COURSE SYLLABUS

Data Analytics & AI Certificate (Self-Paced)

Gain practical skills in analyzing datasets, building predictive models, and creating AI-powered applications using Python and industry-leading tools.

> Group classes in Live Online and onsite training is available for this course. For more information, email onsite@graduateschool.edu or visit: https://www.graduateschool.edu/certificates/data-analytics-ai-certificate-self-paced

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Course Outline

This package includes these courses

- Excel for Data Analytics (Self-Paced) (18 Hours)
- Data Analytics Foundations (Self-Paced) (12 Hours)
- Python for Data Science Bootcamp (Self-Paced) (30 Hours)
- SQL Bootcamp (Self-Paced) (18 Hours)
- Python for Automation (Self-Paced) (6 Hours)
- Python Data Visualization & Interactive Dashboards (Self-Paced) (24 Hours)
- Python Machine Learning Bootcamp (Self-Paced) (30 Hours)
- Tableau Bootcamp (Self-Paced) (12 Hours)
- Python Machine Learning Advanced (Self-Paced) (30 Hours)
- Python for AI (Self-Paced) (30 Hours)
- Data Science Capstone Projects (Self-Paced) (0 hours)

Excel for Data Analytics (Self-Paced)

Master Excel's most powerful features to streamline data analysis, improve reporting accuracy, and extract meaningful insights from large datasets in this hands-on training.

- Learn Excel functions and formulas for organizing, calculating, and summarizing data efficiently
- Create and customize visual charts, including line, column, and pie charts to present data clearly
- Use logical statements, database functions, and data validation to manage and filter large datasets
- Build and manipulate Pivot Tables to quickly summarize, sort, and group information
- Explore advanced tools like named ranges, date calculations, and macro recording for custom reporting
- Apply auditing techniques, cell locking, and Excel hot keys to optimize your spreadsheet workflow

Data Analytics Foundations (Self-Paced)

- Understand core statistical concepts, including measures of central tendency, data dispersion, and the normal curve
- Explore descriptive and inferential statistics, including probability distributions like binomial and Poisson
- Learn to analyze and forecast data using correlation, linear regression, and multiple regression techniques
- Apply predictive analytics with tools like trendlines, moving averages, and scenario modeling
- Create clear data visualizations using charts, histograms, icon sets, color scales, sparklines, and pivot tables
- Discover prescriptive analytics techniques such as Solver and linear programming to optimize decision-making

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

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 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

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

Tableau Bootcamp (Self-Paced)

Develop the skills to turn raw data into compelling visual stories with Tableau, the industry-leading data visualization platform. This hands-on bootcamp teaches you to explore, analyze, and publish dashboards that communicate insights clearly and effectively.

- Connect to datasets in various formats, then clean, filter, and structure the data for effective visual storytelling
- Create a range of visualizations, including bar charts, line charts, treemaps, heat maps, and dual-axis charts
- Use Tableau's calculation tools to create custom fields, apply aggregates, and deepen your data analysis
- Format charts using labels, tooltips, color, and axis adjustments to improve clarity and impact
- Work with geographic data to create interactive map visualizations such as choropleths and proportional symbol maps
- Customize dashboards and stories for various audiences and screen sizes using Tableau's interactivity tools
- Integrate external mapping services and explore advanced visualization types like spider maps and alluvial diagrams
- Publish your work to Tableau Online and export dashboards for professional sharing and team collaboration

Python Machine Learning Advanced (Self-Paced)

Gain hands-on experience with advanced machine learning techniques as you build and deploy real-world projects across natural language processing, recommendation systems, forecasting, deep learning, and computer vision.

- Build and deploy full-stack applications with Flask
- Implement collaborative and content-based recommendation engines
- Forecast trends using advanced time series modeling with Facebook Prophet
- Train and evaluate convolutional neural networks using PyTorch
- Perform real-time object detection in images and video streams with YOLO
- Apply NLP techniques to build effective sentiment analysis models

Python for AI (Self-Paced)

Learn how to build AI-powered web applications using Flask and the OpenAI API. This course covers web development fundamentals, API integration, and AI-driven features for interactive applications.

- Set up Flask projects and create routes for handling web requests and rendering templates.
- Design and style web applications using HTML, CSS, and Flask's templating system.
- Integrate the OpenAI API to implement AI-powered features like sentiment analysis.
- Handle user input with dynamic forms and process data for real-time interactions.
- Implement error handling and debugging techniques to ensure smooth application performance.
- Deploy and test Flask applications for real-world use and AI-enhanced functionality.

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.