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| |  |  |  |  | | --- | --- | --- | --- | | **Course Code:** | IT-301 | **Course Name:** | Database Systems | | **Core/Elective/MLC:** | Core | **L-T-P:** | 3-0-2 | | **Pre-requisites:** | Programming & Data Structures  Flow Diagrams | **Contact Hours:** | Wed : 8-9 AM  Thu: 9-10 AM  Fri: 11-12 noon | | **Type of course:**  **(Lecture/Tutorial/**  **Seminar/Project)** | Lecture/Project | **Course Assessment Methods:**  **(Both Continuous and Semester-End Assessment)** | Mini Project=25%  Lab Exam=10%  Mid Sem Exam=25%  End Sem Exam=40% | |
| **COURSE OBJECTIVE: After completing this course, the student should be able to:**   * Understand the needs for and uses of database management systems in business and the context, phases and techniques for designing and building database information systems in business. * Understand the components of a computerized database information system (application). * Correctly use the techniques, components and tools of a typical database management system, such as MySQL, to build a comprehensive database information system. * Design a correct, new database information system for a business functional area and implement the design, in either MySQL or Oracle. |
| **COURSE OUTCOMES: After the completion of this course,the student will be able to:**   * **CO1:** Become familiar with key concepts supported by an RDBMS. * **CO2:** Understand the Logical layer within the databases and the design concepts related to the Logical Layer. * **CO3:** Understand physical Disk Storage and Access methods and issues affecting Performance. * **CO4:** Importance of SQL and DB Programming Techniques. Learn to express queries (Using SQL) against a Relational Database, and manipulate its contents. * **CO5:** Understand the basics of Transaction Management /Concurrency and Recovery. * **CO6:** Establish basic expertise necessary to pursue any advanced database course. |
| **Topics Covered:**   |  |  | | --- | --- | | **Weeks** | **Topics** | | Week 1: | (Maximum of 2 classes) Introduction to the course, discuss course plan. Class expectation, Feedback to the students if any. Simple File Write operation in any computer language, Introduction to databases. | | Week 2: | Database history, Importance and the need for RDBMS, Types of databases, vendors, definitions, File System Vs Database Systems. Attributes, Tuples, Relational Schema. Conceptual Model/ER. Introduction to SQL-DML, DDL, Creating Relations/Tables, Access and Manipulate Data. | | Week 3: | ER Model development, Entity Types/Sets, Attribute, Relationship Types/Sets, Simple Employee Database conceptual design using ER concepts. Cardinality.UML notation. | | Week 4: | Mathematical notation using Domains/Attributes/Relational Instance, Cartesian Product around Data.ER to Relational Mapping Algorithm | | Week 5 & 6: | Functional Dependency-Definition. Inference Rules. Normalization-The need, Anomalies and Redundant Information in Tuples. Normalization Steps (1NF,2NF,3NF),BCNF | | Week 7 & 8: | Disk storage-Basic File Structures, Ordered/Unordered, Binary Search, Hashing | | Week 8 & 9: | Indexing: Importance of Indexes; Indexing Methods: Primary, Secondary, Clustered, ISAM,B Tree, B+ Tree | | Week 10 & 11: | Relational Algebra and SQL – SELECT, PROJECT, RENAME, Binary and JOIN operations. Examples | | Week 11: | Relational Calculus and SQL – Tuple Relational Calculus, Existential and Universal Quantifiers. Examples | | Week 12: | Schema Definition, Constraints, Queries and Views with Examples, Concept of Stored Procedures. Interface programs such as PL/SQL or Pro\*C(Embedded SQL) | | Week 12 & 13: | Transaction Management: Schedule and Serializability. Concurrency Control: 2-phase lock, Timestamp based protocol. Recovery Mechanism: Undo/Redo values, Write Ahead Logging protocol | |
| **Texts and References (latest editions):**  **Required:**   1. R. Elmasri and S.B Navathe , “Fundamentals of Database Systems”,   **References:**   1. H.Korth and A.Silberschatz: “Database System Concepts”: McGraw Hill 2. Ramakrishnan and Gehrke: “Database Management Systems” :McGraw Hill 3. C.J.Date, A.Kannan, S. Swaminathan: “Database Systems” 4. W.H.Freeman, J.D.Ullman: “Database Systems”   **NOTE:**   1. ***Mini-project: Design must be ready by Mid Sem. Must send soft copies to the instructor.*** 2. ***Final Project implementation must be ready by First/Second week of November.*** 3. ***Lab Exam will be during the last week of October.*** |

**Course Mentor and Instructor**

**Dr. Anand Kumar M**