

Data Science, AI & ML in Python Course

Course Flow :

- Python Programming
- Statistical Techniques
- ML Algorithms
- Project
- Assessment and Certificate

Python Programming:

➤ Python Fundamentals:

- Python Installation, Python Idle & Set path in Environment variable
- Test Python Version
- Python First Code using print() Function
- Python For Web Development

➤ Python Comments, Control Structure and Loops:

- Python Multiline Comment, Single Line Comment
- Python With If
- Python With if and else
- Python with Nested if
- Python if with pass statement
- Use of While Loop in Python

➤ Python Operators:

- Boolean Operators in Python (>, <, ==, ===)
- Evaluate Boolean, bool() as a Function
- Arithmetic Operator
- Assignment Operator
- Comparison Operator
- Logical Operator
- Exponential Operator

➤ Python Lists:

- List Creation in Python
- Print List Item Using Index Number
- Change List Values
- Check List length in Python
- Check Data type using type() function
- Python List as a constructor
- List With index Range
- Add Item in list using append() function

- Add Item in list using insert() function at specific position
- Remove list item using remove(), pop() function & del keyword
- Clear list & delete list using list keyword
- Use of for loop to extract lists

➤ **Python Tuple:**

- Creation of tuple which is unchangeable
- Tuple Items extraction using index number
- Check length using len()
- Tuple creation using one item
- Check type using type() function
- Tuple as a constructor
- Tuple access using For loop
- Tuple access using range index
- Tuple with negative range index
- Check item exist in tuple
- Update tuple & check
- Update tuple using append & list
- Remove tuple value using list
- Unpack tuple
- Join multiple tuple
- Multiply Tuple
- Check count of tuple
- Use of index() in tuple

➤ **Python Set:**

- Creation of set
- Set creation using constructor method
- Length of set
- Check data type of set
- Access set item using for loop
- Check item in set using in keyword
- Update set using update()
- Remove item from set
- Discard item from set
- pop() in set
- Del keyword for set
- Join set value using union & update

➤ **Python Dictionary:**

- Creation of dictionary using key and value
- Print dictionary item using keys
- Check length of dictionary
- Complex dictionary
- Check data type of dictionary

- Use of get() method
- Get all keys
- Change values in dictionary
- values() in dictionary
- items() in dictionary
- Check key exist in dictionary
- Change item in dictionary
- Update dictionary with key
- pop() function to remove from dictionary
- popitem() in dictionary
- Del keyword
- Clear dictionary
- Extract dictionary using for loop
- copy() & dict() function for duplicate

➤ **Python Function, Lambda:**

- Function Creation in Python
- Calling Function in Python
- Empty Function in Python
- Function with Arguments
- Function with Control Structure
- Use of List, Tuple, set & Dictionary in Function
- Python anonymous or lambda function
- Need of lambda function

➤ **Python File handling:**

- Use of mode in File handling, 'r' mode, 'w' mode, 'a' mode, 'x' mode
- open() function to read file
- read() function to access all data
- read() file using characters
- readline()
- Read file using for loop
- close() file
- write() function for append data
- Create file using 'x' mode & 'w' mode
- Delete file using OS module
- remove() & rmdir() function

➤ **Python Type Casting, Numbers & Data Types:**

- Check data type using type() function
- Str, int, float, boolean, list, tuple, set, dict
- Convert data type from list to tuple, int to float
- Types of number in python
- int(), float(), str() function

➤ **Python Custom Module, Date & Math Module:**

- Creating Custom Module in Python
- Use of module in py file using import keyword
- Import datetime module
- Use now() method
- Set custom datetime
- Access year, month, date, hour, minute, second using format
- Import math module
- min(), max(), pow(), abs(), sqrt(), ceil(), floor(), factorial(), fsum(), fmod(), isfinite(), isinf(), prod() Functions

➤ **Python String Formatting:**

- String format()
- String Format() Multiple Values
- String Format() With Index
- String Format() With Named Index

➤ **Python Variable Scope:**

- Local Scope
- Variable with local scope in Function
- Global Scope
- Global Keyword

Statistical Techniques:

- **Random variables**
- **Mean, Variance, Standard Deviation**
- **Covariance and Correlation**
- **Probability distribution functions (PDFs)**
- **Bayes' Theorem**
- **Linear Regression and Ordinary Least Squares (OLS)**
- **Gauss-Markov Theorem**
- **Parameter properties (Bias, Consistency, Efficiency)**
- **Confidence intervals**
- **Hypothesis testing**
- **Statistical significance**
- **Type I & Type II Error**
- **Statistical tests (Student's t-test, F-test, 2-Sample T-Test, 2-Sample Z-Test, Chi-Square Test)**
- **p-value and its limitations**
- **Inferential Statistics**
- **Central Limit Theorem & Law of Large Numbers**
- **Dimensionality reduction techniques (PCA, FA)**

ML Algorithms:

- Introduction to Machine Learning
- Introduction to Data Science and its Applications
- Exploratory Data Analysis (EDA) using Pandas and NumPy
- Data Visualization using Matplotlib, Seaborn, and Plotly
- Data Engineering and Preprocessing
- Web Scraping
- Supervised Learning – Regression
- Supervised Learning – Classification
- SVM, KNN & Naive Bayes
- Ensemble Methods and Boosting
- Unsupervised Learning – Clustering
- Unsupervised Learning – Dimensionality Reduction
- Model Evaluation and Hyperparameter Tuning
- Natural Language Processing (NLP)
- Recommendation Systems
- Reinforcement Learning

➤ In-Class Project

Goal: *In this module, you will do an in-class project based on all the concepts you have learned in the entire course*

Objectives: *After completing this module, you should be able to:*

- Apply the AI ML algorithms to the real-world problems and develop the prediction or classification models using Python programming and its libraries.

➤ Assessment and Certificate

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CERTIFICATE OF COMPLETION	
	
This is to Certify that	
<u>Student Name</u>	
Has successfully completed the Training and Assignments in	
<u>Course Title</u>	
Date : DD MMM YYYY	Instructor Signature Instructor Name