IS220 & 220L Database Security / Laboratory			
Credit Hours	3-1-4	**Prerequisites**	CS-114

Course Learning Outcomes:

S No	CLO	Domain	Taxonomy Level	PLO
1	Explain the fundamental concepts of databases, various variants, and security metrics	Cognitive	2	1
2	Design conceptual, logical and physical database schemas using different data models by taking security into consideration	Cognitive	5	2
3	Analyze functional dependencies and resolve secure database anomalies by normalizing database tables	Cognitive	4	2
4	Secure use of Structured Query Language (SQL) for database, definition and manipulation in any DBMS	Psychomotor	3	4

Course Content:

Concept of Databases: Database Management Systems. Advantages of database management systems over file systems. **Various Database Models:** Implementation, storage and data retrieval strategies of Network three data models- Network, Hierarchical and relational data model, OODB, comparison with each other. **Intro to the Relational Model**: Relational Algebra– its syntax and use in Client server and single user environments. **Query languages**: SQL, embedded SQL in other languages. **Transaction Processing**: Types and Different stages of transactions, aborted/incomplete transactions, Roll Back and different techniques of recovery from the exceptional situation. **Parallel Execution of Transactions**: Inherent problems, limitations, serialization of transactions. Isolation in transaction. **Distributed Database System**. **Accidental Threats to Database Security:** User errors, Communications system errors, OS or database server errors. **Database security and privacy:** Database application security models**,** Database auditing models**,** Application data auditing, Practices of database auditing. **Special Topics in Database security**: Authentication, User Profiles, Authorization, SQL injection and protection, Parameterized Statements, Escaping Inputs, Sanitizing Inputs, Data encryption and password hashing.

Teaching Methodology:

Lectures, Written Assignments, Semester Project, Presentations

Course Assessment:

Midterm Exam, Home Assignments, Quizzes, Project, Presentations, Final Exam

Reference Materials:

1. Ricardo, C. M. (1990). Database systems: principles, design, and implementation. New York: Macmillan ISBN-13: 978- 0023996658
2. Date, C. J. (2004). An introduction to database systems (8th ed.). Boston: Pearson/Addison Wesley. ISBN-13:978-0321197849
3. Databases Illuminated 3rd Ed., Catherine Ricardo and Susan Urban, Jones and Bartlett, 2017 (ISBN 978-1-284-05694-5)
4. Tech Sig Movie ser 29, “What is Electronic Data Processing Concept” – 30mins

Additionally, there would be lecture notes and selected articles.