COURSE SYLLABUS

Data Science & AI Certificate Online

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.

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



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Course Outline

This package includes these courses

- SQL Course Online (18 Hours)
- Python for Data Science Course Online (30 Hours)
- Python Machine Learning Course Online (30 Hours)
- Python for Automation Course Online (6 Hours)
- Python Data Visualization & Interactive Dashboards Course Online (24 Hours)
- Data Science Capstone Project (18 Hours)

Attend the Python for AI course for free as part of this certificate.

Python for AI Course Online

SQL Course Online

Learn how to efficiently extract, filter, and manipulate data using SQL with a focus on PostgreSQL fundamentals. This course covers database querying, table joins, and advanced techniques for managing large datasets.

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

Python for Data Science Course Online

Learn how to use Python as a practical tool for data-driven decision making by building a strong foundation in programming and

data analysis. Through hands-on projects with real-world data, you'll practice cleaning and organizing datasets, creating clear visualizations, and applying statistical techniques to uncover meaningful insights.

- Work with various data types, including integers, floats, and strings
- Control program execution using conditional statements, loops, and functions
- Simplify and reuse code with object-oriented programming
- Analyze structured data using NumPy and pandas
- Design graphs and visualizations with Matplotlib
- Build predictive models using linear regression with scikit-learn

Python Machine Learning Course Online

Master the basics of machine learning, including regression analysis and classification algorithms, in this hands-on course. Develop the skills required to tackle real-world challenges using machine learning, with an emphasis on Python programming and key data science libraries.

- Clean and balance data using the pandas library
- Implement machine learning algorithms like logistic regression and random forest with scikit-learn
- Select relevant features to input into your algorithms
- Correctly split data into training, test, and cross-validation sets
- Understand key theoretical concepts such as overfitting, variance, and bias
- Assess the performance of your machine learning models

Python for Automation Course Online

Learn how to use Python to extract data from websites and write loops to process multiple pages. This course covers essential topics like HTML/CSS, Python fundamentals, web scraping techniques, data storage, scheduling, and includes real-world examples of scraping valuable data.

- Understand how websites are structured using HTML and CSS to locate and extract specific data
- Build a foundation in Python fundamentals, including variables, data types, conditionals, loops, and working with lists
- Use the Requests and Beautiful Soup libraries to scrape web content and target relevant information
- Write loops to automate data collection across multiple web pages and reduce repetitive manual work
- Save scraped data in common formats such as text files and CSVs for analysis and reporting
- Schedule Python scripts to run automatically, supporting ongoing data collection and automated workflows

Python Data Visualization & Interactive Dashboards Course Online

Learn how to collect, manipulate, and analyze real-world data in this course, gaining hands-on experience with Python's NumPy and pandas libraries. Enhance your data visualization skills with tools like Matplotlib, Seaborn, Plotly, and Dash Enterprise, and work on real-life projects that you can deploy online.

- Plan and present a compelling data narrative
- Collect and manipulate data from various sources
- Discover insights through exploratory data analysis
- Manipulate data using NumPy and pandas
- Utilize advanced Python visualization libraries like Plotly and Dash

- Create interactive dashboards
- Apply best practices in dashboard design for professional data science solutions
- Deploy your project and dashboard live on a server

Data Science Capstone Project

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.

See examples of data science capstone projects from students.