

ITMD 321 SYLLABUS**ITMD 321 Data Modeling and Applications**

Hours: 3 credit hours / 45 contact hours

Instructor: Marwan Omar

Textbook, title, author, and year:*Database Concepts 9th Edition by David M. Kroenke
Et.Al. Pearson, 2019***Specific course information:**

- a. **Catalog description:** Basic data modeling concepts are introduced. Hands-on database design, implementation, and administration of single-user and shared multi-user database applications using a contemporary relational database management system.
- b. **Prerequisites:** None
- c. **Required.**

Specific goals for the course

- a. **Program Education Objective:**
 1. Problem solve and create innovative answers to provide technology solutions for the problems of business, industry, government, non-profit organizations, and individuals.
- b. **Course Outcomes:**
At the conclusion of this course, each successful student will able to:
 - Describe the theoretical and physical concepts of a relational database.
 - Design, implement, and validate a relational database structure in using an industry-standard query language.
 - Perform fundamental tasks involved with modeling, designing, and implementing a relational database management system (DBMS).
 - Demonstrate knowledge of essential DBMS concepts: normalization, database security, high availability, backup and recovery, SQL database tuning, and non-relational database models.
- c. **Course student outcomes:**
At the conclusion of this course, each successful student will able to:
 - Describe the theoretical and physical concepts of a relational database.
 - Explain the design methodology for databases and verify their structural correctness.
 - Use a query language, primarily SQL, and their database related supported software.
 - Implement the theory behind the various database models and query languages.
 - Design and build a simple database management system (DBMS).
 - Model, design, and implement a database structure in a DBMS.
 - Create, modify, and query database objects using Structured Query Language (SQL).

- Describe these essential DBMS concepts: database security, high availability, backup and recovery, and SQL database tuning.
- Explain normalization and normal forms, and demonstrate the ability to normalize relational database tables.
- Contrast and compare relational database concepts and non-relational databases including object-oriented, XML, NewSQL, NoSQL, and de-normalized databases.
- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions (**ABET Computing Criterion 3.1**)
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline (**ABET Computing Criterion 3.2**)
- Identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems (**ABET IT Criterion 3.6**)

Topics to be covered

- a. Introduction to databases DBMS Concepts
- b. Introduction to Virtualization
- c. Relational Model ER – Modeling Intro to SQL
- d. Database Design More SQL Intro
- e. Data Definition Language Data Types and Constraints Normalization
- f. Schema Definition Table Creation SQL Queries
- g. SQL Intro
- h. MySQL Workbench Introduction Filtering (WHERE clause)
- i. MySQL Workbench MySQL for Excel
- j. Joins
- k. Sets
- l. Case Studies MySQL Server
- m. Server Administration
- n. Subqueries Grouping and Aggregates
- o. Advanced Joins
- p. Conditional Logic
- q. Transactions
- r. Indexes Constraints
- s. Views Metadata
- t. Programming/APIs SQLite
- u. Database auditing and Security
- v. Database Backup and Disaster Recovery
- w. Introduction to NoSQL databases Big Data
- x. Deeper dive into DDL, DCL, TCL
- y. Deeper dive into Cassandra and CQL