ACCIJOB SQL CURRICULUM (PostgreSQL + pgAdmin 4 + Azure Data Studio Edition)

Instructor: Sayyed Siraj Ali

Duration: 6 Weeks | 18 Sessions (Thu, Sat & Sun)

Platform: PostgreSQL 16 · pgAdmin 4 · Azure Data Studio (ADS)

Database: RetailMart (10+ Tables · 10k–50k Rows)

Curriculum Flow Philosophy — Concept Before Code, Practice Before Project

This curriculum follows a progressive, dependency-based learning structure ensuring a complete transition from foundational SQL concepts to analytical and performance-based SQL proficiency. Each session incrementally builds upon prior knowledge to ensure conceptual retention and industry application readiness.

Day	Topic	Detailed Subtopics / Learning Objectives
1	PostgreSQL Installation & Environment Setup	DBMS vs RDBMS concepts, PostgreSQL architecture, database vs schema, installation of PostgreSQL 16 + pgAdmin 4 + ADS, creating RetailMart DB and verifying connections.
2	Data Types & Table Design	PostgreSQL Data Types (NUMERIC, TEXT, DATE, BOOLEAN, JSON, UUID, ARRAY), selecting correct data types, creating tables, altering/dropping columns, naming conventions.
3	Data Onboarding + Constraints & Keys	Part A: Create schemas (core, sales, products, hr), import RetailMart CSVs, verify record counts, validate data types. Part B: Apply constraints - NOT NULL, UNIQUE, CHECK, DEFAULT, PRIMARY KEY, FOREIGN KEY, cascading actions, and UPSERT/MERGE (INSERT ON CONFLICT).
4	Data Filtering & Sorting	SELECT, WHERE, logical/comparison operators, BETWEEN, IN, LIKE, IS NULL, DISTINCT, ORDER BY, LIMIT for pagination.
5	Aggregate Functions & Grouping	COUNT, SUM, AVG, MIN, MAX, GROUP BY, HAVING, filtering aggregated data, sorting grouped results.
6	Conditional Logic & Derived Columns	CASE WHEN, COALESCE, NULLIF, derived/computed columns, aliases, nested logic for data categorization.
7	Joins (Foundations & Advanced)	INNER, LEFT, RIGHT, FULL, CROSS joins, multi-table joins, join order, handling NULLs, optimizing join performance.
8	Self Join, Set Operations & EXCEPT	Self Join, Cross Join, UNION vs UNION ALL, EXCEPT for set differences and intersections.
9	Subqueries & Common Table Expressions (CTEs)	Scalar, multi-row, correlated subqueries; IN, EXISTS, ANY, ALL; WITH clause for CTEs; recursive CTEs for hierarchical queries.
10	Window Functions (Analytical SQL)	ROW_NUMBER, RANK, DENSE_RANK, LEAD, LAG, PARTITION BY, ORDER BY; running totals, moving averages, trend analysis.
11	Transactions & Error Control	BEGIN, COMMIT, ROLLBACK, SAVEPOINT; transaction flow, rollback scenarios, practical order rollback simulation.
12	ACID Properties & TRY/CATCH Handling	Atomicity, Consistency, Isolation, Durability; isolation levels; concurrency; TRY/CATCH and EXCEPTION handling in PL/pgSQL.

13	Normalization & Data Modeling	Redundancy and anomalies, 1NF, 2NF, 3NF, BCNF, dependency diagrams, denormalization strategies for analytics.
14	Views & Materialized Views	CREATE VIEW, benefits of abstraction, updatable and materialized views, view refresh mechanisms, indexed view usage.
15	Functions & Procedures (PL/pgSQL)	CREATE FUNCTION, parameters, RETURN types, block structure, IF-ELSE, LOOP, TRY/CATCH, modular SQL logic and error handling.
16	Query Optimization, Indexing & Security	EXPLAIN, ANALYZE, execution plan interpretation, clustered vs non-clustered indexes, Information Schema queries, clean SQL coding, SQL Injection prevention, GRANT & REVOKE usage.
17	RetailMart Analytics Project	End-to-end SQL analytics project using RetailMart dataset, KPI creation (Monthly Sales, Top Products, Retention), dashboard visualization using ADS.
18	Concept Recap & Industry Application Demo (Mentor-Led)	Instructor-led session to consolidate key learnings, demonstrate end-to-end analytics workflow, connect SQL skills to data analyst role, and close with industry case discussion.