

# Data Science

**Course Duration: 40 Hrs**

## Course Overview

This 40-hour Data Science course provides a structured path to mastering Python, Machine Learning, Deep Learning, and NLP. Learners will gain hands-on experience in data preprocessing, model building, optimization, and AI applications, ensuring they can analyze data, build intelligent systems, and work on real-world scenarios.

## What you'll learn?

- Python for data science, data wrangling, and visualization
- Machine learning algorithms and evaluation techniques
- Deep learning with CNNs and RNNs
- NLP for text analytics and sentiment analysis
- Feature engineering, model optimization, and deployment

## Target Audience

This course is designed for aspiring data scientists, software developers, AI enthusiasts, analysts, and students looking to build a career in data science. Professionals seeking to transition into AI and ML-based roles will benefit from this structured, hands-on approach to learning advanced data science concepts.

## Pre-Requisites

Basic programming knowledge (preferably Python) and a fundamental understanding of mathematics, including linear algebra, probability, and statistics, will be helpful. Prior exposure to data handling is beneficial but not mandatory, as concepts will be taught from the basics.

## Course content

### 1. Python for Data Science

- Python basics: Variables, loops, functions
- Data handling with NumPy and Pandas
- Data visualization with Matplotlib and Seaborn
- Exploratory Data Analysis (EDA) and data preprocessing

### 2. Machine Learning

- Supervised Learning: Regression (Linear, Logistic), Classification (Decision Trees, SVM, Random Forest)
- Unsupervised Learning: Clustering (K-Means, DBSCAN, Hierarchical)
- Feature selection, feature engineering, and data scaling
- Model evaluation (cross-validation, precision-recall, confusion matrix)

### 3. Deep Learning

- Basics of neural networks and activation functions
- Artificial Neural Networks (ANNs) for structured data
- Convolutional Neural Networks (CNNs) for image processing
- Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks
- Introduction to Transformers (BERT, GPT) and generative AI

## 4. Natural Language Processing (NLP)

- Text preprocessing (tokenization, stemming, lemmatization, stopwords removal)
- TF-IDF and Word Embeddings (Word2Vec, FastText)
- Named Entity Recognition (NER), POS tagging, sentiment analysis
- Sequence modeling with RNNs, LSTMs, and Transformer models
- Chatbot development using NLP

## 5. Advanced Topics in Data Science

- Reinforcement Learning basics
- Time Series Forecasting (ARIMA, LSTMs for sequence prediction)
- Model deployment with Flask/FastAPI and cloud platforms
- Ethics and biases in AI, explainable AI (XAI)
- AutoML and hyperparameter tuning