

SQL with AI

A 3-Month Course Curriculum for College Students

Month	Focus
Month 1	SQL Fundamentals
Month 2	Intermediate SQL + AI Integration
Month 3	Advanced SQL, AI-Driven Analytics & Capstone Project

Month 1: SQL Fundamentals

Week 1 — Introduction to Databases & SQL

- What is a database, RDBMS concepts, SQL vs NoSQL
- Installing MySQL/PostgreSQL + tools (MySQL Workbench, DBeaver, or SSMS)
- Intro to using AI assistants (ChatGPT/Claude) as a learning aid for SQL syntax

Week 2 — Basic Queries

- SELECT, WHERE, ORDER BY, LIMIT
- Comparison & logical operators
- Using AI to explain/debug beginner query errors

Week 3 — Filtering & Aggregation

- GROUP BY, HAVING, aggregate functions (COUNT, SUM, AVG, MIN, MAX)
- DISTINCT, aliasing
- Practice: AI-generated practice datasets and quizzes

Week 4 — Joins

- INNER, LEFT, RIGHT, FULL joins
- Self joins, UNION/UNION ALL
- **Mini Project 1:** Query a sample retail/student database

Month 2: Intermediate SQL + AI Integration

Week 5 — Subqueries & CTEs

- Nested subqueries, correlated subqueries
- Common Table Expressions (WITH clause)
- Using AI to convert plain-English questions into SQL queries

Week 6 — Window Functions

- ROW_NUMBER, RANK, DENSE_RANK

- PARTITION BY, LAG/LEAD
- AI-assisted query optimization techniques

Week 7 — Data Modification & Database Design

- INSERT, UPDATE, DELETE, transactions
- Normalization (1NF–3NF), keys, constraints
- ER diagrams (can use AI tools to auto-generate schema from requirements)

Week 8 — Natural Language to SQL Tools

- Overview of AI-powered SQL tools (Text-to-SQL models, Copilot for databases, ChatGPT/Claude SQL generation)
- Prompt engineering for accurate query generation
- Validating and correcting AI-generated SQL
- **Mini Project 2:** Build a query set using AI-assisted generation + manual validation

Month 3: Advanced SQL, AI Analytics & Capstone

Week 9 — Stored Procedures, Functions & Triggers

- Writing stored procedures and functions
- Triggers and use cases
- Indexing and query performance basics

Week 10 — Performance Tuning with AI

- EXPLAIN/EXPLAIN ANALYZE
- Index optimization
- Using AI tools to suggest query improvements and detect bottlenecks

Week 11 — SQL + AI for Analytics

- Connecting SQL databases to BI/AI tools (Power BI, Tableau, or Python notebooks)
- Using AI to generate insights/summaries from query results
- Intro to combining SQL with basic ML concepts (feature extraction from SQL data)

Week 12 — Capstone Project & Presentation

- Students design a database, write complex queries, and use an AI tool to assist with a real-world dataset (e.g., college admissions data, sales data, or a public dataset)
- **Deliverable:** working database + query documentation + short AI-assisted analysis report
- Final presentations and evaluation

Suggested Assessment Breakdown

Component	Weight
Weekly quizzes/assignments	30%
Mini Projects (Week 4, Week 8)	30%
Capstone Project	30%
Participation / AI tool usage log	10%

Tools Needed

- MySQL/PostgreSQL, DBeaver or MySQL Workbench
- ChatGPT/Claude (or similar) for AI-assisted query writing
- Power BI/Tableau (optional, for Week 11)
- A sample dataset repository (Kaggle datasets work well)