

Course Specification Document

Title	Advanced Databases
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Credits	5 ECTS
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Aims	This course aims to provide the student with knowledge related to the programming structures in SQL, methods to enhance query performance, and unstructured databases. It covers parallel and distributed homogeneous and hybrid databases, enabling the student to handle and write queries in an optimal manner in terms of execution time.
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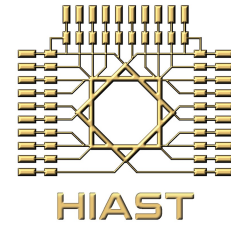
Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand the programming structures in SQL.
- Understand the concept of indexing, types of indexes, and their structures.
- Understand query execution mechanisms.
- Familiarize himself with parallel, distributed, homogeneous, and hybrid databases.
- Understand unstructured databases.
- Write queries in an optimal form.
- Design databases using Oracle Database Management System.
- Design databases using SQL Server Database Management System.

Syllabus

- **Introduction:** Review of fundamental concepts in databases, evolution of database application structures.
- **Programming structures in SQL:** Procedures - Stored functions, loops and conditional expressions, Procedures - External functions.
- **Indexing and PARTITIONING:** Ordered indexes, dense index files, primary-secondary indexes, B+ tree indexes, Bitmap indexes.
- **Query processing:** Cost estimation of query execution, cost of selection operations, cost of sorting operations, cost of merge operations, cost of grouping operations.
- **Query optimization:** Query equivalence, generating equivalent queries, other optimization methods, partial queries - physical perspective.
- **Database management and backup:** Database management, backup procedures.
- **Unstructured databases - NoSQL:** Structure and basic concepts, query mechanisms.



- **Parallel databases:** Parallel input/output operations, parallel query execution, executing a set of queries in parallel, executing an operation in parallel, executing a set of operations in parallel.
- **Distributed databases:** Homogeneous and mixed databases, distributed data storage, distributed transactions, distributed query processing.