

Bright Eaglets Colleges –

Online and On-Campus Classes

3-Month Data Science Course Outline

Duration: 12 Weeks (3 Months)

Mode: Online / Offline

Prerequisites: Basic programming knowledge (Python preferred)

➤ Month 1: Foundations of Data Science

Week 1: Introduction to Data Science

- What is Data Science?
- Applications of Data Science (Business, Healthcare, Finance, etc.)
- Data Science Lifecycle
- Tools and Technologies (Python, Jupyter Notebook, Anaconda, Git, SQL)

Week 2: Python for Data Science

- Python Basics (Variables, Data Types, Operators)
- Control Structures (Loops, Conditionals)
- Functions and Modules
- Introduction to NumPy for numerical computing
- Hands-on Exercises: Writing Python scripts

Week 3: Data Handling with Pandas

- Introduction to Pandas (Series and DataFrames)
- Reading/Writing Data (CSV, Excel, JSON, SQL)
- Data Cleaning (Handling missing values, duplicates)
- Data Manipulation (Filtering, Sorting, Aggregation)
- Exploratory Data Analysis (EDA) basics

Week 4: Data Visualization

- Matplotlib & Seaborn for visualization
- Types of graphs (Bar, Line, Scatter, Histogram, Heatmaps)

- Plotly & Dash for interactive visualizations
- Hands-on Project: Analyzing and visualizing a real-world dataset

➤ **Month 2: Statistical Analysis & Machine Learning Basics**

Week 5: Statistics for Data Science

- Descriptive Statistics (Mean, Median, Mode, Variance, Standard Deviation)
- Probability and Probability Distributions
- Inferential Statistics (Hypothesis Testing, Confidence Intervals)
- Correlation and Regression

Week 6: SQL for Data Science

- SQL Basics (SELECT, WHERE, ORDER BY)
- Joins and Subqueries
- Group By and Aggregations
- Window Functions
- Hands-on: Writing SQL queries for data analysis

Week 7: Introduction to Machine Learning

- Supervised vs. Unsupervised Learning
- Regression vs. Classification Problems
- Introduction to Scikit-Learn
- Splitting Data (Train-Test Split, Cross-Validation)
- Hands-on Project: Simple Linear Regression Model

Week 8: Machine Learning Algorithms - Part 1

- Linear & Logistic Regression
- Decision Trees & Random Forests
- Model Evaluation (Accuracy, Precision, Recall, F1 Score)
- Feature Engineering & Feature Selection
- Hands-on Project: Predicting House Prices

➤ **Month 3: Advanced Topics & Real-World Applications**

Week 9: Machine Learning Algorithms - Part 2

- K-Nearest Neighbors (KNN)
- Support Vector Machines (SVM)
- Clustering (K-Means, Hierarchical Clustering)
- Dimensionality Reduction (PCA, t-SNE)
- Hands-on Project: Customer Segmentation

Week 10: Deep Learning Basics

- Introduction to Neural Networks
- TensorFlow & Keras Basics
- Training a Simple Neural Network
- Convolutional Neural Networks (CNNs) for Image Classification
- Hands-on Project: Recognizing Handwritten Digits (MNIST Dataset)

Week 11: Natural Language Processing (NLP)

- Text Processing (Tokenization, Stemming, Lemmatization)
- TF-IDF & Word Embeddings (Word2Vec, GloVe)
- Sentiment Analysis
- Hands-on Project: Twitter Sentiment Analysis

Week 12: Capstone Project & Career Guidance

- **Final Capstone Project:**
 - Choose a real-world problem
 - Apply data science techniques learned
 - Present findings & insights
- **Career Guidance:**
 - Resume & LinkedIn Optimization
 - Interview Preparation (Common Data Science Interview Questions)
 - Portfolio Building (GitHub, Kaggle)
 - Freelancing & Job Search Strategies