SRI RAAM

Computer Education

An ISO 9001:2008 Certified Institute

*Skill Development and Placement Institute*

# FULL STACK DATA SCIENCE

**Duration : 6 Months**

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**FULL STACK DATA SCIENCE MASTERS PROGRAMME**

This comprehensive program equips students with the expertise to derive meaningful insights from data, employing advanced statistical and machine learning techniques alongside adept data visualization and operational skills. Throughout the course, students master popular data analysis tools, such as Python and SQL delve into cutting-edge realms like natural language processing (NLP) and deep learning. Engaging in hands-on projects, they apply their knowledge to solve real-world challenges, cultivating a skill set tailored for making informed decisions grounded in data across diverse industries. The curriculum spans the entirety of data science, encompassing machine learning operations and proficiency in NLP and deep learning with practical experience in real-time industry projects. Additionally, participants gain mastery in visualization tools such as Tableau and PowerBI, further enhancing their capabilities in presenting and interpreting data-driven insights.

## Course Curriculum

**Course Introduction**

- Welcome to the Course
- Platform Overview

**Python Basic Building**

- Python Keywords and identifiers
- Comments, indentation and statements
- Variables and data types in Python
- Standard Input and Output
- Operators
- Control flow: if else elif
- Control flow: while loop
- Control flow: for loop
- Control flow: break and continue

**Python Data Structures**

- Strings
- Lists, Lists comprehension
- Tuples
- Sets
- Dictionary, Dictionary Comprehension

**Python Functions**

- Python Built-in Functions.
- Python User-defined Functions.
- Python Recursion Functions.
- Python Generators
- Python Enumerators
- Python Lambda Functions.
- Python maps, filters, Zip and unzip

**Python File Handling and Exception Handling**

- file handling

- Exception Handling Using Try Catch Block
- Custom Exception Handling

**Python OOPS**

- Python Objects and Classes
- Python Constructors
- Python Inheritance
- Abstraction In Python
- Polymorphism in Python
- Encapsulation in Python

**Python For Data Science- NumPy**

- NumPy Basics to Advance
- Key Operations using NumPy

**Python For Data Science- Pandas**

- Pandas Basic To Advance- DataFrame And Series
- Key Operations on DataFrames

**Python For Visualization**

Getting Started with Matplotlib
Getting Started with Seaborn

**Maths For Data Science (Probability)**

- Important concepts in probability theory including random variables and independence

**Statistics part -1**

"Introduction & Descriptive Statistics!" Here, we'll dive into the basics of descriptive statistics—like mean, median, mode, variance, and standard deviation. This module is all about understanding why these measures matter for different types of data. We won't just cover the theory; we'll show you how these stats are used in the real world. By the end, you'll not only know the essentials but also how to apply them for practical data analysis.

**Statistics part- 2**

Introduction to Probability Distributions- In this module, we will cover various distributions and understand pdf, pmf and cdf

**Statistics Part- 3**

Hypothesis Testing-This module aims to equip you with the necessary knowledge to choose the appropriate test when analyzing data and determining their relationships. It will provide a detailed explanation of the assumptions underlying each test and teach you how to interpret the results of a hypothesis test accurately.

**Accomplishment 3**

- Accomplishment 3 Test

**Feature Engineering**



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- Feature Selection
- Handling missing values
- Handling imbalanced data
- Handling outliers
- Encoding
- Feature Scaling

**Machine Learning (Supervised - 1)**

AI Vs ML Vs DL Vs DS
Types Of ML Techniques
Supervised vs unsupervised
Linear Regression
End To End Project

**Machine Learning (Supervised - 2)**

Logistic Regression
End To End Project
Support Vector Machines
Naive Bayes
End To End Project

**Machine Learning (Supervised - 3)**

- Decision Tree
- Random forest
- Ensemble Techniques
  - AdaBoost
  - Gradient Boosting
  - XgBoost
- End To End Project

**Machine Learning (Unsupervised)**

- PCA
- Kmeans Clustering
- Hierarchical Clustering
- DBSAN Clustering

**Machine Learning (Time Series)**

Time Series Using fbprophet

Time Series Using AutoTs(Automated time series)

**End To End ML Projects**

- Industry Project 1
- Industry Project 2
- Industry Project 3

- Industry Project 4

**NLP (Natural language processing)**

- Tokenization
- Stopwords
- Stemming
- lemmatization
- POS Tagging
- Chunking
- Corpus
- One Hot Encoding
- BOW (Bag of words)
- TF-IDF (Term frequency invert document frequency)
- N-grams
- CBOW (Continuous Bag of words)
- Skip grams
- Word2Vec
- Avg word2vec
- NLP Project -1
- NLP Project- 2

**Deep Learning ANN**

- Artificial Neural Network Working
- Back Propagation In ANN
- Vanishing Gradient Problem
- Exploding Gradient Problem

**Deep Learning Fundamentals**

- Different Activation functions
- Different types of Loss Function
- Different types Of Optimizers
- Weight Initialization Techniques
- Drop Out Layer

**Deep Learning Frameworks**

- Working With Tensorflow Keras
- Working With Pytorch

**Deep Learning CNN**

- **Convolutional Layers:**
  - Understanding the concept of convolution and its role in feature extraction.
  - Kernel/filter operations and their impact on image data.
- **Pooling Layers:**
  - Different pooling techniques (e.g., max pooling, average pooling).
  - The purpose of pooling in reducing spatial dimensions and computational complexity.



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- **Architecture of CNNs:**
    - Overview of the typical CNN architecture (input layer, convolutional layers, pooling layers, fully connected layers).
    - Deepening networks with multiple convolutional and pooling layers.

**Deep Learning RNN**

**1. Sequence Modelling:**

- Introduction to sequential data and the need for specialized models like RNNs.
- Overview of applications in natural language processing, time series prediction, and more.

**2. RNN Architecture:**

- Basic structure of a recurrent neural network.
- Understanding the recurrent connection and how it allows information to persist through time.

**3. Backpropagation Through Time (BPTT):**

- The challenges of training RNNs and the concept of backpropagation through time.

**Deep Learning LSTM**

**1. Introduction to LSTMs:**

- Overview of the need for specialized models like LSTMs in capturing long-term dependencies.
- Comparison with traditional RNNs.

**2. LSTM Architecture:**

- Structure of an LSTM cell, including the input, forget, and output gates.
- Understanding how an LSTM cell stores and retrieves information.

**3. Gates in LSTMs:**

- Input gate: Controls the input values.
- Forget gate: Determines what information to discard from the cell state.
- Output gate: Determines the next hidden state and the output.

**4. Cell State and Hidden State:**

- Distinction between the cell state (long-term memory) and the hidden state (short-term memory).
- How information is passed and modified within the LSTM cell.

**5. Training LSTMs:**

- Backpropagation through time (BPTT) in the context of LSTMs.



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- Exploring vanishing and exploding gradient issues and how LSTMs address them.

6. **Applications of LSTMs:**

- Time series prediction and forecasting.
- Natural language processing tasks such as language modelling, sentiment analysis, and machine translation.
- Speech recognition.

**End To End DL Projects**

- Industry Project 1
- Industry Project 2
- Industry Project 3

**Accomplishment 5**

- Accomplishment 5 Test

**Data Analytics - PowerBI**

- Introduction to PowerBI
- PowerBI Products
- BI Project Execution Steps (PowerBI Architecture)
- Downloading and installing PowerBI desktop
- PowerBI data sources
- Types of view in PowerBI Desktop
- Types of connections in PowerBI
- Data Transformation (Power Query Editor)
- Data modelling
- Edit Interaction
- Bookmarks and selection pan
- Types of filters
- Cross Report Drill through
- PowerBI service Overview
- Custom Visuals
- Paginated reports
- Row level security

Data Gateways

Data Refresh

- Q & A Custom
- Dashboard PowerBI
- Project-1 PowerBI
- Project-2

**Data Analytics - Tableau**

Introduction to Tableau
Tableau Products
Downloading and installing tableau desktop
Description and navigation of the tableau workspace
How Tableau consider database?
Types of connection in tableau
Sorting techniques in tableau
Tableau drill down and hierarchy
Visual analytics
Connection with different data in Tableau
Grouping in Tableau
Sets in Tableau
Filters in tableau
Measures name and measures values
Parameters in Tableau
Calculated field
Level of details
Data joining & Data blending
Actions in Tableau
Maps
Managing metadata
Tableau exporting
Dashboard
Story
Tableau project-1
Tableau Project-2

**SQL (Structural Query Language)**

**1. Introduction to SQL**

- History of SQL
- What is Database?
- Relational Database
- SQL and Relational Databases
- How to run SQL Query on the local system

**2. Downloading and Installing MySQL**

- Downloading MySQL
- Installation of MySQL

**3. SQL QUERY**



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- The SQL SELECT DISTINCT
- The SQL WHERE CLAUSE
- The SQL WHERE CLAUSE WITH AND, OR & NOT
- The SQL ORDER BY
- The SQL SELECT TOP CLAUSE
- The SQL MIN() AND MAX() FUNCTION
- The SQL COUNT(), AVG() AND SUM() FUNCTION
- The SQL LIKE-OPERATOR
- The SQL IN AND NOT IN OPERATORS
- The SQL BETWEEN OPERATOR
- The SQL ALIAS
- The SQL GROUP BY STATEMENT
- The SQL HAVING CLAUSE
- The SQL UNION
- The SQL STORED PROCEDURE

**4. SQL JOIN**

- INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- Full OUTER JOIN
- SELF-JOIN

**5 The SQL CREATE DATABASE STATEMENT**

- The SQL DROP DATABASE STATEMENT
- The SQL CREATE TABLE
- The SQL DROP TABLE STATEMENT
- The SQL INSERT INTO STATEMENT
- The SQL NULL VALUES
- The SQL UPDATE STATEMENT
- The SQL DELETE STATEMENT
- The SQL ALTER TABLE STATEMENT
    - o ALTER TABLE - ADD COLUMN IN EXISTING TABLE
    - o ALTER TABLE – MODIFY/ALTER COLUMN
    - o ALTER TABLE - DROP COLUMN

**6. The SQL CONSTRAINTS**

- NOT NULL CONSTRAINTS
- SQL UNIQUE CONSTRAINT
- DROP A UNIQUE CONSTRAINT
- SQL PRIMARY KEY CONSTRAINTS
- DROP PRIMARY KEY CONSTRAINTS
- SQL FOREIGN KEY CONSTRAINT
- DROP A FOREIGN KEY CONSTRAINT
- SQL CHECK CONSTRAINTS
- DROP A CHECK CONSTRAINT
- SQL DEFAULT CONSTRAINT

- DROP A DEFAULT CONSTRAINT

**7. SQL CREATE INDEX STATEMENT**

- DROP INDEX STATEMENT

**8. SQL VIEWS STATEMENT**

- The WITH CHECK OPTION
- DELETING ROWS INTO A VIEW
- DROPPING VIEWS

**9. Advance MySQL**

- MySQL Stored Procedure Creating the Stored Procedure
  - EXECUTION OF STORE PROCEDURE
  - DROP THE STORED PROCEDURE
  - o STORED PROCEDURE PARAMETERS
  - STORED PROCEDURE VARIABLES
- CONDITIONAL STATEMENT
  - IF-THEN STATEMENT
  - IF-THEN-ELSE STATEMENT
  - IF THEN ELSEIF ELSE STATEMENT
- CASE STATEMENT
  - o Simple CASE Statement
  - o Searched CASE Statement
- LOOP STATEMENT
- WHILE LOOP STATEMENT
- REPEAT LOOP STATEMENT
- CURSOR

**Accomplishment 6**

- Accomplishment 6 Test

Microsoft Excel

- **MS Excel Introduction and UI**
  - User interface or Parts of Excel, Part 1
  - User interface or Parts of Excel, Part 2
- **Working on Rows and Columns**
  - o Inserting and Deleting Rows, Columns, and Cells
  - o Hide Unhide rows and columns, Modify column and row size, Freeze and Unfreeze
- **Editing and customizing data**
  - o Editing data and customizing it
  - Cut, Copy, Paste, Redo, Undo
  - Clipboard, Split panes
- **Working on worksheets**
- **Basic formulas and functions**
- **Filling, Copying**
  - **FILL types in Excel**
  - o **Copying formulas without changing the cell references**

- **Cell referencing**
  - o Absolute, mixed and relative cell referencing
- **Subtotal**
- **Text functions**
- **Logical or Comparative Operators**
- **Text operations**
  - o **Text to columns**
    - o **Textsplit function**
    - o **Textbefore function**
    - o **Textafter functions**
- **IF and IFs functions**
- **Database Functions**
- **Logical functions**
- **Basic unconditional formatting in Excel**
- **Protection in Excel**
  - o Protecting Cells and Worksheets
  - o Protecting files and Workbooks
- **Formula auditing**
- **Naming, Sorting and Filtering**
  - o Naming Ranges
    - o Basic Sorting and Filtering
    - o Advanced Sorting and Filtering
- **Tables in Excel**
- **Printing**
- **Data Validation and Dropdown**
- **Index and Match functions**
- **LOOKUP in Excel**
  - o HLOOKUP
  - o VLOOKUP
  - o Lookup
  - o XLOOKUP
- **Conditional Formatting**
- **Date and Time Functions**
- **Pivot Tables in Excel**
- **Charts in Excel**
- **Excel Power Query**
- **Excel Dashboarding**

**Interview Preparation**

- Resume Discussion and Resume Preparation
- Python Interview Questions Discussion
- Stats Interview Questions Discussion
- Machine Learning Interview Questions Discussion
- How To Explain End to Projects to Interviewer

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