

PYTHON with SQL

for Data Analytics

3-Month Module-Wise Course Curriculum

Duration: 12 Weeks | Level: Beginner to Job-Ready | Format: Theory + Hands-on + Projects
Covers: Python Programming, SQL (Basic to Advanced), Pandas & NumPy, Data Visualization,
Python-SQL Integration, Capstone Project

Designed for aspiring Data Analysts, Business Analysts & Backend/Reporting Professionals

Course Overview

This program builds job-ready Python and SQL skills for data analytics roles over 12 weeks (3 months), organized into 4 modules. Each week combines core concepts, hands-on practice, and a deliverable. The course progresses from Python and SQL fundamentals to Pandas-based data wrangling, advanced SQL (joins, window functions, CTEs), Python-SQL database integration, data visualization, and finishes with a capstone project plus interview preparation.

Module	Duration	Focus Area
Module 1	Weeks 1-4	Python Fundamentals + SQL Basics
Module 2	Weeks 5-8	Python for Data Analysis (Pandas/NumPy) + Advanced SQL
Module 3	Weeks 9-10	Python-SQL Integration + Data Visualization
Module 4	Weeks 11-12	Real-World Project, Capstone & Interview Prep

Tools & Technologies: Python 3, Jupyter Notebook/VS Code, MySQL / PostgreSQL, MySQL Workbench, Pandas, NumPy, Matplotlib, Seaborn, SQLAlchemy, Git & GitHub, Power BI / Excel (for dashboarding context)

Module 1: Python Fundamentals + SQL Basics (Weeks 1-4)

Week 1: Python Basics

Topics Covered	Introduction to Python, installation & setup, variables, data types (int, float, str, bool), operators, type casting, input/output, conditional statements (if/elif/else), loops (for, while).
Tools / Concepts	Python 3, Jupyter Notebook / VS Code
Deliverable	Practice set: 15+ problems using conditionals and loops; simple calculator/number-guessing game.

Week 2: Python Data Structures & Functions

Topics Covered	Lists, tuples, dictionaries, sets; string manipulation; functions & arguments (*args, **kwargs); lambda functions; list/dict comprehensions; file handling (read/write .txt and .csv); intro to error handling.
Tools / Concepts	Python built-in libraries, CSV module
Deliverable	Mini script: process a CSV file and summarize data using functions and dictionaries.

Week 3: SQL Fundamentals

Topics Covered	Introduction to RDBMS & SQL, installing MySQL/PostgreSQL, database & table creation (DDL), data types, constraints, INSERT/UPDATE/DELETE (DML), SELECT statement, WHERE, ORDER BY, LIMIT, DISTINCT, basic operators.
Tools / Concepts	MySQL Workbench / pgAdmin
Deliverable	Create a sample database (e.g. Employees/Sales) with 3-4 tables and populate it with data.

Week 4: SQL Intermediate + Mini Project 1

Topics Covered	Aggregate functions (COUNT, SUM, AVG, MIN, MAX), GROUP BY & HAVING, JOINS (INNER, LEFT, RIGHT, FULL), subqueries, UNION, basic query optimization concepts.
Tools / Concepts	MySQL / PostgreSQL
Deliverable	Mini Project 1: Write 20+ SQL queries answering business questions on a multi-table sales/HR database.

Module 2: Python for Data Analysis + Advanced SQL (Weeks 5-8)

Week 5: Python OOP & Exception Handling

Topics Covered	Object-Oriented Programming: classes, objects, inheritance, polymorphism, encapsulation; exception handling (try/except/finally); modules & packages; working with dates (datetime module).
Tools / Concepts	Python OOP, datetime, custom modules
Deliverable	Build a small class-based project (e.g. simple inventory or student management system).

Week 6: NumPy & Pandas Fundamentals

Topics Covered	NumPy arrays, array operations, broadcasting; Pandas Series & DataFrames, reading data (CSV/Excel/SQL), indexing & selection (loc/iloc), filtering, sorting.
Tools / Concepts	NumPy, Pandas, Jupyter Notebook
Deliverable	Load a real-world dataset (e.g. sales/e-commerce data) and perform exploratory analysis.

Week 7: Pandas Data Wrangling

Topics Covered	Handling missing values, data cleaning, merging/joining/concatenating DataFrames, groupby & aggregation, pivot tables, apply/map functions, working with dates in Pandas.
Tools / Concepts	Pandas, NumPy
Deliverable	Data cleaning project: clean a messy dataset and produce a summarized, analysis-ready dataset.

Week 8: Advanced SQL + Mini Project 2

Topics Covered	Window functions (ROW_NUMBER, RANK, LEAD/LAG), Common Table Expressions (CTEs), views, stored procedures & functions basics, indexes & query performance, CASE statements.
Tools / Concepts	MySQL / PostgreSQL
Deliverable	Mini Project 2: Solve 15+ advanced SQL problems (rankings, running totals, cohort-style queries).

Module 3: Python-SQL Integration + Data Visualization (Weeks 9-10)

Week 9: Python-SQL Integration

Topics Covered	Connecting Python to databases using sqlite3 / pymysql / psycopg2, running SQL queries from Python, loading query results into Pandas DataFrames, using SQLAlchemy for database connections and ORM basics, writing DataFrames back to SQL tables.
Tools / Concepts	sqlite3, SQLAlchemy, pymysql/psycopg2
Deliverable	Build a Python script that pulls data from a SQL database, transforms it with Pandas, and writes results back.

Week 10: Data Visualization

Topics Covered	Data visualization principles, Matplotlib basics (line, bar, scatter, histogram), Seaborn for statistical plots (heatmaps, boxplots, pairplots), customizing charts, intro to dashboarding concepts (Power BI/Excel) for presenting analysis.
Tools / Concepts	Matplotlib, Seaborn, Power BI/Excel (overview)
Deliverable	Create a visual analysis report (5-6 charts) summarizing insights from the Module 2/3 dataset.

Module 4: Real-World Project, Capstone & Interview Prep (Weeks 11-12)

Week 11: Real-World Project Build

Topics Covered	End-to-end mini ETL pipeline: extract data from SQL/CSV sources, transform with Python/Pandas, load into a database or output file; version control basics with Git & GitHub; project documentation and code structuring best practices.
Tools / Concepts	Python, Pandas, SQL, Git/GitHub
Deliverable	Working ETL pipeline script with documentation, pushed to a GitHub repository.

Week 12: Capstone Project + Interview Preparation

Topics Covered	Capstone project combining Python + SQL + visualization on a chosen domain dataset (e.g. retail, HR, finance); resume & portfolio review; SQL and Python interview question practice; mock interview and case-study discussion.
Tools / Concepts	Python, SQL, Pandas, Matplotlib/Seaborn
Deliverable	Final Capstone Project (presentation-ready) + polished resume/portfolio + interview Q&A practice.

Note: Weekly hours assume roughly 8-10 hours/week (lectures, hands-on labs, and self-practice). Pace and topic order can be adjusted based on batch level and prior experience.

Assessment & Outcomes

Component	Details
Weekly Practice	Hands-on exercises/assignments at the end of every week.
Mini Projects	2 mini projects (SQL-focused) at the end of Module 1 and Module 2.
Capstone Project	End-to-end Python + SQL + visualization project in Week 12.
Interview Readiness	Curated Python/SQL interview questions, resume and portfolio review, mock interview.
Outcome	Ability to write production-quality Python and SQL, clean and analyze real datasets, connect Python to databases, and present data-driven insights.