Databases and SQL for Data Science with Python

by IBM

About this Course
Working knowledge of SQL (or Structured Query Language) is a must for data professionals like Data Scientists, Data Analysts and Data Engineers. Much of the world's data resides in databases. SQL is a powerful language used for communicating with and extracting data from databases.

In this course you will learn SQL inside out- from the very basics of Select statements to advanced concepts like JOINs.
You will:
-write foundational SQL statements like: SELECT, INSERT, UPDATE, and DELETE
-filter result sets, use WHERE, COUNT, DISTINCT, and LIMIT clauses
-differentiate between DML & DDL
-CREATE, ALTER, DROP and load tables
-use string patterns and ranges; ORDER and GROUP result sets, and built-in database functions
-build sub-queries and query data from multiple tables
-access databases as a data scientist using Jupyter notebooks with SQL and Python
-work with advanced concepts like Stored Procedures, Views, ACID Transactions, Inner & Outer JOINs through hands-on labs and projects

You will practice building SQL queries, work with real databases on the Cloud, and use real data science tools.

In the final project you'll analyze multiple real-world datasets to demonstrate your skills.

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IBM

Basic Info	Course 5 of 16 in the IBM Data Engineering Specialization
Level	Beginner
Commitment	6 weeks of study, 2-4 hours/week.
Language	English, **Subtitles:** Arabic, French, Bengali, Ukrainian, Chinese (Simplified), Greek, Italian, Portuguese (Brazil), Dutch, Korean, German, Pashto, Urdu, Russian, Thai, Indonesian, Swedish, Turkish, Azerbaijani, Spanish, Dari, Hindi, Japanese, Kazakh, Hungarian, Polish
Hardware Req	Only browser access is required. Access to cloud based environment will be provided for hands-on labs.
How To Pass	Pass all graded assignments to complete the course.
User Ratings	★★★★½ Average User Rating 4.7

Syllabus

Module 1

Getting Started with SQL

In this module, you will be introduced to databases. You will learn how to use basic SQL statements like SELECT, INSERT, UPDATE and DELETE. You will also get an understanding of how to refine your query results with the WHERE clause as well as using COUNT, LIMIT and DISTINCT.

6 videos, 2 readings

1. **Video:** Course Introduction
2. **Reading:** Course Overview
3. **Ungraded Plugin:** Helpful Tips for Course Completion
4. **Video:** Introduction to Databases
5. **Video:** SELECT Statement
6. **Ungraded Plugin:** SELECT statement examples
7. **App Item:** Hands-on Lab: Simple SELECT Statements
8. **Video:** COUNT, DISTINCT, LIMIT
9. **App Item:** Hands-on Lab: COUNT, DISTINCT, LIMIT
10. **Video:** INSERT Statement
11. **Video:** UPDATE and DELETE Statements
12. **App Item:** Hands-on Lab: INSERT, UPDATE, and DELETE
13. **Reading:** Summary: Basic SQL
14. **Graded Assignment:** Practice Quiz: Basic SQL
15. **Ungraded Plugin:** SQL Cheat Sheet: Basics - SELECT, INSERT, UPDATE, DELETE, COUNT, DISTINCT, LIMIT

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Graded: Graded Quiz: Basic SQL

Module 2

Introduction to Relational Databases and Tables

In this module, you'll learn more about relational database concepts and their importance. This module helps you to understand the process of creating a table in your database on MySQL using the graphical interface and SQL scripts. Further, you will also learn how to alter the entries or delete the entries for any table in the database, or even delete the table itself.

5 videos, 2 readings

1. **Video:** Relational Database Concepts
2. **Video:** Types of SQL statements (DDL vs. DML)
3. **Video:** CREATE TABLE Statement
4. **Video:** ALTER, DROP, and Truncate Tables
5. **Ungraded Plugin:** Examples to ALTER and TRUNCATE tables using MySQL
6. **Ungraded Plugin:** Examples to CREATE and DROP tables
7. **App Item:** Hands-on Lab : CREATE, ALTER, TRUNCATE, DROP
8. **Ungraded Plugin:** SQL Scripts - Uses and Applications
9. **App Item:** Hands-on Lab: Create and Load Tables using SQL Scripts
10. **Reading:** Summary: Relational Database Concepts and Tables
11. **Graded Assignment:** Practice Quiz: Introduction to Relational Databases and Tables
12. **Ungraded Plugin:** SQL Cheat Sheet: CREATE TABLE, ALTER, DROP, TRUNCATE
13. **Video:** How to create a Database instance on Cloud
14. **App Item:** Obtain IBM Cloud Feature Code and Activate Trial Account
15. **Reading:** [Optional] Hands-on Lab Using IBM Db2

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Graded: Relational DB Concepts and Tables

Module 3

Intermediate SQL

This module helps you learn how to use string patterns and ranges to search data and how to sort and group data in result sets. You will also practice composing nested queries and execute select statements to access data from multiple tables.

7 videos, 4 readings

1. **Video:** Using String Patterns and Ranges
2. **Video:** Sorting Result Sets
3. **Video:** Grouping Result Sets
4. **App Item:** Hands-on Lab: String Patterns, Sorting and Grouping
5. **Reading:** [Optional] Hands-on Labs Using IBM Db2
6. **Reading:** Summary: Refining Your Results
7. **Graded Assignment:** Practice Quiz: Refining Your Results
8. **Ungraded Plugin:** SQL Cheat Sheet: Intermediate - LIKE, ORDER BY, GROUP BY
9. **Video:** Built-in Database Functions
10. **Video:** Date and Time Built-in Functions
11. **App Item:** Hands-on Lab: Built-in functions
12. **Video:** Sub-Queries and Nested Selects
13. **App Item:** Hands-on Lab: Sub-queries and Nested Selects
14. **Video:** Working with Multiple Tables
15. **App Item:** Hands-on Lab: Working with Multiple Tables
16. **Reading:** [Optional] Hands-on Labs Using IBM Db2
17. **Reading:** Summary: Functions, Multiple Tables, and Sub-queries
18. **Graded Assignment:** Practice Quiz: Functions, Multiple Tables, and Sub-queries
19. **Ungraded Plugin:** SQL Cheat Sheet: FUNCTIONS and Implicit JOIN

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Graded: Graded Quiz: Refining Your Results

Graded: Graded Quiz: Functions, Multiple Tables, and Sub-queries

Module 4

Accessing Databases using Python

In this module you will learn the basic concepts of using Python to connect to databases. In a Jupyter Notebook, you will create tables, load data, query data using SQL magic and SQLite python library. You will also learn how to analyze data using Python.

6 videos, 2 readings

1. **Video:** How to Access Databases Using Python
2. **Video:** Writing code using DB-API
3. **App Item:** Hands-on Lab: Creating tables, inserting and querying Data
4. **Video:** Accessing Databases with SQL Magic
5. **App Item:** Hands-on Tutorial: Accessing Databases with SQL magic
6. **Video:** Analyzing data with Python
7. **App Item:** Hands-on Lab: Analyzing a Real-World Data Set
8. **Reading:** Summary: Accessing databases using Python
9. **Graded Assignment:** Practice Quiz: Accessing Databases using Python
10. **Ungraded Plugin:** SQL Cheat Sheet: Accessing Databases using Python
11. **Reading:** [Optional] Hands-on Labs Using IBM Db2
12. **Video:** Connecting to a database using ibm_db API
13. **App Item:** (Optional) Db2 Lab: Connecting to a database instance
14. **Video:** Creating tables, loading data and querying data
15. **App Item:** (Optional) Db2 Lab: Creating tables, inserting and querying Data
16. **App Item:** (Optional) Db2 Lab: Tutorial. Accessing Databases with SQL magic
17. **App Item:** (Optional) Db2 Lab: Analyzing a real World Data Set

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Graded: Graded Quiz: Accessing databases using Python

Module 5

Course Assignment

In this module, you will be working with multiple real-world datasets for the city of Chicago. You will be asked questions that will help you understand the data just as you would in the real world. You will be assessed on the correctness of your SQL queries and results.

2 videos, 3 readings

1. **Video:** Working with Real World Datasets
2. **Video:** Getting Table and Column Details
3. **App Item:** Hands-on Lab: Working with a real world data-set
4. **Reading:** Summary and Highlights
5. **Reading:** [Optional] Hands-on Labs Using IBM Db2
6. **App Item:** (Optional)Hands-on Lab: Practice Querying Real World Datasets
7. **App Item:** Final Assignment: Database Querying using SQLite
8. **Reading:** Congratulations & Next Steps

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Graded: Graded Quiz on Assignment

Graded: Final Exam

Module 6

Bonus Module: Advanced SQL for Data Engineer (Honors)

This module covers some advanced SQL techniques that will be useful for Data Engineers. In this module, you will learn how to build more powerful queries with advanced SQL techniques like views, transactions, stored procedures, and joins. If you are following the Data Engineering track, you must complete this module. Completion of this module is not required for those completing the Data Science or Data Analyst tracks.

6 videos, 4 readings

1. **Reading:** About this Honors Module
2. **Video:** Views
3. **App Item:** Hands-on Lab: Using Views
4. **Video:** Stored Procedures
5. **App Item:** Hands-on Lab: Stored Procedures
6. **Video:** ACID Transactions
7. **App Item:** Hands-on Lab: Committing and Rolling Back a Transaction
8. **Reading:** [Optional] Hands-on Labs Using IBM Db2
9. **Reading:** Summary: Views, Stored Procedures, and Transactions
10. **Graded Assignment:** Practice Quiz: Views, Stored Procedures, and Transactions
11. **Ungraded Plugin:** SQL Cheat Sheet: Views, Stored Procedures and Transactions
12. **Video:** Join Overview
13. **Video:** Inner Join
14. **Video:** Outer Joins
15. **App Item:** Hands-on Lab: Joins
16. **Reading:** Summary: JOIN Statements
17. **Graded Assignment:** Practice Quiz: Join Statements
18. **Ungraded Plugin:** SQL Cheat Sheet: JOIN Statements
19. **App Item:** Hands-on Lab: Final Project: Advanced SQL Techniques

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Graded: Graded Quiz: Views, Stored Procedures and Transactions

Graded: Graded Quiz: JOIN Statements

Graded: Graded Quiz: Advanced SQL for Data Engineers

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How It Works

General

How do I pass?

To earn your Certificate, you'll need to earn a passing

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Course 5 of Specialization

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