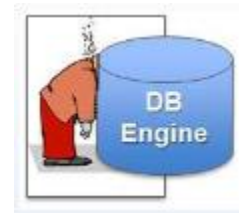# CMPT 506– Advanced Database Systems

Syllabus and Course Admin

Dr. Abdelkarim Erradi

Department of Computer Science & Engineering

Qatar University

Outline for Today

- Course introduction
- Logistics
- Introduction of the students and the instructor
- Review of Fundamental Database Concepts and introduction to NoSQL

About the Instructor

- **Dr. Abdelkarim Erradi**
  - **Office:** Office 132, Female Engineering Building
  - **Phone:** 4403 4254
  - **Office hours:**
    - Sunday 3:30 to 5pm at CSE meeting room and Sunday after the class
    - You can talk to me after class if you have issues/questions
  - **Best way to contact me is by Email**

    erradi@qu.edu.qa

Course learning outcomes

1. Explain and apply approaches for improving a database's performance, including the use of indexes, and data partitioning

2. Understand and perform query optimization

3. Explain concurrency control and discuss database mechanisms for achieving Atomicity, Consistency, Isolation, and Durability

4. Design and build a data analysis solution using data warehousing and Online Analytical Processing (OLAP)

5. Understand the basic concepts of NoSQL database management systems

6. Critically discuss different architectures for distributed databases, database future trends and emerging applications

Schedule

1. Review of fundamental database concepts and introduction to NoSQL [2]

2. Storage and database file organization [1]

3. Indexing techniques [2]

4. Query processing and optimization [2]

5. Transaction management [1]

6. Concurrency control and recovery [1]

7. Storage and query of XML/JSON documents [1]

8. Data warehousing and OLAP [2]

9. Database future trends (e.g., NoSQL and Cloud data services) [1]

[?] number of weeks

The Textbook

Elmasri, R. and S. B. Navathe

Fundamentals of Database Systems,

6th Edition,

Pearson Education, 2014

Fundamentals of Database Systems
Ramez Elmasri   Shamkant Navathe
Sixth Edition

PEARSON NEW
INTERNATIONAL EDITION

Your Grade is Based on:

Homework	**15%**	3 assignments
Review Paper	**10%**	- Review of a NoSQL database: report + presentation (10%) **– Week 4**
Project	**30%**	**2 phases project:** - Relational DB design and implementation (10%) **– Week 8** - NoSQL DB design, implementation and evaluation. Final paper, presentation and demo (20%) **– Week 13**
Midterm exam	**20%**	Week 9
Final exam	**25%**	Consult the University exam timetable

Project Scope - Draft

- Brief overview of the selected NoSQL technology

- Database architecture

- Programming Language Interface

- Data Model + Operators

- Database strategies for Scalability, Availability, and Consistency

- Deep evaluation: advantages and limitations

- Comparison with the Relational Model in terms of: Data modeling, Scalability, Consistency, Partitioning, Storage layout, Querying, and Distributed data processing

- General use cases where it can be used

- Real use cases where it has been used

- How to migrate from RDMS to the selected NoSQL database

- Apply to your project

- Document the key lessons learnt

How to succeed in this course….

❑ Do your weekly textbook assigned reading

❑ **Read the slides before you come to the class**

❑ **Exercise a lot - do as many examples as possible**

    – Understand and enhance the demos and examples I provide as well as the ones in the textbook

❑ **Attend and participate in class**

    ❑ **Many of the exam questions are from the class explanation**

❑ Do all the assignments and projects **yourself**

❑ Know where to find help (and do it <u>EARLY</u>):

    – During lectures

    – Come to office hours

Software we will use

- For database you can use **SQL Server 2016 Express**

  - You can download it free from http://www.microsoft.com/express/database/

- Many NoSQL databases

- For implementation you can use **Eclipse for Java EE Developers**, **Netbeans, WebStorm** or **Visual Studio**

Class URLs

- *Course Content and Student work submissions @*
  https://github.com/cmpt506f16

- **Announcements will be by Email**

Important Notes (1 of 2)

- Attendance… QU attendance policies will be enforced
    - If you miss a class you are responsible for bringing yourself up-to-date on class material and assignments
    - Not attending a scheduled exam means you get 0 unless there is a valid medical document
- Read slides and book chapter… before coming to the class
    - You are responsible for material in assigned textbook chapters and research papers that are listed in the schedule
- Exercise… you have to do a LOT of practice
- Be punctual and pay attention during class
    - Students are not allowed to be late for the lectures; you have to be on time and well prepared
    - Chatting, and phone rings, are not allowed during the lecture

Important Notes (2 of 2)

- This is a Master course and students are expected to learn independently as much as needed in order to complete the course requirements

- Do not expect me to find/fix your code bugs

- Do not expect me to find and fix your technical issues

- I can only give you high level suggestions and guidance

Plagiarism / Cheating

- "Getting an unfair academic advantage"
  - using other people's work as your own
  - Not doing your assignments yourself
- **Do your homework and project yourself**
  - Do NOT copy from each other or from the Internet **I will know it!**
  - **Cite** any references / code used
- Penalties START with a zero on the assignment, failing the course! and other disciplinary actions as per QU policy

Email Rules

- When emailing me you must:

1) Add – **CMPT506** to the beginning of the email title

e.g., **CMPT506** – Request for a meeting

2) You must add your name at the end of the email
Otherwise I will ignore your email!

I reply to CMPT506 emails on Sundays, Tuesdays and Thursdays

What to do next

- Read Chapters 1 to 4 of the textbook

- **Email me your github account (see my email for further details)**

- **Email me your group details (see my email for further details)**

- Select the NoSQL DB you would like to work on

 to CMPT506!