Python with Data Science course:

Course Title: Python for Data Science

Course Description: This course covers the basics of Python programming and its application in data science. Students will learn how to use Python to collect, analyze, and visualize data, as well as build machine learning models.

Course Outline:

Module 1: Introduction to Python

- **Introduction to Python and its features**
- **Setting up Python environment (installing Python, IDEs, etc.)**
- **Basic syntax and data types (strings, lists, dictionaries, etc.)**
- **Control structures (if-else statements, for loops, while loops)**
- **Functions and modules**

Module 2: Data Structures and File Handling

- **Lists, tuples, and dictionaries in-depth**
- **Reading and writing files (CSV, JSON, text files)**
- **Working with dates and times**
- **Introduction to Pandas library**

Module 3: Data Analysis with Pandas

Introduction to Pandas data structures (Series, DataFrame)

- **Data cleaning and preprocessing (handling missing data, data transformation)**
- **Data filtering, grouping, and merging**
- **Data analysis and visualization with Pandas**

Module 4: Data Visualization

- **Introduction to Matplotlib and Seaborn libraries**
- **Creating plots (line plots, scatter plots, bar plots, histograms)**
- **Customizing plots (colors, labels, titles)**
- **Interactive visualizations with Plotly**

Module 5: Machine Learning with Scikit-learn

- **Introduction to machine learning concepts (supervised, unsupervised learning)**
- **Regression, classification, clustering, and dimensionality reduction**
- **Working with Scikit-learn library (loading datasets, training models, evaluating performance)**
- **Model selection and hyperparameter tuning**

Module 6: Working with Real-World Data

- **Working with datasets from Kaggle, UCI Machine Learning Repository, etc.**
- **Data wrangling and preprocessing**
- **Feature engineering and selection**
- **Model deployment and interpretation**

Module 7: Advanced Topics

Introduction to deep learning with TensorFlow or Keras

- **Working with big data (Hadoop, Spark)**
- **Using Python with SQL databases**

Module 8: Project Development

- **Students work on a project of their choice, applying concepts learned throughout the course**
- **Project topics can be chosen from a variety of domains (business, healthcare, finance, etc.)**

Prerequisites: Basic computer programming concepts, familiarity with statistics and data analysis

Software and Tools:

- **Python 3.x**
- **Jupyter Notebook or similar environment**
- **Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, Plotly, TensorFlow/Keras**