



University
of Windsor

COMP 8157
ADVANCED DATABASE TOPICS

WINTER 2023
INTRODUCTION AND
COURSE OUTLINE

DR. SHAFaq KHAN



THE
UNIVERSITY
OF HULL



Stanford
University



University of
Salford
MANCHESTER

- PHD in Computer Science, University of Salford, UK
- MSc. (Computing & Information Systems) University of Hull, UK
- Innovation and Entrepreneurship, Stanford University, USA
- Fellow of The Higher Education Academy, UK



Higher Education
Academy

Keeping up-
to-date with
technology
through
industry
certifications



- ☐ **Artificial Intelligence Analyst 2019
Mastery Award**
- ☐ **Business Intelligence Analyst 2018**
- ☐ **Certified Ethical Hacker (CEH)**
- ☐ **SAP Systems Architect**
- ☐ **Project Management Professional
(PMP)**
- ☐ **Cloud Infrastructure and Services
Associate**
- ☐ **Training in SAP Data Warehouse
Cloud**



- **Employment and Social Development Canada (ESDC) Grant (2023-25).** Our proposal is currently under review by ESDC. Funding: **\$9 million** over 3 years
- **Zayed University Research Grant (2021-23):** Awarded AED 187,280 (**\$66,000**) faculty research grant from Zayed University for a research project entitled “Integrated Framework for a Holistic Digital Transformation Strategy”.
- **Zayed University Research Grant (2019-20):** I was awarded AED 20K (**\$7,000**) for a research project entitled “Blockchain technology as a support infrastructure in e-government evolution”.

- **Artificial Intelligence**
- **Data Analytics**
- **Cloud Computing**
- **IT Governance**
- **Blockchain Technology**
- **Digital Transformation**
- **Information Security**
- **Green Computing**

E-book can be found at: <https://www.lap-publishing.com/catalog/details/store/tr/book/978-613-9-85841-5/it-governance-for-cloud-computing?search=cloud>



Shafaq Naheed Khan

IT Governance for Cloud Computing

People, Skills and Competencies



Courses Taught



Advance Database Topics

Computer Concepts for end users

-Advanced and Practical Database Systems

-Managing Services Operations and Projects

Applied Database Systems

IT Entrepreneurship

- Data Analytics

- Database Systems

Object Oriented Programming

- Enterprise Architecture

IS Governance, Auditing and Control

- Systems Analysis and Design

IT Project Management

- Internship

Web Design and Development

- Final Year Projects

Introduction to Programing

- Information Systems Security

Education and Future

- Disaster recovery planning

Computer Applications

- Internet Applications

Advanced C Programming

- Operating Systems Administration



Experience and Awards

- - Received the **Best Presentation Certificate** at '2019 Blockchain and Internet of Things Conference' held in Okinawa Japan, 2019
- - Received the "**Excellence in Teaching Award**", University of Dubai, August 2011.
- - Received the "**Best CIT Faculty Award**" from the Alumni, University of Dubai, May 2009.
- - Received the "**Effective Advising Award**" by the college of information technology interns.

Dr Khan

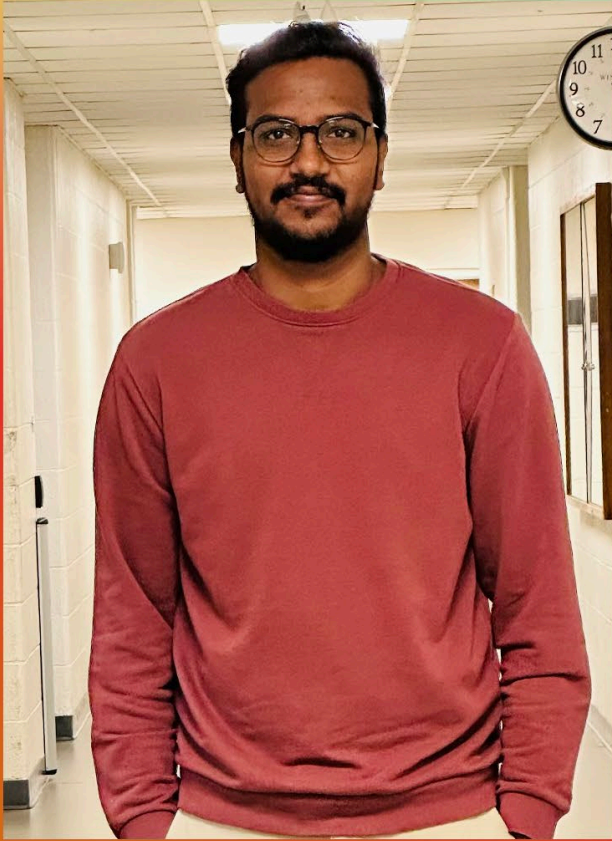
➤ **E-mail:** shafaqk@uwindsor.ca

➤ **Office Location:** 300 Ouellette, Room 4025 or LT 2101 and/or MS Teams

➤ **Office Hours:**

- **Wed/Th:** 1:30 pm to 2:30 pm at 300 Ouellette, Room 4025 and/or MS Teams
- **Wed/Th :** 6 pm to 7 pm at Essex Room 138B or LT 2101 (Main campus) and/or MS Teams





MAHESH ABBURI

GRADUATE ASSISTANT

As an aspiring computer science student at the University of Windsor with one experience in Data Analytics and Reporting.

Email: abburim@uwindsor.ca

Office hours: Thursday 3 pm – 5 pm

Location: 300 Ouelette avenue 4th floor



Krishna Kalyan Sabbella

Graduate Teaching Assistant
sabbell@uwindor.ca

I am an aspiring Software Engineer currently pursuing M.Sc. Computer Science at UoW with over 2 years of professional experience.

Office Hours

Time: Tuesday 4 – 6 PM
Location: 300 Ouellette Avenue

Ali Forooghi

Graduate Assistant

As a Ph.D. computer science student at the University of Windsor with one experience in QA systems and Information Retrieval.

Email: foroogh@uwindsor.ca

Location: 2973 Peter Street



Course Introduction

This course will introduce students to advanced topics in database design and information retrieval. Topics covered may include DBMS three-schema level architectures, data models (e.g., relational, object-oriented model), query languages (e.g. Oracle SQL, PL/SQL), file organization and indexing, transaction management, concurrency control, security and recovery procedures, information retrieval on the internet, and other advanced topics (e.g. online analytical processing - OLAP, data warehouses and data mining)

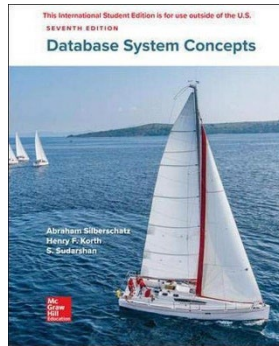
Course Learning Outcomes

At the end of the course, the successful student will know and be able to:

- ✓ Develop applications using systematic knowledge of contemporary database architectures and data models (e.g., relational model, object- oriented model).
- ✓ Implement appropriate security and recovery procedures for databases.
- ✓ Research and apply the latest database management strategies (e.g. from ACM SIGMOD).
- ✓ Evaluate and compare different data models, as well as select and implement the most appropriate models.
- ✓ Recognize and discuss the importance of protecting data against component faults and from unauthorized access.
- ✓ Describe and explain how other components of an application will interface with the database.

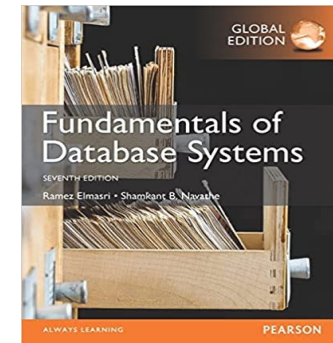
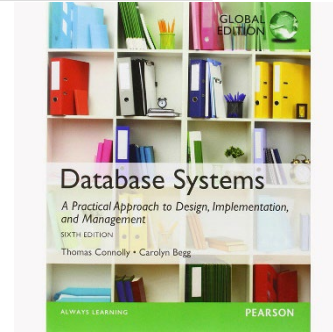
Textbooks

Database systems: a practical approach to design, implementation, and management (6th Edition). T. Connolly and C. Begg.



Database System Concepts (6th Edition). A. Silberschatz, H. F. Korth, and S. Sudarshan

Fundamentals of Database Systems. R. Elmasri & S. B. Navathe



Class

Class Time:

Section 2 – Tu 8:30AM - 11:20AM at 167 Ferry (Downtown) 117

Section 3 – We 2:30PM - 5:20PM at 167 Ferry (Downtown) 110

Section 4 – Th 2:30PM - 5:20PM at 167 Ferry (Downtown) 110

Labs: Last 60 minutes

Tentative Course Schedule

Weeks	Topics	Dates	Deadlines
1	Course Outline	Jan 5	
2	Course Introduction Database Introduction & Architecture	Jan 10 - 12	Project group formation -15 th Jan 2023 Introductory lab
3	Introduction to Big Data	Jan 17 - 19	Workshop on MongoDB
4	Data Mining	Jan 24 - 26	Lab 1: Sec 2: Jan 25; Sec 3: Jan 26; Sec 4: Jan 27 P1: Project proposal submission (Sec 2: Jan 30; Sec 3: Jan 31; Sec 4: Feb 1)
5	Introduction to Distributed DBMS	Jan 31 – Feb 2	Assignment 1 P1: Project proposal presentation
6	Distributed DBMS Design	Feb 7 - 9	Lab 2: Sec 2: Feb 8; Sec 3: Feb 9; Sec 4: Feb 10
7	Distributed DBMS Transparency	Feb 14 - 16	Assignment 2 P2: Milestone report submission (Sec 2: Feb 27; Sec 3: Feb 28; Sec 4: Mar 1)
	Reading Week	Feb 21 - 23	No Classes
8	File organization and indexing	Feb 28 – Mar 2	P2: Milestone presentation
9	Transaction Management	Mar 7 - 9	Lab 3: Sec 2: Mar 8; Sec 3: Mar 9; Sec 4: Mar 10
10	Concurrency Control	Mar 14 - 16	Lab 4: Sec 2: Mar 15; Sec 3: Mar 16; Sec 4: Mar 17
11	Deadlock and Recovery	Mar 21 - 23	Assignment 3 P3: Final Report submission (Sec 2: Mar 27; Sec 3: Mar 28; Sec 4: Mar 29)
12	Security and Administration	Mar 28 - 30	Project Presentation
13	Courses wrap up	Apr 4 - 5	

Assessments

This course is assessed by a combination of assignments, labs, project, class activities and exams.

Assignments	15 %	Please see the course website for details
Labs	15 %	Please see the course website for details
Participation in seminars/workshops	5%	Please see the course website for details
Class participation	5%	Class discussions/activities or unannounced quizzes
Project	30 %	Group work (please see the course website for details)
Final Exam	30 %	TBA (any day within April 10-20), in-person

Labs + Participation Activities

➤ **Labs (15%):** to understand the topics discussed in the lectures and to learn some advance query environment.

Each submission can be made by next day midnight 11:59 pm EST.

Submission: Create a PDF document to provide your answer + SQL or code file.

- **Lab 1** Due : Sec 2:Jan 25; Sec 3: Jan 26; Sec 4: Jan 27
- **Lab 2** Due : Sec 2:Feb 8; Sec 3: Feb 9; Sec 4: Feb 10
- **Lab 3** Due : Sec 2:Mar 8; Sec 3: Mar 9; Sec 4: Mar 10
- **Lab 4** Due : Sec 2: Mar 15; Sec 3: Mar 16; Sec 4: Mar 17

➤ **Participation in seminars/workshops (5%):** You must attend 10 workshops to get full marks

➤ **Class participation (5%):** Class discussions/activities or unannounced quizzes

Workshop on MongoDB on 17th Jan from 10-11am.

Assignments (15%)

LinkedIn Learning Materials.

A1: MongoDB certificate **(2%)** Due : Sec 2:Jan 30; Sec 3: Jan 31; Sec 4: Feb 1

A1: MongoDB Quiz **(3%)** Next day of submission

A2: Hadoop certificate **(2%)** Due : Sec 2: Feb 13; Sec 3: Feb 14; Sec 4: Feb 5

A2: Hadoop Quiz **(3%)** Next day of submission

A3: Spark certificate **(2%)** Due : Sec 2: Mar 20; Sec 3: Mar 21; Sec 4: Mar 22

A3: Spark Quiz **(3%)** Next day of submission

Group Project (30%)

Phase 1- Submission

(10%) Due : Sec 2:Jan 30; Sec 3: Jan 31; Sec 4: Feb 1

Phase 1 Presentation

Next day of submission

Phase 2- Submission

(10%) Due: Sec 2: Feb 27; Sec 3: Feb 28; Sec 4: Mar 1

Phase 2 Presentation

Next day of submission

Phase 3- Submission

(10%) Due: Sec 2: Mar 27; Sec 3: Mar 28; Sec 4: Mar 29

Phase 3 Presentation

Next day of submission

Final Exam (30 %)

Portion: Complete portion covered through the semester.

Date and Time: Any day within **April 10-20**.

Format: In-person, on paper, essay, implementation and MCQs

The final exam schedule is announced by the Registrar's office, normally after the add/drop period, and students are expected to be available for the entire exam period and NOT make any prior travel plans, vacations, or other commitments until after the exam dates are announced. No alternate exams accommodations will be made on those grounds. There will be NO incomplete grade given under any circumstances.

Course Policies

For detailed description see course outline

➤ Academic Honesty:

The instructor will report any suspicion of academic integrity to the Director of the School of Computer Science. If sufficient evidence is available, the Director will begin a formal process according to the University Senate Bylaws which will lead to more review, a strict punishment if convicted, and a note on your permanent student record.

The following behaviours will be regarded as cheating:

- *Copying assignments or quizzes or presenting someone else's work as your own.*
- *Allowing another student to copy an assignment/project from you and present it as their own work; protect your own work and never share it with anyone!*
- *Copying from another student or any other unauthorized source during a test or exam.*
- *Falsifying your identity during the exam or having someone else assist or complete your assessment.*
- *Referring to notes, textbooks, and any unauthorized sources during a test or exam (unless otherwise stated).*
- *Speaking or communicating without permission during a test or exam.*
- *Not sitting at the pre-assigned seat during a test or exam.*
- *Communicating with another student in any way during a test or exam.*
- *Having unauthorized access to the exam/test paper prior to the exam/test.*
- *Explicitly asking a proctor for the answer to a question during an exam/test.*
- *Modifying answers after they have been marked.*
- *Any other behaviour which attempts unfairly to give you some advantage over other students during the grade-assessment process.*
- *Refusing to obey the instructions of the officer in charge of an examination.*

➤ Late Assignment:

- ✓ The students will be penalized 10% per day, including weekends and holidays, for overdue assessments. Late assessments will be accepted for three days maximum after the submission deadline.

Student Responsibilities

- To be polite in all dealings with the professor, the GA/TAs, and the other students.
- To connect with class on time and ready to participate in the learning process.
- If you miss any announcement, it is your responsibility to catch up on instruction you have missed.
- To ensure that you do not plagiarize in any assignment.
- To ensure to submit all assignments (including project) on time.

Thank
you!

Any Questions?