



# ISM 222

Course Name		Course Code	
Database Management Systems		ISM 222	
Prerequisite	Credit	Theory	Practice
115 CS	4	3	

## Course Description

An introduction to database design and database management systems concentrating on the principles, planning, design, modeling, implementation and applications of database systems. The course also covers the concept of Entity Relationship modeling and normalization.

## Course Topics and Duration in Weeks

Topics	Duration
Introduction to Database Systems DBMS and FFS Purpose of DBMS Characteristics of the database approach Disadvantages of DBMS Database Languages Database Architecture Database Users Database Models	1
Relational Database management System Data Modeling and Relational Database Data Models, Schemas, and Instances Three-Schema Architecture and Data Independence Relational Model Concepts CODDS Rules. Basic operations on relational algebra Domains, Attributes, Tuples, and Relations, Keys Characteristics of Relations Relational Model Notation Relational Model Constraints Domain Constraints Key Constraints and Constraints on NULL Values Relational Databases and Relational Database Schemas Integrity, Referential Integrity, and Foreign Keys	3
Data modeling using ER and EER Using High-Level Conceptual Data Models for Database Design Entity Types, Entity Sets, Attributes, and Keys Relationship Types, Relationship Sets, Roles, and Structural Constraints Weak Entity Types ER Diagrams, Naming Conventions, and Design Issues Relationship Types of Degree Higher than Two Enhanced-ER Model (EER) and its Mapping to Relational Model	2



Subclasses, Super classes, and Inheritance Specialization and Generalization	
Functional dependency and normalization Definition of Functional Dependency FD and Keys Full Functional Dependency Normalization Normal Forms Based on Primary Keys First Normal Form Second Normal Form Third Normal Form Boyce-Codd Normal Form	2
File Storage Structure and Indexing Overview of Physical Storage File Organization Organization of Records in Files Data-Dictionary Storage Database Buffer Basic Indexing Concepts Ordered indices Hash indices Dense and Sparse indices Hashing Static and dynamic hashing	2
Transaction, Concurrency Control and Recovery System Transaction Concept A simple transaction model Transaction Atomicity and durability Serializability Transaction Isolation And Atomicity Lock Based Protocols Deadlock Handling Multiple Granularity Time Based Protocols Validation based Protocols	3
Revision	1
<b>Course Learning Outcomes (CLO)</b>	
By the end of successfully completing this course, students are expected to:	
<ul style="list-style-type: none"> <li>▪ Know about the various models and structures of data storage and retrieval</li> <li>▪ Understand the database development process and its role in information systems.</li> <li>▪ Know how to design a database conceptually, logically, and physically.</li> </ul>	

- Know Entity Relationship Model and its elements.
- Understand the concepts of ER Modeling and able to apply them in the process of designing a database.
- Understand and use the Relational Model.
- Apply algorithms of ER to Relational Mapping
- Understand the database Implementation including functional dependency and normalization.

#### Textbook

Fundamentals of Database Systems, 5th edition or Later, Elmasri & Navathe, Addison-Wesley, 2007. ISBN: 0-321-36957-2, Pearson

#### References

Database Systems: A practical Approach to Design and Implementation, Thomas Connolly and Carolyn Begg. Thomas Education, Latest Edition. ISBN:0321210255

Database Design Using Entity-Relationship Diagrams, Sikha Bagui & Richard Earp, Auerbach Publications, 2007. ISBN: 0-8493-1548-4

#### Coordinator (s)

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IS Department Approval

