



Data Science Program

22 March 2023 - 29 April 2023

6 weeks and 6 hours/week

Program Perspective, Technical Details and Schedule

The goal of this program is to provide its participants with a data driven perspective. Motivated by various applications, basic concepts and modern tools of data science are illustrated with a hands-on experience using Python programming language. Applications include analysis of customer behaviour, sales prediction, risk assessment, demand forecasting, text classification and market basket analysis.

Participants are not expected to have a background in Python, but a basic coding experience will be helpful. The program utilizes Google Colab, a robust online platform for executing Python code in a notebook environment, which offers seamless integration with Google Drive. Therefore, participants are required to have an active Gmail account for full utilization of the platform's capabilities. To ensure a smooth learning experience, participants must verify that they have no restrictions that would prevent access and login to Gmail and Google Drive from their computers.

This six-week program is delivered with 12 lectures-36 hours which are briefly described below.

Lecture 1 - Introduction to Data Science (D. Yenigun) 22 Mar, W 19:30-21:30 (CET)

Introduction to data science, Python programming language, Google Colab, Python libraries for data science, importing and handling data, basic statistics and graphs. Applications include basic analysis of customer behaviour.

Lecture 2 – Basic Python Programming and Data Preprocessing (D. Sen) 25 Mar, Sa 10:30-12:30 (CET)

Basic Python commands, variables, lists, vector operations, loops and conditional operations. Data preprocessing, merging data sets, grouped summaries.

Lecture 3 – Data Visualization I (M. Yildirim) 29 Mar, W 19:30-21:30 (CET)

Data visualization; basics and why it matters. Basic plots with Python libraries Matplotlib and Seaborn. Visualizing demand, sales data. Focusing on data that matters.

Lecture 4 – Data Visualization II (M. Yildirim) 01 Apr, Sa 10:30-12:30 (CET)

Advanced data visualization tools, interactive and animated plots, basic dashboard structure with Python libraries Seaborn, Plotly, and Dash framework. Comparing financial data via data visualization. Visualizing consumer market and three-dimensional data on a map.

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Lecture 5 – Linear Regression Models (D. Yenigun) 05 Apr, W 19:30-21:30 (CET)

Correlation, regression problems, linear regression analysis with Python package statsmodels. Applications include determining factors influencing sales and sales prediction.

Lecture 6 – Classification Models (D. Yenigun) 08 Apr, Sa 10:30-12:30 (CET)

Classification problems, logistic regression analysis with Python package statsmodels. Applications include risk assessment.

Lecture 7 – Time Series Visualization and Forecasting (D. Yenigun) 12 Apr, W 19:30-21:30 (CET)

Smoothing methods, seasonal decomposition, prediction with ARIMA methodology using Python package statsmodels. Applications include demand forecasting.

Lecture 8 – Cluster Analysis (D. Sen) 15 Apr, Sa 10:30-12:30 (CET)

Unsupervised learning, principal component analysis and cluster analysis with Python package scikit-learn. Applications include market segmentation and customer analysis.

Lecture 9 – Support Vector Machines (D. Sen) 19 Apr, W 19:30-21:30 (CET)

Regression and classification problems with Support Vector Machines using Python package scikit-learn. Applications include sales prediction and risk assessment.

Lecture 10 – Artificial Neural Networks (D. Sen) 22 Apr, Sa 10:30-12:30 (CET)

Regression and classification problems with Artificial Neural Networks using Python packages scikit-learn and Keras. Applications include sales prediction and risk assessment.

Lecture 11 – Natural Language Processing (D. Sen) 26 Apr, W 19:30-21:30 (CET)

Text classification, named-entity recognition and sentiment analysis using Python packages scikit-learn, Keras, nltk, and spaCy.

Lecture 12 – Market Basket Analysis (D. Yenigun) 29 Apr, Sa 10:30-12:30 (CET)

Market Basket Analysis with Python. Identifying products that are purchased together and constructing recommendations.

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