

# Database Systems

CMPT 308 • Spring 2024

## Background

When and where	Tuesday mornings 8AM to 10:45AM in HC 2019 • Labs Fridays 8AM to 9AM and online	
Suggested Text	<i>Database Systems The Complete Book, second edition</i> by Garcia-Molina, Ullman, and Widom. Published by Prentice Hall. ISBN 978-0-13-187325-4	
Web	<a href="https://www.labouseur.com/courses/db">https://www.labouseur.com/courses/db</a>	
Instructor	Alan G. Labouseur Hancock 3007	Alan.Labouseur@Marist.edu (Office hours are posted.)

## Grades

Letter Grades				
You can earn up to 1000 points, broken down as follows:	Labs	10.0%	100 points: 10 at 10 points each	[1, 2]
	Text-to-SQL Project	10.0%	100 points	[1, 2]
	Relational Database Project	25.0%	250 points	[1,2,5]
	Mid-term Exam	25.0%	250 points - study sheet permitted	[1,2,5]
	Final Exam	25.0%	250 points - study sheet permitted	[5]
	Attendance & Participation	2.5%	25 points for quality & quantity	[5]
	Laziness and Whining	2.5%	25 points for not (lazy or whining)	[1]

## Themes, Objectives, and Assessment

Assessment methods include assignments, quizzes, exams, discussions, presentations, peer review, and projects.	In this course, I hope that you will . . .	
	• come to understand that data has value, and <b>the</b> right answer is infinitely better than <b>a</b> fast answer.	[1, 2]
	• reach a solid knowledge of and appreciation for principles and foundations of relational and graph database systems.	[1, 2]
	• gain an understanding of relational database concepts, terminology, and their superiority over NoSQL garbage like document stores.	[1, 2]
	• attain in-depth knowledge of the relational data model and why it's superior to other data models in general, and will remain so.	[1, 2]
	• realize that no SQL is better than NoSQL.	[1, 2, 5]
	• realize that Lotus Notes and Ms-Access are not databases, and that it's unprofessional to use MySQL and mongoDB.	[1, 2]
	• appreciate, understand, use, and bask in awe of SQL.	[1, 2]
	• appreciate, understand, and bask in awe of graphs.	[1, 2, 5]
	• design, implement, test, and document a BCNF relational database.	[1, 2]
	• discuss and use new database technology.	[1, 2, 5]
	• come to know some modern graph data techniques and technologies	[1, 2]
	• develop continuing education skills. Capable problem solvers never stop learning. To the end, you will get practice in finding some answers for yourself.	[1, 2]
[References] refer to Department of Computing Technology Goals available at <a href="https://www.labouseur.com/courses/goals.pdf">https://www.labouseur.com/courses/goals.pdf</a>		

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## Schedule

#	Week	Due	Chapters	Topics
0	16-Jan	—	1 9.1	The Plan — Data vs. Information — Data throughout history: Files, Hierarchies, Networks, Tables, Documents, Key-value stores, and Graphs
1	23-Jan	Lab 1 <i>Installing PostgreSQL</i>	2, 4.1, 5.1 6.1, 7.1, 9.2	The Relational Model — Relational Algebra — Data types — Keys Beginning SQL — Simple SQL queries
2	30-Jan	Lab 2 <i>Our beloved CAP database</i>	2, 6.2-3 7.1-2, 9.3	Entity/Relationship modeling — SQL create statements Referential Integrity and constraints — SQL subqueries
3	6-Feb	Lab 3 <i>Getting started with SQL</i>	2, 6.2-4 7.1-2, 9.3	Check constraints — Null and three-valued logic — Cursors — Subqueries SQL: Insert, update, and delete — Aggregations with GROUP BY and HAVING
4	13-Feb	Lab 4 <i>Subqueries SQL</i>	6.1 - 6.5	Joining relations with Inner and Outer joins Set operations in SQL
5	20-Feb	Lab 5 <i>Joins Three-quel</i>	8.1-4 14.1-3 & G*	The System Catalog — Views — Indexes and Index Structures Graph Databases
6	27-Feb	Lab 6 <i>Interesting and Painful Queries</i>	—	<b>Mid-term Exam</b> in HC 2023 One-page study sheet permitted. Some restrictions apply.
7	5-Mar	—	3 4.1-6	Introduction to Normalization, Functional dependencies, and Normal forms
8	12-Mar	—	—	<i>No class meeting — Spring Break</i>
9	19-Mar	Text-to-SQL Project	3 4.1-6	More Normalization — Functional dependencies — Normal forms The normalization process — Lossless Joins — Normalization examples
A	26-Mar	Lab 7 <i>Normalization 1</i>	3, 4.1-6 10.1	Discuss Lab 7 — Database design and data modeling Weak entities and entity subtypes — Authorization and Security
B	2-Apr	Lab 8 <i>Normalization 2</i>	9.4	Discuss Lab 8 — Stored Procedures and Triggers
C	9-Apr	—	—	<i>No class meeting — College-wide time-wasting Day</i>
D	16-Apr	Lab 9 <i>Normalization 3</i>	1.2.4 18.3-4 19.2	Discuss Lab 9 — Locks, locking isolation levels, and deadlock
E	23-Apr	Lab A <i>Stored Procs</i>	6.6 17	ACID — Transactions, Recovery, and the Log file
F	30-Apr	Relational Database Project	all of it	<i>Catch up class / Review</i>
∞	7-May	—	everything	<b>Final Exam</b> at 8AM in HC 2023 One-page study sheet permitted. Some restrictions apply.