Week 1: Introduction to Python

Day 1: Overview of Python and Setting Up the Environment

- Introduction to Python:
  - History of Python
  - Features of Python
  - Applications of Python

- Setting Up Python Environment:
  - Installing Python (*Anaconda, Visual Studio Code, Jupyter Lab, Text editor, Pycharm*)
  - Introduction to Jupyter Notebook
  - Basic Jupyter Notebook functionalities
  - Writing and running your first Python program

Day 2: Basic Syntax and Data Types

- Basic Syntax:
  - Python script vs. Python interactive mode
  - Comments and Documentation
  - Python identifiers and keywords
  - Indentation and code blocks

- Data Types:
  - Numbers (*integers, floats, complex numbers*)
  - Strings
  - Booleans
  - Type conversion
  - Variables and constant

Day 3: Control Structures (if, for, while loops)

- Control Structures:
  - Conditional statements (*if, else, elif*)
  - Looping statements
    - for loop
    - while loop
  - Loop control statements (*break*, *continue*, *pass*)

- Practice and Q&A:
  - Hands-on exercises on control structures
  - Q&A session to clear doubts
  - Small projects to reinforce learning
- Feedback
- LinkedIn setup
- GitHub setup

Week 2: Python for Data Analysis

Day 1: Introduction to NumPy and Arrays

- Introduction to NumPy:
  - Overview of NumPy
  - Installing and importing NumPy
  - NumPy arrays vs. Python lists

- Arrays and Array Operations:
  - Creating arrays (1D, 2D, and beyond)
  - Basic array operations (arithmetic, statistical functions)
  - Indexing, slicing, and iterating through arrays

Day 2: Advanced Array Operations with NumPy

- Advanced Array Operations:
  - Array reshaping
  - Stacking and splitting arrays
  - Broadcasting in NumPy
  - Working with random numbers in NumPy

Day 3: Introduction to Pandas and DataFrames

- Introduction to Pandas:
  - Overview of Pandas
  - Installing and importing Pandas

- DataFrames, Series, and Basic Operations:
  - Creating and manipulating Series
  - Creating and manipulating DataFrames
  - Basic operations on DataFrames (selection, filtering, and sorting)
  - Handling missing data in Pandas

- Practice and Q&A:
  - Hands-on exercises on DataFrames and Series
  - Q&A session to clear doubts
  - Small projects to reinforce learning
  - Start with Capstone project
  - Quiz
  - Drafting article
- Push to GitHub
- Publish on LinkedIn

Week 3: Data Cleaning and Preparation

Day 1: Handling Missing Data

- Introduction to Missing Data:
  - Understanding missing data
  - Diverse types of missing data

- Techniques to Handle Missing Data:
  - Identifying missing data
  - Removing missing data
  - Imputing missing data (mean, median, mode, etc.)
  - Using advanced imputation techniques

- Practice and Q&A:
  - Hands-on exercises on handling missing data
  - Q&A session to clear doubts

Day 2: Data Transformation Techniques

- Data Transformation:
  - Introduction to data transformation
  - Scaling and normalization
  - Encoding categorical data (one-hot encoding, label encoding)
  - Binning and discretization

- Practice and Q&A:
  - Practical exercises on data transformation techniques
  - Q&A session to clear doubts

Day 3: Data Merging and Concatenation, Working with Dates and Times

- Data Merging and Concatenation:
  - Combining data from various sources
  - Merging dataframes (inner, outer, left, right joins)
  - Concatenating dataframes (adding rows and columns)

- Working with Dates and Times:
  - Introduction to datetime in Pandas
  - Parsing dates
  - Date arithmetic
  - Extracting and manipulating date/time components

- Practice and Q&A:
  - Hands-on exercises on data merging, concatenation, and date/time manipulation
  - Q&A session to clear doubts
  - Small projects to reinforce learning
  - Real world exercise

Week 4: Data Visualization with Python

Day 1: Introduction to Matplotlib and Plotting Basic Graphs

- Introduction to Matplotlib:
  - Overview of Matplotlib
  - Installing and importing Matplotlib
  - Understanding the Matplotlib architecture

- Plotting Basic Graphs:
  - Line plots
  - Bar plots
  - Histograms

- Practice and Q&A:
  - Hands-on exercises on plotting basic graphs
  - Q&A session to clear doubts

Day 2: Advanced Plotting with Seaborn

- Introduction to Seaborn:
  - Overview of Seaborn
  - Installing and importing Seaborn
  - Differences between Matplotlib and Seaborn

- Advanced Plotting:
  - Creating statistical plots (box plot, violin plot, etc.)
  - Plotting categorical data
  - Pair plots and heatmaps

- Practice and Q&A:
  - Practical exercises on advanced plotting techniques
  - Q&A session to clear doubts

Day 3: Customizing and Styling Plots

- Customizing Plots:
  - Adding titles, labels, and legends
  - Customizing line styles and colours
  - Adding annotations

- Styling Plots:
  - Using themes in Seaborn
  - Customizing the layout with subplots
  - Saving plots to files

- Practice and Q&A:
  - Hands-on exercises on customizing and styling plots
  - Q&A session to clear doubts - small projects to reinforce learning

Week 5: Introduction to Machine Learning

Day 1: Overview of Machine Learning and Supervised vs Unsupervised Learning

- Overview of Machine Learning:
  - Definition and importance of Machine Learning
  - Applications of Machine Learning in various industries
  - Types of Machine Learning

- Supervised vs Unsupervised Learning:
  - Definition and key differences
  - Examples of supervised learning (classification, regression)
  - Examples of unsupervised learning (clustering, dimensionality reduction)

- Practice and Q&A:
  - Discussion and examples of several types of learning
  - Q&A session to clear doubts

Day 2: Introduction to Scikit-Learn

- Introduction to Scikit-Learn:
  - Overview of Scikit-Learn library
  - Installing and importing Scikit-Learn
  - Key features and benefits of using Scikit-Learn

- Basic Usage of Scikit-Learn:
  - Loading datasets (e.g., Iris dataset)
  - Splitting data into training and testing sets
  - Overview of key modules and classes in Scikit-Learn

- Practice and Q&A:
  - Hands-on exercises on using Scikit-Learn
  - Q&A session to clear doubts

Day 3: Data Preprocessing Techniques

- Data Preprocessing:
  - Importance of data preprocessing in Machine Learning
  - Handling missing values
  - Feature scaling (standardization, normalization)
  - Encoding categorical variables (one-hot encoding, label encoding)

- Data Transformation with Scikit-Learn:
  - Using Pipeline and ColumnTransformer
  - Overview of fit, transform, and fit_transform methods

- Practice and Q&A:
  - Hands-on exercises on data preprocessing techniques
  - Q&A session to clear doubts - small projects to reinforce learning

Week 6: Supervised Learning - Regression

Day 1: Linear Regression

- Introduction to Linear Regression:
  - Overview of linear regression
  - Understanding the relationship between dependent and independent variables
  - The equation of a linear model ($y = mx + c$)

- Implementing Linear Regression:
  - Using Scikit-Learn to implement linear regression
  - Visualizing linear regression with Matplotlib

- Hands-on Practice:
  - Practical exercises on implementing linear regression
  - Q&A session to clear doubts

Day 2: Polynomial Regression

- Introduction to Polynomial Regression:
  - Overview of polynomial regression
  - Difference between linear and polynomial regression
  - The equation of a polynomial model

- Implementing Polynomial Regression:
  - Using Scikit-Learn to implement polynomial regression
  - Visualizing polynomial regression with Matplotlib

- Hands-on Practice:
  - Practical exercises on implementing polynomial regression
  - Q&A session to clear doubts

Day 3: Evaluation Metrics for Regression and Model Validation

- Evaluation Metrics for Regression:
  - Introduction to evaluation metrics
  - Mean Absolute Error (MAE)
  - Mean Squared Error (MSE)
  - Root Mean Squared Error (RMSE)
  - R-squared (Coefficient of Determination)

- Model Validation and Cross-Validation:
  - Importance of model validation
  - Overview of cross-validation techniques
  - Implementing cross-validation with Scikit-Learn

- Hands-on Practice:
  - Practical exercises on evaluating and validating regression models
  - Q&A session to clear doubts
  - Small projects to reinforce learning

Week 7: Supervised Learning - Classification

Day 1: Logistic Regression

- Introduction to Logistic Regression:
  - Overview of logistic regression
  - Differences between linear and logistic regression
  - The logistic function and the concept of odds

- Implementing Logistic Regression:
  - Using Scikit-Learn to implement logistic regression
  - Visualizing the decision boundary

- Hands-on Practice:
  - Practical exercises on implementing logistic regression
  - Q&A session to clear doubts

Day 2: Decision Trees

- Introduction to Decision Trees:
  - Overview of decision tree algorithm
  - Understanding tree structure (nodes, branches, leaves)
  - Splitting criteria (Gini index, entropy)

- Implementing Decision Trees:
  - Using Scikit-Learn to implement decision trees
  - Visualizing decision trees with graphviz

- Hands-on Practice:
  - Practical exercises on implementing decision trees
  - Q&A session to clear doubts

Day 3: Evaluation Metrics for Classification and Overfitting/Regularization

- Evaluation Metrics for Classification:
  - Introduction to evaluation metrics
  - Confusion matrix, accuracy, precision, recall, F1-score
  - ROC curve and AUC

- Overfitting and Regularization:
  - Understanding overfitting and underfitting
  - Techniques to prevent overfitting (pruning, cross-validation)
  - Regularization techniques (L1 and L2 regularization)

- Hands-on Practice:
  - Practical exercises on evaluating classification models and applying regularization
  - Q&A session to clear doubts
  - Small projects to reinforce learning

Week 8: Web Scraping with Python

Day 1: Introduction to Web Scraping

- Introduction to Web Scraping:
  - Overview of web scraping
  - Ethical considerations and legal implications
  - Common uses of web scraping

- Basic Concepts:
  - Understanding HTML structure
  - Navigating through HTML elements and attributes
  - Inspecting web elements using browser developer tools

Day 2: Using Requests and BeautifulSoup

- Introduction to Requests Library:
  - Overview of the Requests library
  - Making HTTP requests (GET, POST)
  - Handling response objects

- Introduction to BeautifulSoup:
  - Overview of BeautifulSoup
  - Parsing HTML content
  - Navigating and searching the parse tree (tags, attributes, text)

- Combining Requests and BeautifulSoup:
  - Extracting specific elements and data from web pages
  - Handling complex web pages with nested elements

- Hands-on Practice:
  - Practical exercises on using Requests and BeautifulSoup to scrape data
  - Q&A session to clear doubts

Day 3: Storing Scraped Data

- Introduction to Data Storage:
  - Overview of different data storage options (CSV, JSON, databases)
  - Choosing the right storage format based on use case

- Storing Data in CSV and JSON:
  - Writing scraped data to CSV files
  - Writing scraped data to JSON files

- Hands-on Practice:
  - Practical exercises on storing scraped data in different formats
  - Q&A session to clear doubts
  - Small projects to reinforce learning

Week 9: Introduction to Power BI

Day 1: Overview of Power BI & Connecting to Data Sources

- Introduction to Power BI
- Components of Power BI (Desktop, Service, Mobile)
- Power BI Use Cases and Benefits
- Power BI Interface Tour
- Connecting to Data Sources (Excel, SQL Server, etc.)
- Import vs. Direct Query Mode
- Hands-On: Connecting Power BI to Data Sources

Day 2: Data Transformation and Cleaning in Power BI

- Introduction to Power Query Editor
- Basic Data Transformation Techniques (Filtering, Sorting, Merging)
- Hands-On: Data Cleaning Exercises
- Creating Custom Columns and Measures
- Advanced Data Transformation (Pivot, Unpivot)

Day 3: Creating Basic Visualizations & Practical Application

- Introduction to Visualizations (Bar Charts, Line Charts, Pie Charts)
- Hands-On: Creating and Customizing Basic Visualizations
- Practice: Building a Simple Report with Various Visuals
- Case Study: Creating a Complete Power BI Report
- Review and Q&A

Week 10: Advanced Data Visualization in Power BI

Day 1: Advanced Chart Types and Custom Visuals

- Introduction to Advanced Chart Types (Waterfall, Funnel, Treemap, etc.)
- Using Custom Visuals from Power BI Marketplace
- Hands-On: Creating Advanced Visualizations
- Importing and Customizing Custom Visuals

Day 2: Creating Interactive Dashboards

- Overview of Dashboard Elements and Interactivity
- Adding Slicers, Filters, and Drill-Throughs
- Hands-On: Building an Interactive Dashboard
- Techniques for Enhancing User Experience and Interaction

Day 3: Data Modelling and DAX Basics

- Introduction to Data Modelling in Power BI
- Creating Relationships and Data Models
- Introduction to DAX (Data Analysis Expressions) Basics
- Hands-On: Creating Basic Measures and Calculated Columns
- Best Practices for Visualization Design

Week 11 and Week 12:

Capstone Project:

- Using the knowledge of python
- Machine Learning
- Visualization
- Dashboard making