

# Data Science using Python Programming

## Session-1 Python Introduction

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|---|---|
| ✓ Basic Concepts, Data Types, Operators | ✓ Control Statements, Looping, List, Tuple, Dictionary, Set |
| ✓ Function and Types of Functions       | ✓ File Processing in Python                                 |

## Session-2 Working with Numpy

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|---|--|
| ✓ Introduction to numpy, Environment Setup          | ✓ ND array Object, Data Types, Array Attributes          |
| ✓ Array Creation Routines, Array from Existing Data | ✓ Array From Numerical Ranges, Indexing and Slicing      |
| ✓ Iterating Over Arrays, Array Manipulation         | ✓ Binary Operators, String Functions, Mathematical Func. |

## Session-3 More on Numpy with Matplotlib

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|--|--|
| ✓ Arithmetic Operators, Statistical Functions      | ✓ Sort, Search and Counting Functions, Byte Swapping |
| ✓ Copies and Views, Matrix Library, Linear Algebra | ✓ Matplotlib, Histogram Using Matplotlib             |
| ✓ I/O with Numpy                                   | ✓ Examples based on Numpy                            |

## Session 4 Data Visualization using Matplotlib

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|---|---|
| ✓ Introduction to Matplotlib, Environment Setup   | ✓ Introduction to Anaconda and Jupyter Notebook             |
| ✓ PyPlot API, Simple Plot, PyLab Module           | ✓ Figure Class, Axes Class, Multiplots, Subplots() Function |
| ✓ Subplot2grid() Function, Grids, Formatting Axes | ✓ Setting Limits, Setting Ticks and Tick Labels             |

## Session 5 Data Visualization Plot Types

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|--|--|
| ✓ Bar Plot, Histogram, Pie Chart, Scatter Plot | ✓ Contour Plot, Quiver Plot, Box Plot, Violin Plot |
| ✓ 3D Contour Plot, 3D Wireframe Plot           | ✓ 3D Surface Plot, Working with Text and Images    |
| ✓ Working with Transforms                      | ✓ Three Dimensional Plotting, Twin Axes            |

## Session 6 Working with Pandas

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|--|--|
| ✓ Introduction to Pandas, Data Structure       | ✓ Series, Data Frame, Panel and Basic Functionality  |
| ✓ Re-indexing, Iteration, Sorting using Pandas | ✓ Working with Text Data, Statistical Functions      |
| ✓ Aggregations, Missing Data, GroupBy          | ✓ Merging/Joining, Concatenation, Date Functionality |
| ✓ Timedelta, Categorical Data, Visualization   | ✓ IO Tools, Sparse Data, Comparison with SQL         |

## Session 7 Mathematics for Data Science

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|--------------|------------------|
| ✓ Statistics | ✓ Probability    |
| ✓ Calculus   | ✓ Linear Algebra |

## Session 8 Fundamentals of Data Science

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|---|------------------------------|
| ✓ Introduction to Data Science, Basic Terminology | ✓ Data Science Venn Diagram  |
| ✓ Data Science Case-Study                         | ✓ Working with Types of Data |

## Session 9 The Five Steps of Data Sciences

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|---|------------------------------------|
| ✓ Getting Problem Statements, Obtain the data | ✓ Explore the Data, Model the Data |
| ✓ Communicate and Visualize the Results       |                                    |

## Session 10 Linear Regression

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|---|---|
| ✓ Scatter Diagram (Correlation Analysis)                            | ✓ Scatter Diagram (Correlation Coefficient)                                   |
| ✓ Ordinary Least Squares  | ✓ Principles of Regression  |
| ✓ Splitting the data into training, validation and testing datasets | ✓ Understanding Overfitting (Variance) vs Under fitting (Bias)                |
| ✓ Generalization error and Regularization techniques                | ✓ Introduction to Simple Linear Regression, Heteroscedasticity/Equal Variance |

## Session 11 Logistic Regression

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|---|---|
| ✓ Principles of Logistic Regression           | ✓ Types of Logistic Regression                      |
| ✓ Assumption and Steps in Logistic Regression | ✓ Analysis of Simple Logistic Regression Result     |
| ✓ Multiple Logistic Regression                | ✓ Confusion Matrix (False Positive, False Negative) |