COURSE SYLLABUS

Data Science & AI Certificate

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



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Course Outline

This package includes these courses

- Python for Data Science Bootcamp (30 Hours)
- SQL Bootcamp (18 Hours)
- Python Automation Course (6 Hours)
- Python Data Visualization & Interactive Dashboards (30 Hours)
- Python Machine Learning Bootcamp (30 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: Create AI Apps with Flask & OpenAI

Python for Data Science Bootcamp

- Learn Python fundamentals, including variables, data types, functions, loops, and control flow, for building robust programs
- Work with complex data structures such as dictionaries and lists to efficiently organize and access data
- Use NumPy and Pandas to import, clean, and manipulate datasets for analysis and exploration
- Generate descriptive statistics and apply filtering, grouping, and pivoting techniques to gain deeper insights
- Visualize data using Matplotlib and create clear, customized charts, including bar graphs, histograms, and scatter plots
- Gain the practical skills needed to transition into machine learning with a solid understanding of data science workflows

SQL Bootcamp

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.

- Explore information stored in a database (tables, columns, rows, etc.) using the graphical interface of DBeaver, a popular free database app.

- Write SQL queries to retrieve data from tables in the database
- Combine information from multiple tables using JOIN statements
- Filter data, group it, and sort it to extract the specific information you need
- Master advanced techniques, including subqueries, string functions, and IF-Else logic with CASE
- Learn how to use views and functions with parameters instead of directly querying tables

Python Automation Course

- Understand how websites are structured with HTML and CSS to identify elements for data extraction
- Learn Python fundamentals, such as variables, data types, conditionals, loops, and list manipulation
- Use the Requests and Beautiful Soup libraries to perform web scraping and target specific content
- Write loops to automate web scraping across multiple pages and streamline repetitive tasks
- Store scraped data in different formats, such as text files and CSVs, for analysis and reporting
- Schedule Python scripts to run on a regular basis, enabling continuous data collection and automating workflows

Python Data Visualization & Interactive Dashboards

Transform raw data into interactive visual insights by building dashboards with Python's top visualization tools. This course blends analysis, design, and deployment to help you showcase data professionally.

- Work with real-life datasets using Python's core libraries, including NumPy for numerical computing and Pandas for data manipulation
- Create static and interactive visualizations using Matplotlib, Seaborn, and Plotly to clearly communicate trends and patterns
- Build multi-component dashboards using Dash Enterprise, incorporating callbacks, sliders, date pickers, and more
- Practice hands-on development by applying new skills to personalized projects with guided instructor support
- Publish your dashboards online using GitHub and Heroku to demonstrate your work to potential employers or clients
- Explore best practices for styling and structuring visual narratives that are clear, persuasive, and engaging

Python Machine Learning Bootcamp

- Explore foundational techniques like linear and logistic regression for modeling numerical and categorical data
- Understand the difference between regression and classification problems and when to apply each approach
- Build and evaluate models using k-nearest neighbors, decision trees, and ensemble methods like random forest
- Learn key concepts such as cross-validation, training vs. test sets, and performance metrics like mean squared error
- Apply feature engineering techniques to improve model accuracy while managing overfitting and bias-variance tradeoffs
- Use Python's essential data science libraries, NumPy, Pandas, and scikit-learn, to structure data and implement algorithms
- Gain insights into how machine learning powers systems at companies like Netflix, Spotify, and Amazon
- Complete a final portfolio project that demonstrates your ability to apply machine learning to solve real problems

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.