

750761, Advanced Concepts in Database

3 hours per week, 3 credit hours, prerequisite: **none**

Teaching Method: 37 hours Lectures (2-3 hours per week) + 8 hours Laboratory (1 per 2 weeks)

Aims: The goal of this module is to study some contemporary technologies in the database area that

have been adopted in real applications and to survey products and applications that embody these technologies.

Selected topics from the following will be covered: Object Oriented and Object Relational Databases; XML/Semi-structured Data Management; Temporal, Spatiotemporal, Time-Series, and Sequence Data

Management; Distributed Databases; Information Retrieval Techniques; Advanced Query Optimization; Data

Stream Systems; Main Memory Databases.

Learning Outcomes:

On completion of this module, the student should:

- Have knowledge and understanding of database technologies.
- Have deeper knowledge and understanding of more advanced topics in database.
- Be able to design and implement database systems.
- Be able to manage the database systems
- Be able to use different information retrieval techniques.

Textbooks and Supporting Materials:

1- Abraham Silberschatz , Henry F. Korth, and S. Sudarshan, Database System Concepts, 5th Edition,

McGraw-Hill, May 2005

Research papers

Website(s): <http://www.cs.yale.edu/homes/avi/db-book/db5/index.html>

Synopsis:

1- Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object-Based and Semistructured, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators.

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2- Relational Databases: Relational Model, SQL, Advanced SQL, Other Relational Languages, Database Design and the E-R Model, Relational Database Design, Application Design and Development.

3- Object-based Databases and XML: Object-Based Databases, XML.

4- Querying: Query Processing, Query Optimization.

5- Transaction Management: Transactions, Concurrency Control, Recovery System.

6- Data mining and Information Retrieval: Data Analysis and Mining, Information Retrieval.

7- System architecture: Database-System Architectures, Parallel Databases, Distributed Databases.

8- Others Topics: Advanced Application Development, Advanced Data Types and New Applications, Advanced Transaction Processing, Microsoft SQL Server.

Assessment: Two 1-hour midterm exams (15% each); Assignments (30%); 2-hours Final Exam (40%)