

■ 6-Month MySQL Database Syllabus (Complete)

MONTH 1 — DATABASE FOUNDATIONS

Week 1: Introduction to Databases

- What is a Database?
- Types of Databases: Relational vs NoSQL
- What is SQL?
- Installing MySQL / MariaDB / XAMPP
- MySQL Workbench / phpMyAdmin overview
- Basic database concepts: Table, Row, Column, Primary Key, Foreign Key

Week 2: Basic SQL Commands

- CREATE DATABASE, USE
- CREATE TABLE, ALTER, DROP
- INSERT, UPDATE, DELETE
- SELECT (Simple Queries)
- WHERE clause with operators (=, <>, >, <, BETWEEN, LIKE)

Week 3: Data Types & Constraints

- INT, VARCHAR, TEXT, DATE, DATETIME, FLOAT
- PRIMARY KEY, AUTO_INCREMENT
- NOT NULL, UNIQUE, CHECK
- DEFAULT values

Week 4: SELECT Queries (Advanced)

- ORDER BY (ASC/DESC)
- LIMIT, OFFSET
- DISTINCT
- IN, NOT IN
- AND, OR, NOT

MONTH 2 — JOINS, FUNCTIONS & ADVANCED SQL

Week 1: SQL Joins

- INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- FULL JOIN
- CROSS JOIN
- Joining 3 or more tables

Week 2: SQL Functions

- Aggregate Functions — COUNT(), SUM(), AVG(), MIN(), MAX()
- String Functions — CONCAT(), UPPER(), LOWER(), LENGTH()
- Date Functions — NOW(), CURDATE(), DATEDIFF()
- Mathematical Functions

Week 3: GROUP BY & HAVING

- GROUP BY usage
- HAVING vs WHERE
- GROUPING with multiple columns

Week 4: Subqueries

- Subquery inside SELECT
- Subquery inside FROM
- Subquery inside WHERE
- Nested subqueries
- EXISTS, NOT EXISTS

MONTH 3 — DATABASE DESIGN & NORMALIZATION

Week 1: ER Diagrams

- Entities, Attributes
- Relationships (1–1, 1–M, M–M)

- Converting ER diagrams to tables

Week 2: Normalization

- 1NF, 2NF, 3NF
- BCNF (Boyce-Codd Normal Form)
- Functional dependencies
- Avoiding redundancy & anomalies

Week 3: Indexing

- What is an Index?
- PRIMARY vs UNIQUE vs COMPOSITE Index
- How indexes improve speed
- When NOT to use indexes

Week 4: Views & Stored Routines

- CREATE VIEW, UPDATE VIEW
- Stored Procedures (IN, OUT parameters)
- Stored Functions
- Use cases

MONTH 4 — ADMINISTRATION, SECURITY & TRIGGERS

Week 1: Database Administration

- Backup & Restore (mysqldump)
- Export & Import using Workbench/phpMyAdmin

Week 2: User Management & Permissions

- CREATE USER
- GRANT, REVOKE
- Roles & privileges

Week 3: Triggers

- BEFORE INSERT, AFTER INSERT
- BEFORE UPDATE, AFTER UPDATE
- BEFORE DELETE, AFTER DELETE
- Real-time use cases

Week 4: Transactions & Locks

- START TRANSACTION, COMMIT, ROLLBACK
- Savepoints
- Deadlocks & locking mechanisms

MONTH 5 — ADVANCED CONCEPTS & OPTIMIZATION

Week 1: Query Optimization

- EXPLAIN command
- Query execution plan
- Slow queries & optimization techniques

Week 2: Stored Routines (Advanced)

- Loops & Conditions inside stored procedures
- Error handling in SQL procedures

Week 3: Partitioning

- RANGE, HASH, LIST partitioning
- Benefits of large datasets

Week 4: Functions vs Procedures vs Triggers

- Differences
- When to use what

MONTH 6 — PROJECTS & REAL-WORLD DB INTEGRATION

Week 1: Mini Projects

- Library DB
- Hospital DB

- Inventory DB

- Student DB

Week 2: MySQL with Python / Django

- MySQL Connector
- Django MySQL configuration
- Running migrations
- CRUD using Django ORM

Week 3: MySQL with Node.js / Express

- Installing mysql2 package
- Writing queries in Node
- API with MySQL DB

Week 4: Final Project

- Real-world database design
- ER model → Normalization → Implementation
- Queries, Joins, Views, Procedures, Triggers
- Documentation & Presentation