Data Science Course Syllabus

Total Duration: 90hrs

Module 1: Foundations of Data Science

Chapter 1: Introduction to Data Science

- What is Data Science
- The Evolution of Data Science
- Importance of Data Science in Today's World
- Applications Across Industries
- Key Skills Required for a Data Scientist
- Future Trends and Opportunities in Data Science

Chapter 2: The Data Science Workflow

- Overview of the Data Science Lifecycle
- Data Collection & Data Sources
- Data Cleaning & Preparation
- Exploratory Data Analysis (EDA)
- Building Predictive Models
- Model Evaluation & Optimization
- Deployment Basics

Chapter 3: Understanding Data Types and Data Structures

- Numerical, Categorical, Text, and Time Series Data
- Arrays, Lists, Dictionaries, and DataFrames
- Structured vs Unstructured Data

- Choosing the Right Data Structure for Analysis

Chapter 4: Data Collection Techniques

- Manual and Automated Data Collection
- Primary vs Secondary Data
- Real-Time Data Streams
- Ethical and Legal Considerations in Data Sourcing

Chapter 5: Data Cleaning Techniques

- Importance of Clean Data
- Identifying and Handling Missing Values
- Dealing with Outliers and Duplicates
- Data Transformation & Normalization
- Tools Used for Data Cleaning (Excel, Python - Pandas, etc.)
- Best Practices for Preprocessing

Module 2: Machine Learning Basics & Project Implementation

Chapter 6: Exploratory Data Analysis (EDA)

- Why EDA Matters
- Visualization Techniques (Histograms, Scatter Plots, Boxplots)
- Summary Statistics and Insights
- Feature Correlation and Distribution Analysis

Chapter 7: Feature Engineering

- What are Features in ML
- Creating New Features
- Handling Categorical Data (Encoding Techniques)
- Scaling & Normalization
- Feature Selection Techniques

Chapter 8: Model Selection and Evaluation

- Understanding Different Types of Models
- Supervised vs Unsupervised Learning Basics
- Model Selection Criteria (Accuracy, Precision, Recall)
- Cross-Validation Techniques
- Overfitting and Underfitting

Chapter 9: Model Deployment and Monitoring

- Introduction to Model Deployment
- Local vs Cloud Deployment
- Introduction to APIs for Model Deployment
- Monitoring Model Performance Over Time
- Updating Models with New Data

Chapter 10: Machine Learning Concepts and Techniques

- What is Machine Learning?
- ML vs Traditional Programming

- Overview of ML Algorithms (Linear Regression, KNN, Decision Trees)
- Steps in Building an ML Model
- Challenges in Model Training

Chapter 11: Capstone Project & Portfolio Building

- Guided Real-World Project (e.g., House Price Prediction)
- End-to-End Project Workflow
- Model Building and Evaluation
- Report Generation and Insights
- Introduction to Building a Portfolio (GitHub, Resume Integration)