CSI 2132 – Databases A

- Course Overview

January 2022, Verena Kantere

Taught by

Professor: Verena Kantere

Office: SITE 5 060

Email: vkantere@uottawa.ca

Research Specialization: Data Management, Databases, Big Data, Cloud computing, IoT systems, Data Analytics, Information Systems

I have been teaching courses on Databases I, II and Advanced Databases for over 14 years.

Teaching Assistants

There are 6 TAs for the course. All of them will be involved in delivering lab and tutorials, and be able to help students with questions on the material of the course. However, each one of them will be responsible for questions on specific parts of the examination and respective course material:

- Liu Chang, cliu162@uottawa.ca : responsible for assignment 1
- Sahi Ishveen Manjeet, isahi065@uottawa.ca : responsible for course project deliverable 1
- Balumuri Sathvika, sbalu012@uottawa.ca : responsible for the mid term
- Muthuvel Mahalakshmi, mm058@uottawa.ca : responsible for assignment 2
- Verma Divyanshu, dverm090@uottawa.ca : responsible for the course project deliverable 2
- Ren Jie, jren018@uottawa.ca : responsible for assignment 3

Taught at

The course is delivered in person. The lectures are:

- From 10 January to 07 April 2022*
- Tuesday 14:30 - 15:50 and Friday 16:00-17:20
- Classroom: 120 University (FSS) 2005
- Professor's office hours: 12:00-14:00 every Tuesday at SITE 5060
- TAs' office hours: 10:00-12:00 every Thursday at SITE 5000D

The course is not bimodal: in-person lectures/labs/tutorials will not be transmitted online. Online delivery of the course might be chosen in case of instructor's illness.

* On Tuesday the 31st of January there will be NO lecture. That lecture will be recorded and available online for 7 days.

Taught at

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Class	Class Title	Enrolled	Days & Times	Room	Class Dates
CSI 2132-A00 (2547)	DATABASES I (Lecture)	199	Tu 2:30PM - 3:50PM	120 University (FSS) 2005	Jan 9, 2023- Apr 12, 2023
			Fr 4:00PM - 5:20PM	120 University (FSS) 2005	Jan 9, 2023- Apr 12, 2023
CSI 2132-A01 (2548)	DATABASES I (Laboratory)	53	Mo 4:00PM - 5:20PM	800 King Edward (STE) 2060	Jan 9, 2023- Apr 12, 2023
CSI 2132-A02 (2549)	DATABASES I (Laboratory)	38	Mo 4:00PM - 5:20PM	800 King Edward (STE) 0131	Jan 9, 2023- Apr 12, 2023
CSI 2132-A03 (2550)	DATABASES I (Laboratory)	38	Mo 5:30PM - 6:50PM	800 King Edward (STE) 0130	Jan 9, 2023- Apr 12, 2023
CSI 2132-A04 (2940)	DATABASES I (Laboratory)	37	We 5:30PM - 6:50PM	800 King Edward (STE) 0131	Jan 9, 2023- Apr 12, 2023
CSI 2132-A05 (2551)	DATABASES I (Tutorial)	87	Mo 2:30PM - 3:50PM	120 University (FSS)1006	Jan 9, 2023- Apr 12, 2023
CSI 2132-A06 (2939)	DATABASES I (Tutorial)	112	Mo 2:30PM - 3:50PM	591 Cumberland (SCR) 002	Jan 9, 2023- Apr 12, 2023
CSI 2132-A07 (3081)	DATABASES I (Laboratory)	33	Fr 5:30PM - 6:50PM	800 King Edward (STE) 0130	Jan 9, 2023- Apr 12, 2023

Course Page and MS Team

Brightspace link:

https://uottawa.brightspace.com/d2l/home/350196

MS Teams link:

https://teams.microsoft.com/l/team/19%3aihLpvYCGhLYVWOZOuNoBm0kxEM0wbQdPuyKE0EK6RwU1%40thread.tacv2/conversations?groupId=71c64aa9-b149-4bbf-8f7a-02e53fc4bcef&tenantId=d41fdab1-7e15-4cfd-b5fa-7200e54deb6b

The MS team will be used for online communication mostly with the TAs. There will be dedicated channels for each assignment, the project, the midterm and the final exam.

The MS team will be used in case that the course needs to be delivered online (unlikely).

Suggested Bibliography

Main book:

- **Database System Concepts,** Silberschatz, Korth & Sudarshan
  https://www.db-book.com/

Other well-known traditional books:

- **Fundamentals of Database Systems,** Elmasri & Navathe
  https://www.researchgate.net/publication/336472480_Fundamentals_of_Database_System
- **Database Systems: The Complete Book,** Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom
  http://infolab.stanford.edu/~ullman/dscb.html
- **Database Management Systems,** Raghu Ramakrishnan and Johannes Gehrke (easily found on the web)
- **Database System Implementation,** Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (easily found on the web)
- **A First Course in Database Systems**, 3nd Edition, Jeff Ullman, and Jennifer Widom, (easily found on the web)

Course Goal and Curriculum

The goal of this course is to introduce the fundamentals of database management.

The course curriculum is:

1. Introduction to data management and databases*
2. Entity Relationship model
3. Relational model
4. Relational algebra and relational calculus
5. The query language SQL
6. Database normalization (normal forms and functional dependencies)
7. Physical organization and storage
8. Hashing and indexing

*The introduction to databases will not be examined. The purpose of it is to give to the students a good idea of what is traditional and modern data management and databases

Expected Outcomes of the Course

- A solid knowledge of the basic data management theoretical notions, issues and solutions:
  - Logical design of a relational database including conceptual design and correctness or appropriateness of the design
  - Basic query languages and how they compare
  - Physical storage techniques of relational data
  - Associative data structures: views and basic indexing schemes
- Hands-on experience with classical relational DBMSs:
  - Installing and operating a DBMS
  - Designing, implementing, and querying a database
- Creating a basic web application on top of a database

Evaluation

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Grading

- Midterm exam 10%
- Assignments 15%
- Course project 25%
- Final exam 50%

Requirements for success in the course:

- 50% or more of the grade in the final exam
- 50% or more of the grade in the course project

Course Assignments

There will be 3 short assignments:

1. (5%) Assignment on Relational Algebra and Relational Calculus
2. (5%) Assignment on Normalization and Functional Dependencies
3. (5%) Assignment on Indexing and Hashing

- The assignments should be submitted by each student individually
- The assignment solutions will NOT be announced. However, the students will receive individual feedback on their solutions and will be able to meet in-person or online with the TAs to discuss their solutions

Course Project

In teams (i.e. 1-3 students together) you will have to design and implement a database and develop a web application on top of it, for which we will give you the requirements.

You will have to submit:

1st part:

1. The ER diagram
2. The relational database schema (with declaration of all constraints)

2nd part:

1. The implemented database
2. The web application
3. Queries/triggers/views etc on the database needed for the functionality of the database

Course project - practicalities

- A student project can be submitted by teams of 1-3 students
- A deadline will be announced for you to declare your team members
- The team composition cannot change after its declaration
- You should try to find team mates and not do the project alone:
  - The project is substantial work for one student. Except if you already have knowledge of web app development and databases, you are advised to find other students to divide the work.
  - One major goal of the project is that students practice in collaborating with others. This simulates how IT project are developed in the industry.
  - Collaboration has to do with estimating the amount of work, the type of work, appropriately assigning parts of the work to the person that is most qualified and most motivated to do it, create a timeline for internal milestones and deliverables, devising appropriate 'interfaces' in order to allow people to work in parallel

Midterm Exam

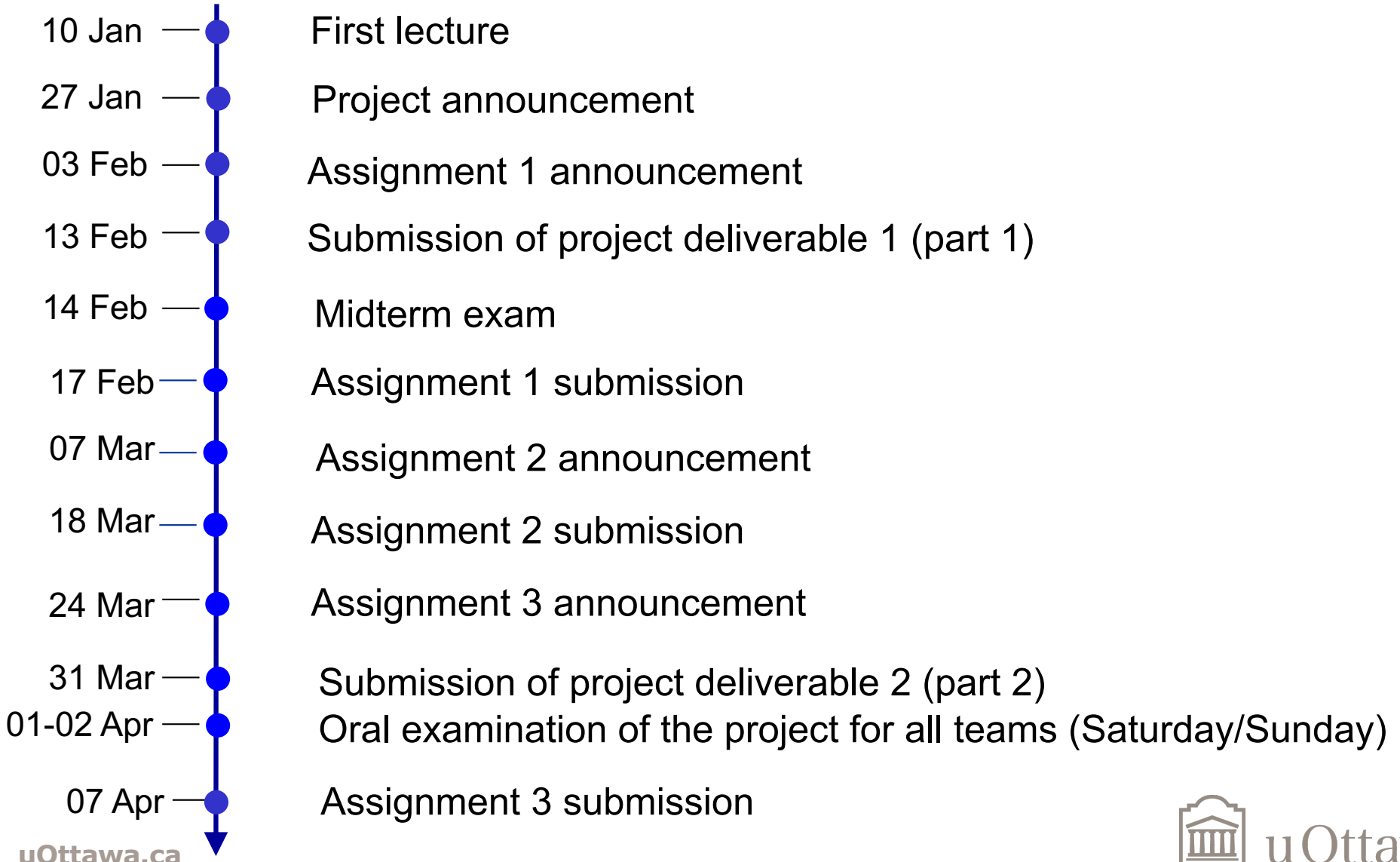
- The midterm will take place in class instead of a lecture:
  - Tuesday, 14 February, 2023, 14:30-15:50, FSS 2005

- The duration of the midterm is 1 hour
- The midterm exam is a written exam
- The midterm exam is conducted with closed books and notes
- The midterm will examine knowledge on the ER model, the Relational Model, and on Relational Algebra

Final Exam

- The goal of the final exam is to evaluate if the student has comprehend the theoretical notions and query languages and techniques discussed in the course
- The final exam may include:
  - questions of critical thinking and comprehension of the material
  - exercises of gradual difficulty that can be solved based on the taught material
- The final exam is a written exam
- The final exam is conducted with closed books and notes

Tentative Timeline of the Course



Following the Course and Course Evaluation

- Please come to all lectures, tutorials and labs
  - Make questions in class, communicate with me and the TAs
- The TAs are here to assist you constantly!
- Do not leave work on assignments and especially the project for the last minute!
- Please evaluate the course!
- Please do evaluate the course responsibly, and not based on whether the course is easy or difficult!
  - This course teaches a fundamental part of computer science. It is a challenging course because:
    - It contains substantial theoretical material (the course is NOT only about learning SQL!)
    - It contains a hands-on extended project
    - The project requires that you also learn the basics of web app development (which is not part of the official course curriculum)

Please come to me to discuss ANY issue related to the course, but also to your studies, or beyond

I wish you a happy semester!