COURSE SYLLABUS

# Data Science & AI Certificate (Self-Paced)

Learn Python, SQL, automation, and machine learning to become a Data Scientist. Gain Python programming, data analysis, SQL querying, and predictive modeling skills. Perfect for beginners, this program prepares you for entry-level data science and Python engineering roles. Unlock high-paying job opportunities in the field of data science.

> Group classes (Live Online) and onsite training are available for this course. For more information, email onsite@graduateschool.edu or visit: https://sdfm.graduateschool.edu/certificates/data-science-online




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## Course Outline

This package includes these courses

- SQL Bootcamp (Self-Paced) (18 Hours)
- Python for Data Science Bootcamp (Self-Paced) (30 Hours)
- Python Machine Learning Bootcamp (Self-Paced) (30 Hours)
- Python for Automation (Self-Paced) (6 Hours)
- Python Data Visualization & Interactive Dashboards (Self-Paced) (24 Hours)
- Data Science Capstone Projects (Self-Paced) (18 Hours)

Attend the Python for AI course for free as part of this certificate. Choose your date after you register for the program.

Python for AI (Self-Paced)

### SQL Bootcamp (Self-Paced)

Learn how to extract, filter, and manipulate data using SQL. This course covers PostgreSQL fundamentals, database querying, table joins, and advanced techniques for handling large datasets.

- Write SQL queries to retrieve, filter, and sort data efficiently.
- Use joins to combine information from multiple tables and establish relationships.
- Apply aggregate functions like SUM, COUNT, AVG, and GROUP BY to summarize data.
- Work with subqueries, conditional logic (CASE statements), and advanced string functions.
- Optimize queries using indexes, data type conversions, and best practices.
- Explore views and user-defined functions to streamline database management.

### Python for Data Science Bootcamp (Self-Paced)

- Handle different types of data such as integers, floats, and strings

- Control the flow of your programs with conditional statements, loops, and functions
- Reuse and simplify code with object-oriented programming
- Analyze tabular data with NumPy and Pandas
- Create graphs and visualizations with Matplotlib
- Make predictions with linear regression, using scikit-learn

## Python Machine Learning Bootcamp (Self-Paced)

- How to clean and balance your data using the Pandas library
- Applying machine learning algorithms such as logistic regression and random forest using the scikit-learn library
- Choosing good features to use as input for your algorithms
- Properly splitting data into training, test and cross-validation sets
- Important theoretical concepts like overfitting, variance and bias
- Evaluating the performance of your machine learning models

## Python for Automation (Self-Paced)

- Scrape (extract) text and images from websites
- Schedule Python scripts to run automatically
- Automate browser interactions, reporting, and messaging

## Python Data Visualization & Interactive Dashboards (Self-Paced)

- Plan & present a data story
- Gather and manipulate data from different sources
- Find data stories through exploratory data analysis
- Manipulate data with NumPy and Pandas.
- Use advanced Python visualization libraries Plotly and Dash
- Build a dashboard
- Apply the rules of effective dashboard design to create professional data science solutions
- Go live with your project & deploy the dashboard on a live server

## Data Science Capstone Projects (Self-Paced)

Throughout this program, you will complete three capstone projects to showcase in your portfolio:

**Machine Learning & AI Capstone**

- Choose, clean, and engineer features from a structured dataset to train machine learning models (e.g., logistic regression, random forest), evaluate performance, and visualize results clearly.
- Deliver a professional presentation detailing your data processing workflow, modeling techniques, and insights discovered using Python libraries like pandas, scikit-learn, and Matplotlib.

**Python for AI Capstone *(Choose One of Two)***

- AI Chat Assistant: Build an interactive chat assistant embedded on a webpage, using Flask and JavaScript to integrate with OpenAI's API for context-aware user interactions.
- Collectibles Identification App: Develop a Flask-based web app allowing image uploads of collectible items, leveraging OpenAI to identify items, generate descriptive metadata, and dynamically display logged session history.

**Python Data Visualization Capstone**

- Clean, analyze, and visualize global $CO_2$ emissions alongside GDP and population data, highlighting trends and correlations through insightful visualizations with Matplotlib, seaborn, and plotly.
- Build a responsive Dash dashboard enabling interactive exploration of emissions data, clearly communicating insights such as regional trends, GDP-emission correlations, and emission anomalies.

You will work on your capstone projects both in and outside of class, using scheduled mentoring sessions to review your progress, ask questions, and get personalized feedback from your instructor.