# CS 206:   DATABASE SYSTEMS   (3-0-2:  4)

**Introduction***:* Purpose of database systems, data abstraction and modelling, instances and schemes, database manager, database users and their interactions, data definition and manipulation language, data dictionary, overall system structure.

**Entity-relationship model***:* Entities and entity sets, relationships and relationship sets, mapping constraints, E-R diagram, primary keys, strong and weak entities, reducing E-R diagrams to tables, trees or graphs, generalization and specialization, aggregation.

**Brief Introduction to hierarchical and network model***:* Data description and tree structure diagram for hierarchical model, retrieval and update facilities, limitations; Database task group (DBTG) model, record and set constructs retrieval and update facilities, limitations.

**Relational model***:* Structure of a relational database, operation on relations, relational algebra, tuple and domain relational calculus, salient feature of a query language.

Structured query language: Description an actual RDBMS and SQL.

**Normalization***:* Pitfalls in RDBMS, importance of normalization, functional, multi-valued and join dependencies, 1NF to 5NF, limitations of RDBMS.

**Database tuning***:* Index selection and clustering, tuning of conceptual schema, denormalization, tuning queries and views.

**Query optimization***:* Importance of query processing, equivalence of queries, cost Estimation for processing a query, general strategies, bi-relational and multi-relational join algorithms, algebraic manipulation.

**Crash recovery***:* Failure classification, transactions, log maintenance, check point implementation, shadow paging, example of an actual implementation.

**Concurrency Control in RDBMS***:* Testing for serializability, lock based and time-stamp based protocols; Deadlock detection and Recovery.


**Suggested Laboratory Assignments:**

1. ER modeling of real world problems
2. Implementation of indexing structures
3. Creating relational databases with simple tables
4. Creating databases with indexing structures
5. Implementing SQL queries
6. Creating views and queries based on views
7. Implementing embedded SQL queries
8. Working with multimedia objects
9. Check pointing and recovery
10. Implementing multi-user database

**Text Book:**

1. Silberschatz, Korth and Sudarshan, Database system concepts, McGraw Hill.

**References:**

1. Elmasri and Navathe, Fundamentals of database systems; Narosa Publishing Co.
2. C.J Date, "An Introduction to Database Systems", Publisher: Addison, Wesley
3. Raghu Ramakrishnan and Gehrke, Database Management System, McGraw-Hill