**Omaha Data Science Academy (OSDA)**

**Data Foundations – Business Intelligence**

**Data Manipulation and Management**

**ODSA Cohort 10 (October 18rd – November 10th, 2021)**

Instructor(s): Jeremy Bergmann, BS/MS/MBA

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GitHub: <https://github.com/jbergmann56/OSDA-DataManipulationAndManagement>

**COURSE DESCRIPTION:**

This class will teach the student how to design, store, clean, query, and access data, with a focus on use within data science projects. The topics in this class include: SQL programming, data cleansing/ transformation, data extract/load (ETL) techniques, advanced database functions (stored procedures, column functions, database triggers, temporary tables), Relational Database modeling and design, and an overview of cloud-based data storage offerings (NoSQL, Hadoop, Cloud SQL, etc.).   
  
This class will include a COVID-19 dataset, where students can practice and apply their SQL knowledge via class assignments and test their knowledge through online quizzes (link).

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**Overall Approach:**

The approach to the course is to provide the background needed for data manipulation within Business Intelligence (BI) and data science projects, via SQL programming language and relational database technologies. The course topics include: Data Manipulation basics, writing SQL Queries, Manipulating, Managing, and cleaning data, and utilizing tools to automate the deployment of data science projects.

**Class Schedule:**

**Class 1 - Data Manipulation - Basics**

Hour 1 - Introductions, Class Overview, Data Science Philosophy, Tool Setup (Github, MySql Workbench)

Hour 2 - Data Manipulation Background, Definitions & Database Basics - Lecture

Hour 3 – Examples & Exercises – COVID Data, WorldDB, Class Project (Optional)

**Class 2: Writing Queries**

Hour 1 - SQL Queries, Clauses & Data Types – Lecture

Hour 2 – Column Functions & Sub-Queries – Lecture

Hour 3 - Examples & Exercises - Querying Data

**Class 3 – Extracting and Storing Data**

Hour 1 - Class 1&2 Quiz, Views, Create Databases, Create/Alter/Delete Tables, Constraints – Lecture

Hour 2 - Examples & Exercises - Storing Data for Analysis

Hour 3 - Importing Data into MySQL - Import/Export Wizard

**Class 4 – Joining & Merging Data**

Hour 1 - SQL Joins & Unions – Lecture & Examples

Hour 2/3 - Examples & Exercises - Joining Data for Analysis

**Class 5 – Cleaning Data Using SQL**

Hour 1 - Class 3&4 Quiz, Cleaning Data – Overview, Case Statements, SQL Wildcards

Hour 2 – Identifying & Removing Duplicates, Data Cleansing – String, Numeric & Date Functions

Hour 3 - Examples - Cleaning Data for Analysis

**Class 6 – Advanced Database Functionality**

Hour 1 – Stored Procedures & Temporary Tables

Hour 2 – Column Functions and Triggers

Hour 3 - Exercise – Analyze and Update Covid-19 Data

**Class 7 – Database Design - Structuring & Modeling Data**

Hour 1 – Class 5&6 Quiz, OLTP - ER & Relational Diagrams, Normal Forms, OLAP Data Models – Lecture

Hour 2 – Examples & Exercise – OLTP Data Modeling - ER & Relational Diagrams

Hour 3 – Exercise – OLAP Dimensional Modeling using COVID Data

**Class 8 – Storing & Managing Data**

Hour 1 - ETL & Data Storage, Example - Python: ETL

Hour 2 - Data Mgmt/Database Admin, Data Gov. & Quality - Lecture

Hour 3 - Examples & Exercises - Analyze Data Quality & Create Data Dictionary, Final Exam

**Additional - Tools for Data Manipulation and Management**

Hour 1 – Cloud Platforms (AWS, Azure & Google), NoSQL, ETL/Workflow Tools - Lecture

Hour 2+ – Working Session – Using Google Cloud MySQL/Data Studio, MS Azure, COVID-

19 Dashboard, Final Project