



DATA SCIENCE COURSE

Prepared By (CTO) SYNTHOQUEST

45 Days Duration

Duration: 45 days × 2 hrs/day = 90 hrs

Goal: Equip learners with skills to extract, analyze, visualize, and interpret data, and build predictive models using Python and other tools.

Core Domains

1. Introduction to Data Science (5%)

- Definition, history, and applications
- Data Science lifecycle: collection → cleaning → analysis → visualization → deployment
- Tools and ecosystems: Python, R, SQL, Excel

2. Python for Data Science (10%)

- Python basics: variables, loops, functions
- Libraries: NumPy, Pandas, Matplotlib, Seaborn
- Data preprocessing and cleaning

3. Statistics & Probability (10%)

- Descriptive statistics: mean, median, mode, variance, standard deviation
- Probability theory, distributions, Bayes theorem
- Hypothesis testing, correlation, regression basics

4. Data Wrangling & Exploration (10%)

- Handling missing values, outliers, duplicates
- Data transformation, normalization, encoding
- Exploratory data analysis (EDA) and visualization

5. Machine Learning Fundamentals (15%)

- Supervised learning: regression, classification
- Unsupervised learning: clustering, dimensionality reduction
- Model evaluation: accuracy, precision, recall, F1-score, cross-validation

6. Advanced Machine Learning & Feature Engineering (10%)

- Feature scaling, selection, and extraction
- Ensemble methods: Random Forest, Gradient Boosting, XGBoost
- Hyperparameter tuning

7. Deep Learning & AI Integration (10%)

- Neural networks basics, activation functions, backpropagation
- CNN for images, RNN/LSTM for sequential data
- AI & ML integration in data pipelines

8. Data Visualization & Business Intelligence (10%)

- Visualization tools: Matplotlib, Seaborn, Plotly
- Dashboards and reporting using Power BI / Tableau
- Storytelling with data

9. Data Science Projects & Deployment (10%)

- End-to-end projects: data collection → model → visualization → deployment
- Model deployment using Flask / FastAPI
- Version control, documentation, and best practices

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