MySQL Teaching Syllabus

Module 1: Introduction to Databases & MySQL
- What is a Database? (Relational vs Non-Relational)
- Introduction to SQL and MySQL
- Installing MySQL (Windows, Linux, Mac, Docker)
- MySQL Workbench / CLI basics
- Database design concepts (tables, rows, columns, relationships)

Module 2: Basic SQL Operations
- Creating databases and tables
- Data types in MySQL
- INSERT, SELECT, UPDATE, DELETE
- Filtering data with WHERE
- Sorting data with ORDER BY
- Limiting results with LIMIT

Module 3: Intermediate Querying
- Using DISTINCT
- Aggregate functions: COUNT(), SUM(), AVG(), MIN(), MAX()
- Grouping data: GROUP BY, HAVING
- String functions (CONCAT, SUBSTRING, UPPER, LOWER)
- Date & time functions

Module 4: Joins & Relationships
- Primary keys & foreign keys
- Types of joins: INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN
- Multi-table queries
- Subqueries & nested queries

Module 5: Advanced SQL Concepts
- Indexing (clustered, non-clustered)
- Views
- Stored Procedures & Functions
- Triggers
- Transactions & ACID properties
- Error handling with MySQL

Module 6: Database Design & Normalization
- ER diagrams
- Normalization (1NF, 2NF, 3NF, BCNF)
- Denormalization concepts
- Real-world schema design (e.g., ecommerce, student management)

Module 7: Performance & Security
- Query optimization & EXPLAIN
- Indexing strategies
- Caching concepts
- User management & roles
- Permissions & GRANT/REVOKE
- SQL injection prevention

Module 8: MySQL in Real Applications
- Connecting MySQL with Python / PHP / Node.js
- Using MySQL in web development

- Backup & restore databases (mysqldump)
- Replication basics
- Introduction to MySQL Cluster

Capstone Project Ideas
- Library Management System
- Student Enrollment System
- E-commerce Database (products, orders, users)
- Hospital/Clinic Management System

Extra Topics to Enrich the MySQL Syllabus

1. Data Import & Export
- Loading data from CSV/Excel into MySQL (LOAD DATA INFILE)
- Exporting query results
- ETL basics

2. Advanced Querying Techniques
- Common Table Expressions (WITH)
- Window functions (ROW_NUMBER, RANK, LEAD, LAG)
- Recursive queries
- Pivoting & unpivoting data

3. Database Administration (DBA Basics)
- Understanding MySQL architecture (storage engines: InnoDB vs MyISAM)
- Backup & restore strategies (mysqldump, mysqlpump, binary logs)
- Monitoring performance (SHOW PROCESSLIST, INNODB STATUS)
- Partitioning tables

4. Security & Best Practices
- Password policies & encryption
- SSL/TLS connections
- Data masking & anonymization
- Auditing & logging

5. Scaling MySQL
- Sharding concepts
- Horizontal vs vertical scaling
- Replication & failover
- MySQL with cloud platforms (AWS RDS, Google Cloud SQL, Azure Database)

6. Real-World Use Cases
- Designing for analytics vs OLTP systems
- Using MySQL with big data pipelines
- Integration with BI tools (Tableau, PowerBI, Metabase)

7. Project & Portfolio Building
- Building a REST API with MySQL backend
- Designing and normalizing a database from scratch
- Optimization case study (before/after EXPLAIN)
- Deploying a MySQL project to the cloud

8. Soft Skills for MySQL Professionals
- Writing clean & reusable SQL
- Documenting schemas & queries
- Collaborating with developers (Git, versioning schemas)

- Interview-style SQL problem-solving