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## CERTIFICATE COURSE IN AI (Artificial Intelligence) – ML(Machine Learning)

### STAGE 1 →

#### Python Prerequisites

Goal: Gain basic programming skills in Python.

Topics:

1. Variables, data types, operators
2. Conditional statements, loops
3. Functions and scope
4. Lists, dictionaries, sets, tuples
5. File handling
6. Exception handling
7. Basic OOP (Classes and Objects)

### STAGE 2 →

#### Data Science & preprocessing

Goal: Learn data handling, cleaning, and exploration.

Topics :

1. Pandas and NumPy for data wrangling
2. Data visualization (Matplotlib, Seaborn)
3. Data cleaning & missing value treatment
4. Feature scaling, encoding, normalization

### STAGE 3 →

#### Machine Learning with Python

Goal: Understand core ML algorithms and implement them.

Topics:

1. Supervised Learning:  
Linear/Logistic Regression, Decision Trees, Random Forest, SVM, KNN
2. Unsupervised Learning: K-Means, PCA, Clustering
3. Model evaluation metrics, Cross-validation, Grid Search
4. Overfitting/Underfitting

Tools: Scikit-learn, MLflow (optional), Jupyter Notebook

### STAGE 4 →

#### Deep Learning & AI

Goal: Dive into neural networks and build AI applications.

Topics:

1. Perceptron, activation functions
2. Forward & backward propagation
3. Neural Networks using TensorFlow/Keras
4. CNNs for image processing
5. RNNs and LSTMs for time series / NLP
6. Transfer learning, Intro to Transformers

Tools: TensorFlow / Keras / PyTorch, OpenCV, Hugging Face

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