

□

# CS 638

## Principles of Database Management & Use

M. Tamer Özsu

[tamer.ozsu@uwaterloo.ca](mailto:tamer.ozsu@uwaterloo.ca)



UNIVERSITY OF  
**WATERLOO**

# Course objectives

*This is a graduate-level introduction to data management for CS non-majors. It takes a user-oriented approach focusing on database principles, how to design a database, how to access the data in the database and some of the more recent technology for big data processing and the NoSQL movement*

**The course is open only to MHI and MDSAI students with no CS background**

- Use database terminology knowledgeably
- Understand DB concepts that arise in the workplace
- Interact with (direct, understand) IT personnel
- Understand technical articles involving DB technology

# Course Content

- Introduction to database systems
- Relational data model
- SQL language
- Formal languages
- Entity-Relationship (ER) model
- Extended ER model
- Mapping ER models to relational
- Design theory: normalization
- Transactions
- Database internals – quick look
- Big data processing
- Distributed/Parallel databases
- NoSQL systems

Relational database principles

Data modeling

DBMS use

Advanced topics

Greens are only for MDSAI students

# How the course will be run

- This is an online course that will be run on the flipped classroom model – course lecture videos will be online and we will have regular online meetings
- Weekly meeting times – may change so check announcements
  - Fridays 12:00noon-1:00PM Eastern time
  - We can adjust this if it doesn't work for a majority; just let me know.
- You cannot get by just by listening to the lectures; **the book material is an important component – you need to read the relevant parts of the book.**
- Please make sure you do not fall behind; you will need to pace yourself.
  - The weekly schedule that you should follow and the reading material is on the course site and later in these slides

# Getting help

- We use LEARN
  - The course notes will be posted here
  - You'll take quizzes and exams here as well
- Messaging forum
  - Ask public questions here
  - Assignments and solutions posted
  - Announcements posted
  - Quizzes and exams through LEARN as well
    - They will be open for a few days
    - Once you start, you will have to finish in a given period of time (exams usually 1.5-3 hours; quizzes in 10-20 minutes)
    - Quizzes are almost every week; open on Monday morning, closed on Wednesday late afternoon. Once started has to be completed in the allocated time.

# Course Schedule

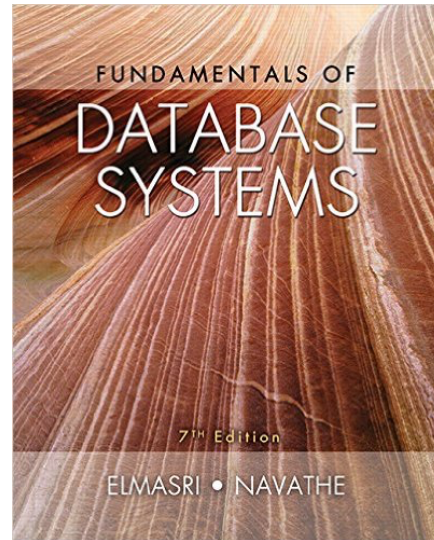
Week	Module	Topic	Book Readings
1 (8 Sep)	0	ALL: Introduction to the Course	
2 (14 Sep)	1	ALL: Introduction to Database Management	1,2
3 (21 Sep)	2	MHI: Relational Data Model	5
	2a	MDSAI: + Formal Languages	8
4 (28 Sep)	3	ALL: Basic SQL	6
5 (5 Oct)	3a	MHI: Additional SQL	
	4	MDSAI: + Advanced SQL	7
6 (12 Oct)		Thanksgiving & Reading week	
7 (19 Oct)	5	ALL: Conceptual Modeling: ER Model	3,4
8 (26 Oct)	6	ALL: Logical Modeling: ER-to-Relational Mapping	9
	7	ALL: +Design Theory: Normalization	14 (14.1-14.3,14.5)

# Course Schedule

Week	Module	Topic	Book Readings
8 (30 Oct-1 Nov)		Midterm Exam	
9 (2 Nov)		Catch-up; no lecture	
10 (9 Nov)	8	MHI: Transactions and Transaction Support in SQL	20
	9	MDSAI: Database Internals – Query Processing	18, 19 (19.1-19.3)
11 (16 Nov)	10	MHI: Guest lecture by Prof. Helen Chen, AHS on “Enterprise Data Warehouse Design and Business”	
	11	MDSAI: Database Internals – Transaction Processing	20, 21 (21.1-21.4), 22 (22.1-22.3)
12 (23 Nov)	12	MHI: Big Data Processing	23
	13	MDSAI: +Distributed Data Management	22
13 (30 Nov)	14	ALL: NoSQL Systems	24
12-14 December		Final Exam	

# Textbook (Recommended)

- R. Elmasri and S. Navathe, *Fundamentals of Database Systems*, 7/E, Pearson, 2016



- Note: Course notes adapted from authors' book slides



# Marking

- Assignments (4) 20%
- Quizzes 15%
- Midterm Exam 25%
- Final Exam 40%
  - comprehensive

F20 Schedule	Week	Module		Topic	Readings 7/e
		MHI	MDSAI		
08-Sep	1	0	0	Introduction to the Course	
14-Sep	2	1	1	Introduction to Database Management	1, 2
21-Sep	3	2	2	MHI: Relational Data Model	5
			2a	MDSAI: + Formal Languages	8
28-Sep	4	3	3	Basic SQL	6, 7.1.7, 7.1.8
05-Oct	5	3a		MHI: Additional SQL	
			4	MDSAI: + Advanced SQL	7
12-Oct	6			Thanksgiving and Reading Week	
19-Oct	7	5	5	Conceptual Modeling: ER Model (with Enhanced ER)	3,4
26-Oct	8	6	6	Logical Modeling: ER-to-Relational Mapping	9
		7	7	Design Theory: Normalization	14 (14.1-14.3, 14.5)
30 Oct-1 Nov	8			Midterm Exam	
02-Nov	9			Catch-up; no lecture	
09-Nov	10	8		MHI: Transactions and Transaction Support in SQL	20
			9	MDSAI: DBMS Internals: Query Processing	18, 19 (19.1-19.3)
16-Nov	11	11		MHI: Guest lecture by Prof. Helen Chen, AHS on "Enterprise Data Warehouse Design and Business"	23
			10	MDSAI: DBMS Internals: Transaction Processing	20, 21 (21.1-21.4), 22 (22.1-22.3)
23-Nov	12	12	12	MHI: Big Data Processing	23
			13	MDSAI: + Distributed Data Management	22
30-Nov	13	14	14	NoSQL Systems	24
12-14 Dec				Final Exam	