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PINEAPPLE EDUCATION

Innovation, Research, Academic & Training Institute with Placement Support

(Mentored by Lawyers, Chartered Accountants, IT Professionals & Academicians)

21 Years

Powered by IIMMI INTERNATIONAL INSTITUTE OF MANAGEMENT, MEDIA & IT

PROFESSIONAL DBMS & MYSQL PROGRAM | CAREER-FOCUSED CURRICULUM

Learning Roadmap

A visual path through the complete 8-module DBMS using MySQL curriculum.

1.5 Months	8 Modules	Projects + Career Prep
Program Duration (6 Weeks)	Complete Curriculum	Applied Learning

01 DBMS Foundations & Setup
Foundation | 0.5 Week

02 Data Modeling & Normalization
Database Design | 1 Week

03 SQL Fundamentals: DDL & DML
Core SQL | 1 Week

04 Advanced SQL & Analytics
Advanced SQL | 1 Week

05 Views, Indexes & Stored Programs
Programming & Tuning | 1 Week

06 Transactions, Security & Admin
Reliability & Security | 0.5 Week

07 Real-World Projects & Interview Prep
Applied Practice | 0.5 Week

08 Capstone Project
End-to-End Delivery | 0.5 Week

Tools & Technologies

MySQL 8.x | MySQL Workbench | MySQL CLI | phpMyAdmin | SQL | draw.io | dbdiagram.io | Python | mysql-connector | Pandas | SQLAlchemy | VS Code | Git & GitHub | CSV / Excel | Sakila Database

Career Pathways

Database Administrator (DBA) | SQL Developer | Data Analyst | Business Intelligence Analyst | Backend Developer | Junior Data Engineer | Database Support Engineer

Hands-On SQL Labs	6 Portfolio Projects	Capstone Project	Interview Preparation
Practice after every topic	Across real business domains	End-to-end MySQL database	Mock interviews & resume

Program Overview

Timeline, week-wise focus and everything you need to know before you start.

Program Timeline (6 Weeks)



Week-wise Focus

WEEK 1	DBMS concepts, MySQL setup, relational model and ER design	M01 - M02
WEEK 2	Normalization, schema design, DDL, data types and constraints	M02 - M03
WEEK 3	DML, querying basics, built-in functions, aggregation and joins	M03 - M04
WEEK 4	Subqueries, CTEs, window functions, views and indexing	M04 - M05
WEEK 5	Stored programs, triggers, transactions, security and backups	M05 - M06
WEEK 6	Real-world projects, interview preparation and capstone delivery	M07 - M08

Who Can Join

- Students of BCA, MCA, B.Tech, BSc IT / CS and similar streams
- Fresh graduates targeting IT and data roles
- Professionals moving into database or data roles
- Aspiring DBAs, SQL developers and analysts

Prerequisites

- Basic computer operating skills
- No prior programming experience required
- Logical thinking and interest in working with data
- Laptop or PC capable of running MySQL 8

How the Program Runs

- Concept explanation with live demonstrations
- Hands-on SQL practice for every topic
- Assignments at the end of each module
- Projects, interview preparation and capstone

PROGRAM OUTCOME

Design, build, query, secure and optimize MySQL databases - and finish with a portfolio-ready DBMS case covering ER design, schema, advanced SQL, stored programs and professional documentation.

01

MODULE 01

DBMS Foundations & Setup

DURATION: 0.5 WEEK

Foundation-level understanding of data, databases and DBMS architecture, with a professional MySQL environment installed and ready for hands-on work.

Database Concepts

- Data vs Information
- File System vs DBMS
- Advantages of DBMS
- DBMS Users & Roles (DBA, Developer, Analyst)
- Three-Schema Architecture
- Data Independence
- Database Languages (DDL, DML, DCL, TCL)

Types of Databases

- Relational Databases (RDBMS)
- NoSQL Overview (Document, Key-Value, Column, Graph)
- OLTP vs OLAP
- Popular RDBMS: MySQL, PostgreSQL, Oracle, SQL Server
- Choosing the Right Database

MySQL Introduction

- MySQL Architecture
- Client-Server Model
- Storage Engines (InnoDB, MyISAM)
- MySQL Versions & Editions
- Databases, Schemas & Tables
- Real-World Use Cases

Software to Install

- MySQL Server 8.x
- MySQL Workbench
- MySQL Command Line Client
- phpMyAdmin (Optional)
- draw.io / dbdiagram.io
- VS Code
- Git and GitHub

Assignment

- Install and verify MySQL Server, Workbench and the command-line client
- Create a GitHub account and a repository for SQL practice scripts
- Import the Sakila sample database and explore its tables
- Write a one-page note comparing File System and DBMS with an example

LEARNING OUTCOME

Understand how databases and DBMS work, set up a professional MySQL working environment, and be ready to design and query real databases.

02

MODULE 02

Data Modeling & Normalization

DURATION: 1 WEEK

Designing reliable relational databases, from business requirements to ER diagrams and fully normalized tables.

Relational Model

- Tables, Rows & Columns
- Super, Candidate & Alternate Keys
- Primary Key
- Foreign Key
- Composite Key
- Entity Integrity
- Referential Integrity
- Relational Algebra (Introduction)

ER Modeling

- Entities & Attributes
- Relationships
- Cardinality (1:1, 1:N, M:N)
- Participation Constraints
- Weak Entities
- Generalization & Specialization
- Crow's Foot Notation
- ER to Relational Mapping

Normalization

- Functional Dependencies
- Insert, Update & Delete Anomalies
- 1NF
- 2NF
- 3NF
- BCNF
- Denormalization (When & Why)

Schema Design Practice

- Requirement Analysis
- Data Dictionary
- Naming Conventions
- Designing in MySQL Workbench
- Forward & Reverse Engineering
- Documenting the Design

Hands-On Practice

- Draw the ER diagram for a Library, Hospital or E-commerce system
- Convert the ER diagram into relational tables with keys
- Normalize an unnormalized table step by step up to 3NF

LEARNING OUTCOME

Translate a business requirement into a clean, normalized relational schema with the right keys and relationships.

03

MODULE 03

SQL Fundamentals: DDL & DML

DURATION: 1 WEEK

Core SQL for creating databases, defining tables with constraints, and inserting, updating and retrieving data accurately.

Data Types

- INT & BIGINT
- DECIMAL & FLOAT
- CHAR & VARCHAR
- TEXT
- DATE, TIME & DATETIME
- TIMESTAMP
- ENUM
- BOOLEAN
- JSON (Introduction)

DDL Commands

- CREATE DATABASE
- CREATE TABLE
- ALTER TABLE
- DROP
- TRUNCATE
- RENAME
- AUTO_INCREMENT
- Temporary Tables

Constraints

- PRIMARY KEY
- FOREIGN KEY
- ON DELETE / ON UPDATE CASCADE
- UNIQUE
- NOT NULL
- CHECK
- DEFAULT

DML Commands

- INSERT (Single & Multi-Row)
- INSERT ... SELECT
- UPDATE
- DELETE
- REPLACE
- Safe Update Mode

Querying Basics

- SELECT
- WHERE
- DISTINCT
- ORDER BY
- LIMIT & OFFSET
- Aliases
- Arithmetic, Comparison & Logical Operators
- BETWEEN
- IN
- LIKE & Wildcards
- IS NULL
- REGEXP

Importing & Exporting Data

- Table Data Import Wizard
- LOAD DATA INFILE
- CSV Import
- Export to CSV / SQL
- mysqldump (Basics)

Hands-On Practice

- Create a College or Online Store database with all constraints
- Load sample data from CSV files and perform CRUD operations
- Solve a graded set of practice queries on filtering, sorting and patterns

LEARNING OUTCOME

Create well-structured tables with proper constraints and confidently manage data using DDL, DML and basic SELECT queries.

04

MODULE 04

Advanced SQL & Analytics

DURATION: 1 WEEK

Advanced querying skills to combine tables, summarize data and answer real business questions using functions, joins, subqueries and window functions.

Built-in Functions

String (CONCAT, SUBSTRING, TRIM) | Numeric (ROUND, CEIL, MOD)

Date & Time (NOW, DATEDIFF, DATE_FORMAT) | CASE & IF | IFNULL, COALESCE & NULLIF | CAST & CONVERT

Aggregation & Grouping

COUNT | SUM | AVG | MIN & MAX | GROUP BY | HAVING | GROUP_CONCAT | WITH ROLLUP

Joins & Set Operations

INNER JOIN | LEFT JOIN | RIGHT JOIN | CROSS JOIN | SELF JOIN | Multi-Table Joins

UNION & UNION ALL | INTERSECT & EXCEPT (MySQL 8.0.31+)

Subqueries & CTEs

Scalar & Row Subqueries | Derived Tables | Correlated Subqueries | EXISTS & NOT EXISTS | ANY & ALL

Common Table Expressions (CTE) | Recursive CTE

Window Functions

OVER & PARTITION BY | ROW_NUMBER | RANK & DENSE_RANK | NTILE | LAG & LEAD

FIRST_VALUE & LAST_VALUE | Running Totals | Moving Averages

Hands-On Practice

- Sales analysis: revenue by product, region and month
- Top-N per group and ranking problems using window functions
- Employee hierarchy report using a recursive CTE

LEARNING OUTCOME

Write efficient multi-table queries and analytical reports that turn raw data into clear business answers.

05

MODULE 05

Views, Indexes & Stored Programs

DURATION: 1 WEEK

Programmable MySQL features for reusable logic, faster queries and automated database behavior.

Views

- Create, Alter & Drop Views
- Updatable Views
- WITH CHECK OPTION
- Views for Security & Simplicity

Indexes & Query Optimization

- B-Tree Indexes
- Primary & Secondary Indexes
- Composite Indexes
- Unique Index
- Full-Text Index
- Covering Index
- EXPLAIN & Execution Plans
- Index Pitfalls
- Slow Query Log
- Query Rewriting

Stored Procedures

- IN, OUT & INOUT Parameters
- Variables & DELIMITER
- IF, CASE & Loops
- Error Handling (DECLARE HANDLER)
- SIGNAL
- Cursors

Functions & Triggers

- User-Defined Functions
- BEFORE & AFTER Triggers
- OLD & NEW Values
- Audit Logging Triggers

Advanced Features

- Event Scheduler
- Prepared Statements
- JSON Functions
- Generated Columns

Hands-On Practice

- Build an audit trigger that logs every change made to an orders table
- Write a stored procedure that processes an order end to end
- Tune slow queries on a large table using indexes and EXPLAIN

LEARNING OUTCOME

Build reusable database logic and optimize query performance using views, indexes, procedures, functions and triggers.

06

MODULE 06

Transactions, Security & Admin

DURATION: 0.5 WEEK

Keeping data consistent, secure and recoverable with transactions, access control, backups and basic database administration.

ACID at a Glance

A — Atomicity
All steps of a transaction succeed, or none do.

C — Consistency
Data always moves from one valid state to another.

I — Isolation
Concurrent transactions do not interfere with each other.

D — Durability
Committed changes survive crashes and restarts.

Transactions & Concurrency

- START TRANSACTION
- COMMIT & ROLLBACK
- SAVEPOINT
- Autocommit
- Isolation Levels
- Dirty, Non-Repeatable & Phantom Reads
- Row & Table Locks
- InnoDB MVCC (Introduction)
- Deadlocks

Security & Access Control

- Users & Roles
- GRANT & REVOKE
- Privilege Levels
- Password Policies
- SQL Injection & Prevention
- SSL / Encryption Basics

Backup, Recovery & Administration

- mysqldump Backup & Restore
- Binary Logs
- Point-in-Time Recovery
- Monitoring (SHOW PROCESSLIST)
- Replication (Introduction)
- Partitioning (Introduction)
- Cloud MySQL Overview (AWS RDS, Azure, GCP)

Hands-On Practice

- Simulate a bank transfer using COMMIT, ROLLBACK and SAVEPOINT
- Create users and roles with least-privilege access
- Take a full backup and restore it into a new database

LEARNING OUTCOME

Protect data integrity with transactions, control access securely, and recover from failures using backups.

07

MODULE 07

DURATION: 0.5 WEEK

Real-World Projects & Interview Prep

Portfolio work that applies design, SQL and programming skills to real business domains, along with structured interview preparation.

Application Integration

- Python + MySQL Connectivity
- mysql-connector-python
- Parameterized Queries
- CRUD from Python
- Query Results into Pandas
- SQLAlchemy (Introduction)

Portfolio Projects

01 **Library Management System**
Schema Design & CRUD

02 **E-commerce Order Database**
Retail & Joins

03 **Hospital Management System**
Healthcare & Constraints

04 **Banking & Transactions System**
Finance & ACID

05 **HR & Payroll Database**
Corporate & Window Functions

06 **Sales Analytics & Reporting**
Business Intelligence

Project Standards

- Version-control every project on GitHub with a clear README
- Document the ER diagram, schema, sample queries and results
- Present findings in clear business language

Technical Interview Preparation

- SQL Coding Questions
- Joins & Subqueries
- Window Functions
- DBMS Theory (Keys, Normalization, ACID)
- Indexing & Query Optimization
- Stored Programs & Triggers
- Database Design Scenarios

Career Readiness

- Resume Building
- LinkedIn & GitHub Profile
- Mock Interviews
- Portfolio Presentation
- Explaining Projects in Business Language

INTERVIEW GOAL

Explain not only the queries written, but also the business problem, design decisions, results, limitations and recommended next steps.

08

MODULE 08

Capstone Project

DURATION: 0.5 WEEK

A complete end-to-end database project integrating design, implementation, analytics, optimization and professional documentation.

Capstone Stages

01 **Problem Definition & Requirements**
CAPSTONE STAGE

02 **ER Design & Normalization**
CAPSTONE STAGE

03 **Schema Creation & Data Loading**
CAPSTONE STAGE

04 **Complex Queries & Analytics**
CAPSTONE STAGE

05 **Views, Procedures & Triggers**
CAPSTONE STAGE

06 **Indexing & Optimization**
CAPSTONE STAGE

07 **Security, Backup & Testing**
CAPSTONE STAGE

08 **Final Presentation & GitHub Docs**
CAPSTONE STAGE

Capstone Domains (Choose One)

Healthcare | Finance & Banking | Retail & E-commerce | Education & ERP | Logistics & Supply Chain | Travel & Hospitality

Deliverables

ER Diagram | Normalized Schema (SQL Scripts) | Sample Data | Analytical Queries | Views, Procedures & Triggers | Backup Strategy | Project Report | GitHub Repository

Evaluation Criteria

- Correctness and normalization of the schema
- Quality and performance of queries
- Use of advanced features and security practices
- Clarity of documentation and final presentation

PROGRAM OUTCOME

A portfolio-ready DBMS project built in MySQL, from requirement analysis to a documented, optimized and presented database solution.