IICIS

ITKART Institute of Cyber & Information Security

6-Month Course

Data Science

24 Weeks (6 Months)

Strong foundation in Data Analysis, Machine Learning, and Visualization using Python, SQL, and industry tools

Instructor-led + Hands-on Labs + Projects + Case Studies

Module	Module Title
1	Foundations of Data Science
2	Data Handling & Processing
3	Exploratory Data Analysis (EDA) & Visualization
	Revision & Internal Assessment
4	Machine Learning Fundamentals
5	Advanced Topics & Tools
6	Capstone Project & Career Preparation
	Final Evaluation

Module 1: Foundations of Data Science (Week 1–2)

Content:

- Introduction to Data Science: Roles, Applications, and Career Paths

- Data Science Workflow: Data Collection → Cleaning → Analysis → Modeling → Deployment

- Statistics Basics: Mean, Median, Variance, Standard Deviation, Probability, Distributions

- Linear Algebra & Calculus Essentials for ML: Vectors, Matrices, Derivatives

- Tools Setup: Python, Jupyter Notebook, Anaconda, Git, Google Colab

Labs:

1. Set up free-tier accounts on AWS, Azure, and GCP
2. Explore cloud dashboards, services, and console navigation
3. Simple hands-on: Launch a VM and connect via SSH/RDP

Module 2: Data Handling & Processing (Week 3–6)

Content:

- Data Types & Sources: Structured, Semi-Structured, Unstructured, Streaming Data

- Data Cleaning: Handling missing values, duplicates, outliers, and anomalies

- Data Transformation & Feature Engineering

- SQL for Data Science: Joins, Aggregations, Window Functions, Subqueries

- Working with APIs & Web Scraping

- Introduction to Big Data Tools: Hadoop, Spark Basics

Labs:

1. Data wrangling with Pandas (cleaning & transforming datasets)
2. SQL queries on real datasets (sales, customer, or marketing data)
3. Extract data from APIs and perform basic analysis

Module 3
Exploratory Data Analysis (EDA) & Visualization (Week 7–8)

Content:

- Descriptive Statistics & Data Summaries

- Data Visualization Principles: Choosing the right chart for analysis

- Visualization Tools: Matplotlib, Seaborn, Plotly

- Correlation, Covariance & Feature Relationships

- Hypothesis Testing & A/B Testing Concepts

Labs/Project:

1. Perform EDA on a real dataset (Titanic, Sales, or Marketing Data)
2. Visualize distributions, relationships, and patterns in data

Module 4: Machine Learning Fundamentals (Week 9–14)

Content:

- Introduction to Machine Learning (ML Concepts & Applications)

- Supervised Learning: Regression (Linear, Multiple, Ridge, Lasso), Classification (Logistic Regression, KNN, Decision Trees, Random Forest, SVM)

- Unsupervised Learning: Clustering (K-Means, Hierarchical, DBSCAN), Dimensionality Reduction (PCA)

- Model Training, Testing & Evaluation: Cross-validation, Confusion Matrix, Accuracy, Precision, Recall, ROC-AUC

- Introduction to Neural Networks & Deep Learning

Lab / Project:

1. Build ML models on datasets (predict housing prices, classify spam emails, customer churn prediction)
2. Train, evaluate, and optimize models using Scikit-learn

Module 5: Advanced Topics & Tools (Week 15–20)

Content:

- Natural Language Processing (NLP): Tokenization, Sentiment Analysis, Text Classification

- Time Series Analysis: ARIMA, Prophet, LSTM basics

- Introduction to Deep Learning: TensorFlow / PyTorch Basics, Simple Neural Network Implementation

- Cloud & ML Ops Basics: AWS SageMaker, Google Colab, Model Deployment Concepts

Labs:

1. Sentiment analysis on Twitter or review datasets
2. Forecast sales or stock data using Time Series models
3. Train and deploy a small model on cloud environment

Module 6: Capstone Project & Career Preparation (Week 21–24)

End-to-End Data Science Project (Choose 1):

- Predict Customer Churn for Telecom or Banking

- Build a Recommendation System (Movies, Products, or E-commerce)

- Fraud Detection using ML Models

- Social Media Sentiment Analysis using NLP

- **Project Documentation, Report Writing & Presentation**

- **Resume Building for Data Science Roles**

- **Interview Preparation: SQL, Python, ML Algorithms, Case Study Questions**

Labs:

1. Implement IAM policies for secure access
2. Enable encryption & backup for cloud resources
3. Simulate recovery from a cloud service outage

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