites such as [StackOverflow](#) and [DBA.SE](#) are likely to be useful in your studies as well

Supplementary Books

These books are entirely optional, but they may be useful; they have informed my own study of the subject, and I will likely be referring to them in preparing my lectures.

Mastering Data Modeling by Carlis and Maguire (Addison-Wesley; ISBN 0-207-70045-X)

The Practical SQL Handbook by Bowman, Emerson, and Darnovsky (Addison-Wesley; ISBN 0-201-44787-8)

GRADING AND COURSE COMPONENTS

There will be four primary components of this course, from which your grade will be computed as follows:

<i>Component</i>	<i>Count</i>	<i>Contribution</i>
<i>Homework Assignments</i>	5	30%
<i>Group Project</i>	1	30%
<i>Midterm A</i>	1	5%
<i>Midterm B</i>	1	15%
<i>Final Exam</i>	1	20%

Final grades will be no worse than those that would arise from a standard 70–80–90 scale: if you have a total weighted grade of 90/100 points, then your grade will be no worse than an A.

Homework Assignments

There will be 5 homework assignments. These assignments must be completed individually and submitted via TRACS. **Please follow submission instructions exactly** — if we ask for a PDF file, please do not submit a Word or Apple Pages document.

Each homework is due before Monday (submit no later than 11:59 PM on Sunday). In addition, you have 3 'late days' that you may use throughout the semester, each of which extends the deadline by 24 hours. You can use them all on one assignment, or apply them to separate assignments.

Project

This course has a substantial group project component. The project will be launched the third week of class, and there will be deliverables due throughout the semester.

Further details will be available on the launch day, but the main idea of the project is to design a data model and build a database-driven web application. Since the focus of this class is on databases, not on web programming, we will be minimizing the complexity of the web side of the project and keeping the focus on how to write real applications that work with a database.

Exams

There will be three exams: two midterms and a final. The final will be comprehensive.

For each exam, you may have a single 8½ x 11" sheet of hand-written notes.

COURSE POLICIES

Announcements

From time to time, I will make announcements regarding the course materials, structure (such as assignment due dates, changes, or corrections), etc., either in lecture or via TRACS announcements. You are responsible for these announcements. Make sure that you check TRACS regularly, or have TRACS announcements delivered to your e-mail (and check that).

Recording and Sharing of Course Materials

You may make audio or video recording of my lectures for your own personal study, and you may share such recordings with your classmates in this offering of the course (in either section). You **may not** make such recordings publicly available, or share them with other students not in the course this term, without my prior written consent.

After each lecture, I will make the following available on TRACS:

- My lecture notes
- Lecture slides, if I used any
- Scans of the drawings made on the document camera
- Example code and data sets

You may download and use these, and retain copies after the course has completed, for your own personal use and study. Please do not share or reproduce them without asking me first, unless they are clearly labeled for redistribution (e.g. example code bearing an open source license).

Late Work

This course is designed with built-in measures to accommodate most ordinary need for extensions or late submissions. Therefore, with the exception of the late days allowed on the homework assignments, **no late work will be accepted.** Homework assignments and project deliverables must be turned in on time, and you must take exams at their scheduled times.

Exceptions to this policy will only be granted in extreme circumstances. Any requests for individual exceptions must be submitted by e-mail so that I have a record of the request and my response.

Cheating and Academic Integrity

As both a programmer and a student, you are expected to do your own work, attribute sources, and respect the legal and moral rights of others with respect to their work; as a student, you are also required to abide by the University Honor Code¹. While I aim to allow you to make reasonable use of resources, cheating (including copying code, using unauthorized resources during tests, etc.) will not

¹ <http://www.txstate.edu/honorcodecouncil/>

be tolerated. If you are found to be cheating, the penalty may range from an F on the assignment to an F on the course, and will also be reported to the university.

External Resources

You may consult external resources such as other books and web sites for understanding how to solve homework problems or portions of the project. In your assignment solution, list all external resources you used; if they are available online, provide the URL. You do not need to cite the textbook, or the official documentation for the software we are using.

Besides the course forum, you may ask questions related to completing the project on publicly accessible discussion forums such as Stack Overflow, newsgroups, or publicly-archived mailing lists². Provide URLs to the forum discussion on the relevant web site or archive (Google Groups works well for newsgroup archives) with your project deliverable submission.

Restrict your questions to questions about how to go about a particular sub-portion of the problem, how something works, why something you are trying doesn't work, or other specific difficulties. Do not ask "how do I solve <the problem description>?", or similarly direct translations of the project requirements, or for specific code. Questions should be written to fill in a gap in your understanding that will then enable you to continue your work, not to get a solution to the assignment.

Internet discussion forums other than the TRACS forum are not permitted for homework assignments. If you consult with other students in the class on a homework assignment, list those students' names in your submission.

Conduct

You are expected to behave in a civil, respectful manner in all class interactions, both in official meetings such as lectures and out-of-classroom activities such as project group meetings and study sessions, and to contribute to a constructive learning environment.

² Sites that require registration, login, and/or payment to view answers, such as Experts Exchange or Quora, do not qualify as publicly-available.

Texas State policy (PPS 4.02) describes general behaviors that are disruptive. In addition, the [Hacker School Social Rules](#) are a good source of guidance on how to maintain a constructive and educational environment.

If you experience or witness harassment of any form, please let me know.

Disability Accommodations

If you need particular accommodations to be able to fully participate in this course, please talk with me as soon as possible. I may ask that you provide documentation from the Office of Disability Services, so if you have such documentation please bring it.

SCHEDULE

Following is an approximate schedule. It may be adjusted as we progress through the semester. **Bold** items are key dates for the project and exams.

Week	Lec. Date	Topic	Reading	Due	Site
1	8/27	Introduction	1–3		SM
2	9/3	Modeling Data	3,5,9.1,A		RR
3	9/10	Beginning SQL and Python	6	H1	SM
4	9/17	Project Launch & Census Midterm A			—
5	9/24	Data Mining (Guest: Dr. Gao) Querying and Reporting	7.1,7.3	H2	SM
6	10/1	Design and Normalization	14		RR
7	10/8	Midterm B		H3	SM
8	10/15	Databases and the Web			RR
9	10/22	Project: Design Review		P: Design	SM
10	10/29	Data Integrity	6.1,6.2,20		RR
11	11/5	Transactions	20	H4	SM
12	11/12	TBD		P: Prog. Report	RR
13	11/19	Beyond Relational Databases	12,23,24	H5	SM
14	11/26	<i>Thanksgiving</i>			—
15	12/3	Project: Presentations		P: Final	RR
F	12/10	Final Exam (5PM)			SM

The **Site** column indicates which site I will be lecturing from. When I am teaching from Round Rock, my Thursday office hours will be in Round Rock.

Items are listed the week *before* they are due. An item listed as being due in Week 3 means that Week 3 is the last week you have to complete it, and it must be turned in before Monday, September 14.

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