Machine Learning with Python

Instructor:

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About This Course:

- A comprehensive, hands-on program designed to master Machine Learning (ML) using Python.
- Covers foundational Python, statistics, and advanced ML algorithms with real-world projects.
- Taught by a top-rated ML engineer with an industry-aligned curriculum.

Course Objectives:

- Equip learners with Python programming and statistical skills essential for ML.
- Build proficiency in data preprocessing, model training, and evaluation.
- Enable the deployment of ML models using frameworks like Flask and Streamlit.
- Provides guidance and support to enter the freelancing world with ML skills.

Target Audience:

- Aspiring data scientists, analysts, and software engineers.
- Professionals seeking to transition into ML roles.
- Students and enthusiasts are eager to apply ML in real-world scenarios.
- Students aiming to pursue a master's degree with a scholarship abroad or publish research papers in the field of Machine Learning

Job Roles After Completion:

- Junior Machine Learning Engineer
- Junior Data Scientist/Analyst
- AI/ML Researcher
- Python Developer (ML Specialization)

Key Takeaways:

- Mastery of Python libraries (NumPy, Pandas, Scikit-learn).
- Hands-on experience with Kaggle datasets and frameworks.
- In-depth understanding of supervised/unsupervised learning techniques.
- guidance and support to enter the freelancing world
- 3-5 hands-on projects completion related to Python and ML.

Prerequisites:

- Basic programming knowledge (recommended but not mandatory).

Course Outline

Module 1: Python & Statistics for ML

Total Duration: 15 Classes (120 minutes each)

Module Breakdown:
- Python Programming: Classes 1-10
- Statistics for ML: Classes 11-15

Class-by-Class Breakdown:

Class 1: Getting Started
- Introduction to the course

- Python Installation
- Intro to VS Code, Jupyter Notebook, and Google Colab
- Run your "Hello world" Program

Class 2: Basic Python
- Different ways of Virtual environment creation and why it's important
- Python Syntax and Semantics
- Variables in Python
- Basic data types in Python
- Operators in Python
- Coding exercise and assignment

Class 3: Python Control Flow
- Conditional Statement (if, elif, else)
- Loops in Python
- Coding exercise and assignment

Class 4: Data Structure in Python
- List and List Comprehension
- Tuple
- Set
- Dictionaries
- Coding exercise and assignment

Class 5: Functions in Python
- Getting Started with Function
- Lambda Function
- Map Function
- Filter Function
- Coding exercise and assignment

Class 6: Module, Packages, File Handling, and Exception Handling
- Importing Module, Packages, and Standard Library Overview
- File operations and working with File paths
- Exception Handling
- Coding exercise and assignment

Class 7: OOP Concept
- Class and Object in Python
- Inharitance

- Polimorphism
- Encapsulation
- Abstruction
- Magic Method
- Operator overloading

Class 8: Data Analysis with Python
- Numpy
- Pandas
- Data manipulation with pandas and numpy
- Reading data from various data sources using Pandas

Class 9: Data Visualization with Python
- Matplotlib
- Seaborn
- Ydata Profiling

Class 10: Python Framework
- Getting Started with Flask
- Git & Version Control Basics
- Getting Started with Streamlit

Class 11: Introduction to Statistics
- Statistics and its application
- Types of statistics
- Population vs Sample data
- Central tendency and dispersion
- Standard deviation

Class 12: Descriptive Statistics
- Variables and Random Variables
- Histogram
- Percentile and quartile
- Number Summery

Class 13: Correlation and Probability
- Correlation and Covariance
- Addition Rule
- Multiplication Rule

Class 14: Probability Distribution
- PDF, PMF, CDF
- Types of probability distribution
    - Bernoulli
    - Binomial
    - Poisson
    - Normal/Gaussian
    - Uniform

Class 15: Inferential Statistics
- Hypothesis Testing
- P value
- Z test
- T test
- Type 1 and Type 2 errors
- Bayes Theorem
- Chi-Square Test
- Annova Test

Module 2: Machine Learning

Total Duration: 15 Classes (120 minutes each)

Class-by-Class Breakdown:

Class 16: Feature Engineering
- Missing value handling
- Imbalanced data handling
- Outlier Handling
- Encoding

Class 17: Exploratory Data Analysis and Kaggle Competition
- Intro to Kaggle
- EDA on the Titanic dataset

Class 18: Simple Linear Regression
- Types of Linear Regression
- Simple Linear Regression

- Intuition of simple linear regression
- How do you find m and b?
- Simple Linear Regression model code from scratch
- Regression Metrics
  - ❖ MAE
  - ❖ MSE
  - ❖ RMSE
  - ❖ R2 score

Class 19: Multiple Linear Regression
- Overfitting and Underfitting
- Cost Function
- Introduction to Multiple Linear Regression (MLR)
- Code of MLR
- Error function of MLR
- Minimizing error

Class 20: Ridge, Lasso, and ElasticNet ML Algorithm
- Ridge Regression
- Lasso and ElasticNet
- Cross Validation
- Feature selection Basic

Class 21: Hands-on Project Implementation Life Cycle
- Basic Simple Linear Regression Project: From data collection, preprocessing, EDA, Feature engineering, Training
- Project deployment in AWS

Class 22: Logistic Regression
- Logistic Regression math intuition
- Code implementation
- Hyperparameter Tuning
- Grid Search
- Random Search

Class 23: Support Vector Machine
- Intro to SVM
- Soft and hard margin
- SVM Math Intuition
- SVC Cost function

- SVC implementation

Class 24: Naive Bayes Theorem
- Understanding the Bayes Theorem
- Code implementation

Class 25: KNN and Decision Tree
- Knn In-depth intuition
- Optimization of KDTree
- Code example
- Intro of DT
- Entropy, Gini Impurity, Information Gain
- DT regression
- Code Example

Class 26: Random Forest
- Bagging, Boosting, and Ensemble Techniques
- Random Forest Regression
- Code example

Class 27: Adaboost and Gradient Boosting
- Intro
- Creating the DT stump
- Updating weights
- Selecting new data point for next tree
- Model training for adaboost and gradient boosting

Class 28: XGBoost
- Intro
- XGBoost Classifier Intuition
- Code example

Class 29: Feature Selection
- Filter-Based Feature Selection
  - Duplicate Features
  - Variance Threshold
  - Correlation
  - ANOVA
  - Chi-Square

- Wrappar Method
  - Exhaustive Feature Selection/Best Subset Selection
  - Sequential Backward Selection/Elimination
  - Sequential Forward Selection
- Principal Component Analysis

Class 30: Unsupervised Learning
- K–Means Clustering
- Hierarchical Clustering
- DBSCAN