East West University
Department of Computer Science and Engineering
Course Outline of CSE464

Course Information

Course: CSE464 Advanced Database Systems

Credit and Teaching Scheme:

	Theory	Laboratory	Total
Credit Hours	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th week

Prerequisite: CSE301/CSE302 - Database Systems

Instructor Information

Instructor: **Khairum Islam**
Lecturer, Department of Computer Science and Engineering
Office: Room #
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Class Routine and Office Hour

Sunday: NIL

Monday: NIL

Tuesday: 10:50-01:30

Wednesday: NIL

Thursday: 03:00-4:20

Course Objective

This course covers advanced database management system design principles and techniques. The course materials will be drawn from both classic and recent research literature. Possible topics include basic relational algebra concepts, query processing and optimization, transaction processing and concurrency control protocols, distributed databases, object-oriented and object-relational databases, Web and semi-structured data, big data, search engines etc. An introductory database is a prerequisite of this course.

Course Outcomes (COs)

After completion of this course students will be able to:

CO1	**Apply** and **analyze** different query processing and optimization techniques along with concurrency control protocols for tuning database performance.
CO2	**Apply**, **analyze** and **evaluate** advanced SQL programming and Object-Relational Databases for designing and implementing object-oriented database.
CO3	Critically **compare** and **analyze** methods/technologies for building an information retrieval system and for designing a distributed database and handling its challenges such as replication and fragmentation.
CO4	**Choose** appropriate tools, **demonstrate** skills and **write** reports to design, build and test object relational databases and relevant machine learning application for interesting use cases.

Course Topics, Teaching-Learning Methods and Assessment Scheme

Course Topic	**Teaching-Learning Method**	**CO**	**Marks of COs**				**Exam Marks**
			C3	C4	C6	CO Mark	
Reviewing Relational Algebra Operators, Indexing, B+ Tree Indexing	Lecture, Class Discussion, Discussion Outside Class with Instructor/ Teaching Assistant	CO1					**Midterm (20)**
Query Processing Techniques for Selection, Sorting and Join Operations	Do	CO1					
Query Optimization Techniques for complex queries	Do	CO1					
Concurrency Control Protocols, Isolation Levels	Do	CO1					
Advanced SQL Programming, PL/SQL, Procedures, Functions, Triggers	Do	CO2					**Final Exam (30)**
Designing an Object Relational Database using Object-Oriented Oracle	Do	CO2					
Information Retrieval Techniques, TF-IDF, PageRank	Do	CO3					
Distributed Database Principles: Fragmentation and Replication	Do	CO3					

Mini Project and Assignments

Mini Project	Teaching-Learning Method	CO	Mark of Cognitive Levels		Mark of Psychomotor Levels		Mark of Affective Levels	Mark of COs
			C3	C4	P2	P3	A2	
Assignments/ Presentation etc.	Individual, moderately complex design problems on PL/SQL and Object Relational Databases	CO2 and CO3	**6**	**4**				**10**
Mini Project on Oracle Machine Learning including Report and Presentation	Group-based moderately complex Project with report writing, and oral/poster presentation	CO4	**4**	**3**	**1**	**1**	**1**	**10**

Overall Assessment Scheme

	CO				Assessment Area Mark
Assessment Area	**CO1**	**CO2**	**CO3**	**CO4**	
Class Test/Quizzes	5	5	5		15
Midterm Exam	20				20
Final Exam (Theory)		20	10		30
Lab final				10	10
Lab Performance				5	5
MiniProject				10	10
Assignment/Presentation etc.		5	5		10
Total Mark	**25**	**30**	**20**	**25**	**100**

Teaching Materials/Equipment

Text Book:

- **Avi Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*, Sixth Edition, McGraw-Hill, ISBN 0-07-352332-1**

Reference Book:

- Hector Garcia-Molina. Jeffrey D. Ullman and Jennifer Widom, *Database Systems: The Complete Book*, Stanford InfoLab (2nd edition)

- Thomas Connolly, Carolyn Begg, Database Systems: *A Practical Approach to Design, Implementation and Management*, Perason (6th edition)

Software/Tools:

- Oracle Database https://www.oracle.com/database/
- MySQL Database https://www.mysql.com/
- Oracle Machine Learning Library https://www.oracle.com/data-science/machine-learning/
- Other appropriate tools to design and develop a database application.

** Lecture Slides and Lab Manuals will be made available to the students during the class in electronic form.*

Grading System

Marks (%)	Letter Grade	Grade Point	Marks (%)
80-100	A+	50-54	C+
75-79	A-	45-49	C
70-74	B+	40-44	D
65-69	B	0-39	F
60-64	B		
55-59	B-		

Exam Dates

It will be provided on the classroom.

Academic Code of Conduct

Academic Integrity:
Any form of cheating, plagiarism, personification, falsification of a document as well as any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offence under the Academic Code of Conduct and **may lead to severe penalties as decided by the Disciplinary Committee of the university.**

Special Instructions:

- Students are expected to attend all classes and examinations. A student MUST have at least 80% class attendance to sit for the final exam.
- Students will not be allowed to enter into the classroom after 10 minutes of the starting time.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- Normally there will be **NO make-up exam**. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss any exam, the student MUST get approval of makeup exam by written application to

the Chairperson through the Course Instructor **within 48 hours** of the exam time. Proper supporting documents in favor of the reason of missing the exam have to be presented with the application.

- For **final exam**, there will be NO makeup exam. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss the final exam, the student MUST get approval of **Incomplete Grade** by written application to the Chairperson through the Course Instructor **within 48 hours** of the final exam time. Proper supporting documents in favor of the reason of missing the final exam have to be presented with the application. **It is the responsibility of the student to arrange an Incomplete Exam within the deadline mentioned in the Academic Calendar in consultation with the Course Instructor**.
- All mobile phones MUST be turned to silent mode during class and exam period.
- There is **zero tolerance for cheating** in exam. Students caught with cheat sheets in their possession, whether used or not; writing on the palm of hand, back of calculators, chairs or nearby walls; copying from cheat sheets or other cheat sources; copying from other examinee, etc. would be treated as cheating in the exam hall. The only penalty for cheating is **expulsion for several semesters as decided by the Disciplinary Committee of the university**.

Special Instructions for Online Classes

- Don’t be late to join the class.
- Please mute your mic during the class.
- If you have any questions, raise your hand electronically or speak up when the instructor allows you to do so.
- Switch on your camera during attendance registration. Otherwise, your attendance will not be counted.
- Students are not allowed to make any video of the lecture locally in their machines. The lecture videos may be provided only by the instructor.
- **During online assessments, maintain your academic honesty and integrity. If any part of your answer seems to be copied from other students or the internet, you will be heavily penalized.**