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**Data Science with Python – Course Syllabus**

**1. Introduction to Data Science**

* Introduction to Data Science
* Python in Data Science
* Why is Data Science so Important?
* Application of Data Science
* What will you learn in this course?

**2. Introduction to Python Programming**

* What is Python Programming?
* History of Python Programming
* Features of Python Programming
* Application of Python Programming
* Setup of Python Programming
* Getting started with the first Python program

**3. Variables and Data Types**

* What is a variable?
* Declaration of variable
* Variable assignment
* Data types in Python
* Checking Data type
* Data types Conversion
* Python programs for Variables and Data types

**4. Python Identifiers, Keywords, Reading Input, Output Formatting**

* What is an Identifier?
* Keywords
* Reading Input
* Taking multiple inputs from user
* Output Formatting
* Python end parameter

**5. Operators in Python**

* Operators and types of operators

          - Arithmetic Operators

          - Relational Operators

          - Assignment Operators

          - Logical Operators

          - Membership Operators

          - Identity Operators

          - Bitwise Operators

* Python programs for all types of operators

**6. Decision Making**

* Introduction to Decision making
* Types of decision making statements
* Introduction, syntax, flowchart and programs for

   - if statement

   - if…else statement

   - nested if

* elif statement

**7. Loops**

* Introduction to Loops
* Types of loops

   - for loop

   - while loop

   - nested loop

* Loop Control Statements
* Break, continue and pass statement
* Python programs for all types of loops

**8. Lists**

* Python Lists
* Accessing Values in Lists
* Updating Lists
* Deleting List Elements
* Basic List Operations
* Built-in List Functions and Methods for list

**9. Tuples and Dictionary**

* Python Tuple
* Accessing, Deleting Tuple Elements
* Basic Tuples Operations
* Built-in Tuple Functions & methods
* Difference between List and Tuple
* Python Dictionary
* Accessing, Updating, Deleting Dictionary Elements
* Built-in Functions and Methods for Dictionary

**10. Functions and Modules**

* What is a Function?
* Defining a Function and Calling a Function
* Ways to write a function
* Types of functions
* Anonymous Functions
* Recursive function
* What is a module?
* Creating a module
* import Statement
* Locating modules

**11. Working with Files**

* Opening and Closing Files
* The open Function
* The file Object Attributes
* The close() Method
* Reading and Writing Files
* More Operations on Files

**12. Regular Expression**

* What is a Regular Expression?
* Metacharacters
* match() function
* search() function
* re.match() vs re.search()
* findall() function
* split() function
* sub() function

**13. Introduction to Python Data Science Libraries**

* Data Science Libraries
* Libraries for Data Processing and Modeling

  - Pandas

  - Numpy

  - SciPy

  - Scikit-learn

* Libraries for Data Visualization

  - Matplotlib

  - Seaborn

  - Plotly

**14. Components of Python Ecosystem**

* Components of Python Ecosystem
* Using Pre-packaged Python Distribution: Anaconda
* Jupyter Notebook

**15. Analysing Data using Numpy and Pandas**

* Analysing Data using Numpy & Pandas
* What is numpy? Why use numpy?
* Installation of numpy
* Examples of numpy
* What is ‘pandas’?
* Key features of pandas
* Python Pandas - Environment Setup
* Pandas – Data Structure with example
* Data Analysis using Pandas

**16. Data Visualisation with Matplotlib**

* Data Visualisation with Matplotlib

  - What is Data Visualisation?

  - Introduction to Matplotlib

  - Installation of Matplotlib

* Types of data visualization charts/plots

  - Line chart, Scatter plot

  - Bar chart, Histogram

  - Area Plot, Pie chart

  - Boxplot, Contour plot

**17. Three-Dimensional Plotting with Matplotlib**

* Three-Dimensional Plotting with Matplotlib

  - 3D Line Plot

  - 3D Scatter Plot

  - 3D Contour Plot

  - 3D Surface Plot

**18. Data Visualisation with Seaborn**

* Introduction to seaborn
* Seaborn Functionalities
* Installing seaborn
* Different categories of plot in Seaborn
* Exploring Seaborn Plots

**19. Introduction to Statistical Analysis**

* What is Statistical Analysis?
* Introduction to Math and Statistics for Data Science
* Terminologies in Statistics – Statistics for Data Science
* Categories in Statistics
* Correlation
* Mean, Median, and Mode
* Quartile

**20. Data Science Methodology (Part-1)**

Module 1: From Problem to Approach

* Business Understanding
* Analytic Approach

Module 2: From Requirements to Collection

* Data Requirements
* Data Collection

Module 3: From Understanding to Preparation

* Data Understanding
* Data Preparation

**21. Data Science Methodology (Part-2)**

Module 4: From Modeling to Evaluation

* Modeling
* Evaluation

Module 5: From Deployment to Feedback

* Deployment
* Feedback

Summary

**22. Introduction to Machine Learning and its Types**

* What is a Machine Learning?
* Need for Machine Learning
* Application of Machine Learning
* Types of Machine Learning

  - Supervised learning

  - Unsupervised learning

  - Reinforcement learning

**23. Regression Analysis**

* Regression Analysis
* Linear Regression
* Implementing Linear Regression
* Multiple Linear Regression
* Implementing Multiple Linear Regression
* Polynomial Regression
* Implementing Polynomial Regression

**24. Classification**

* What is Classification?
* Classification algorithms
* Logistic Regression
* Implementing Logistic Regression
* Decision Tree
* Implementing Decision Tree
* Support Vector Machine (SVM)
* Implementing SVM

**25. Clustering**

* What is Clustering?
* Clustering Algorithms
* K-Means Clustering
* How does K-Means Clustering work?
* Implementing K-Means Clustering
* Hierarchical Clustering
* Agglomerative Hierarchical clustering
* How does Agglomerative Hierarchical clustering Work?
* Divisive Hierarchical Clustering
* Implementation of Agglomerative Hierarchical Clustering

**26. Association Rule Learning**

* Association Rule Learning
* Apriori algorithm
* Working of Apriori algorithm
* Implementation of Apriori algorithm