

1. Course Number and Course Title:

COE 632 – Advanced Database Systems

2. Credits Hours:

3-0-3

3. Prerequisites and/or Co-Requisites:

Prerequisite: Approval of the CSE Head of Department

Co-requisites: None

Competencies: Undergraduate course in Database Systems

4. Name and Contact Information of Instructor:

Dr. Ghassan Z. Qadah

5. Course Description (Catalog Description):

Covers the following advanced topics in database systems: file structures, indexing techniques, query processing and optimization, concurrency control and backup and recovery, Extensible Markup Language (XML) databases and languages, and mobile databases and data mining. Covers advanced database concepts such as parallel and distributed databases, transaction management, commit protocols and replicated databases.

6. Textbook and other Supplemental Material:

Textbook:

- Elmasri R. and Navathe S., Database Systems, 6th ed., Pearson, 2014.

Other recommended textbooks:

- Ramakrishnan, R. and Gehrke, J., Database Management Systems, 3rd edition, McGraw Hill, 2003.
- Silberschatz A., Korth K. and Sudarshan S., Database System Concepts, 6th ed. 2011, McGraw Hill.

Supplemental material

- Selected articles and journal papers.

7. Course Learning Outcomes:

Upon completion of the course, students will be able to:

1. Evaluate different files, indexing structures and storage schemes in support of modern database systems
2. Quantitatively estimate the performance of alternative algorithmic implementations of primitive database operations
3. Apply different optimization techniques, including cost-based, heuristic-based, and Semantic-based Query Optimization, to speed up query processing against large databases
4. Use different concurrency control and commit protocols, including two-phase locking and ARIES Algorithms, to insure correct access to databases
5. Design backup and recovery scheme that insures database integrity.

6. Design parallel/distributed schemes to speed up the processing of database systems
7. Use database replication to improve the reliability of database systems
8. Use XML data model and languages, such as XQueries and XPath, in modern database development.
9. Apply data mining concepts to generate abstract rules from large databases.
10. Evaluate research papers in the field of advanced databases and present the result to class.

8. Teaching and Learning Methodologies:

Methods include lectures, problems and class presentation based learning methods (assignments, exams, database topics presentation, survey papers, and class discussions).

9. Course Topics and Schedule:

Topic	Weeks
File and indexing structures	Week 1
Query processing	Week 2
Query optimization	Week 3
Parallel database structures	Week 4
Distributed databases organizations	Week 5
Transaction management	Week 6
Concurrency Control	Week 7
Commit protocols + Midterm Exam	Week 8
Backup & Recovery Techniques	Week 9
Replicated databases	Week 10
XML databases	Week 11
Data Mining Concepts	Week 12
Data Mining algorithms	Week 13
Recent advances in database systems	Week 14
Review and evaluation, class presentations	Week 15
Final exam	Week 16