

Machine Learning Engineer

Data Analysis & ML with Python

3 Months (3 hours / day)

Day 1

1. Introduction to Python

- What is Python
- The application areas of Python
- Download and install Python
- Execute Python program from command prompt and using IDLE
- Save programs with .py extension and execute it from prompt

2. Python Basics

- Data types and variables
- Operators and operator precedence
- Data type conversions
- Command line argument
- Data input
- Comments

3. Python Flow Control

- If statement
- If.. elif.. else statement

Day 2



- While loop
- For loop
- Break & continue
- Else clause

Day 3,4

4. Introduction to Python IDE – PyCharm

5. Python Sequences

- Range
- String
- List
- Tuple
- Dictionary
- Set

6. Shallow and deep copy

Day 5,6,7

7. Functions and modules

- What is function
- Define a function
- Pass arguments
- Arguments with default values
- Arbitrary arguments



- Local and global variables
- Return a value from function
- Return multiple values
- Documentation Strings

8. Python built in functions

- Mathematical functions
- Random number functions
- Mathematical constants

9. Recursive functions

Day 8, 9

10. Python Modules

- What is module?
- Import module using import statement
- Namespaces and scoping
- Dir(), globals(), locals() and reload()

11. File Handling

- Reading
- Writing
- File manipulations
- Directories

Day 10

12. Exception Handling

- What is exceptions
- Python built-in exceptions
- Try
- Except
- Finally
- Raise exceptions
- User defined exception
- Assertions

Day 11

13. Python classes and objects

- Class definition
- Creating objects
- Constructors
- Accessing attributes
- Build-in class attributes
- Destructors
- Inheritance (Single, Multiple, Multilevel)
- Overriding
- Operator Overloading
- Data hiding

Day 12

14. Regular Expressions

- Match()
- Search()
- Search and replace
- Modifiers
- Patterns
- Character classes
- Repetitions

Day 13

15. Multithreading

- What is a thread?
- What is multithreading?
- Create and start a new thread
- The Threading module
- Thread synchronization

Day 14

16. Date and Time in Python

- The DateTime module
- Time tuple
- The Time module
- Date object
- The Calendar module

Day 15,16,17,18

17. Database programming

- With SQLite
 - Installing SQLite browser
 - Creating database
 - CRUD operations
- With MySQL
 - MySql datatypes
 - CRUD operations
 - Subquery
 - Join
 - Aggregate functions
 - Procedures

Day 19, 20

18. Python GUI Programming with Tkinter

- Widgets
- Geometry managers / layout managers
- Variable classes
- Events and binds

Day 21

- Evaluation Test

Day 22

19. Packages

- Creating packages
- Installing packages using PIP

20. Functional Programming

- Iterators
- Generators
- The lambda construct
- Comprehensions
- Map, reduce and filter

Day 23 - 25

Basic Project

Day 26 - 29

21. Python Packages for Data Analysis and Visualization

- NumPy
 - Installation
 - Creating arrays
 - Performing array operations

- Indexing and selection
- Slicing
- Broadcasting

- Pandas
 - Installation
 - Data Structure- series data frame
 - Reading files - csv, excel (datasets)
 - Data operations
 - Row and column selection
 - Filter data
 - Sorting
 - Null values
 - String operations
 - Count values
 - Group by
 - Index

- Matplotlib
 - Installation
 - Basic commands
 - Plot Bar and Scatter Diagrams
 - Subplot

Day 30,31,32, 33, 34, 35



22. Statistics and Algebra for machine Learning

- Descriptive Statistics
 - Frequency Distribution – Data representation and visualization
 - Measures of central tendency – Mean Median Mode
 - Measures of Dispersion – Range, Quartile Deviation, Standard Deviation
 - Skewness and Kurtosis

- Probability
 - Definition of Probability (Classical, Frequency, Axiomatic)
 - Conditional Probability
 - Independence of events
 - Bayes Theorem
 - Random Variables
 - Probability Distribution
 - Distribution function
 - Mathematical Expectation, Variance, Moments, Moment Generating function
 - Standard Distributions – Binomial, Bernoulli, Uniform, Normal
 - Bi-variate Probability distribution
 - Marginal and Conditional Probability Distribution

- Inferential Statistics
 - Probability Distribution
 - Hypothesis Testing



- Correlation and Regression Analysis
- Analysis of Variance
- Linear Algebra
 - Principal Component Analysis (PCA)
 - Singular value Decomposition (SVD)
 - Matrices and Matrix Operations
 - Transpose, Symmetric Matrices, Orthogonalization and Orthonormalization
 - Inverse of Matrix, Determinant of Matrix
 - Rank of Matrix, Eigen decomposition of Matrix
- Algebra of Vectors
 - Scalar or dot product, Vector or Cross product
 - Scalar triple product
 - directional cosines and ratios
 - Vector Space

Day 36, 37, 38

24. Data Analysis

- T -testing
- Hypothesis Testing
- Significance Testing-P value
- Regression and Anova
- Visualization using matplotlib



- Example: Analyzing a sample data given in csv format

Day 39, 40, 41, 42

25. Machine learning

- Introduction to machine learning
- Types of machine learning
 - Supervised machine learning
 - Unsupervised Machine learning
- Machine learning models
- Supervised Learning Algorithms
 - Linear regression
 - Logistic Regression
 - Decision tree
 - Naïve Bayes
 - KNN
 - SVM
- Unsupervised Learning Algorithms
 - K means –Clustering
- Implementation of machine learning using python
 - Scikit –learn
 - Implementing different Algorithms
 - Analyzing the algorithm using accuracy score and confusion matrix



Day 43 - 47

26. Project (5 days)

Day 48, 49, 50

27. Python Web Development using Django - An Introduction

- Web server
- Web client
- HTML

Django

- Installation
- Configuration
- Urls and Views
- App creation
- Model
- Database connection using MySQL