Course : Bio-Data Analytics and Visualization

Duration : 125 Hours

Sr No.	Detailed Syllabus
1	Importance of Data Analytics in Biotechnology
2	Types of Biological Data
3	Genomics Data
4	Proteomics Data
5	Clinical and Experimental Data
6	Data Analytics Lifecycle
	Introduction to Python
8	Python Installation and Environment Setup
9	Python Syntax and Indentation
10	Data Types and Variables
11	Conditional Statements
12	Loops and Iterations
13	Functions and Modules
14	File Handling in Python
15	Exception Handling
16	Handling Biological Data Files
17	Python Virtual Environments
	NumPy Library of Python
19	NumPy Arrays
20	Data Types in NumPy
21	Array Indexing and Slicing
22	Mathematical Operations on Arrays
23	Statistical Operations using NumPy
24	Linear Algebra Operations
25	Random Number Generation
26	Performance Optimization with NumPy
	Pandas Library of Python
28	Pandas Series
29	Pandas DataFrames
30	Importing and Exporting Data
31	Data Cleaning Techniques
32	Data Preprocessing
33	Handling Missing Values
34	Filtering and Sorting Data
35	GroupBy and Aggregation
36	Merging and Joining Datasets
37	Time Series Data Handling
	Matplotlib Data Visualization Library
39	Line Plots
40	Bar Charts
41	Histograms
42	Scatter Plots
43	Box Plots
44	Plot Customization
45	Visualization of Biological Experiments
	Biopython for Bioinformatics
47	Introduction to Biopython

48	Installation and Environment Setup
49	Working with SeqIO Module
50	Biological Sequence Objects
51	Sequence Manipulation and Analysis
52	Reading FASTA Files
53	Writing FASTA Files
54	Pairwise Sequence Alignment
55	Multiple Sequence Alignment
56	Working with Align Module
57	Protein Structure Data Handling
58	PDB Module Usage
59	Accessing Online Biological Databases
60	Entrez Programming Utilities
61	Automating BLAST Searches with Biopython
	Scripting and Automation for Bioinformatics
63	Introduction to Bioinformatics Automation
64	Writing Python Scripts for Automation
65	Batch Processing of Biological Data Files
66	Automating Sequence Analysis Tasks
67	Automating BLAST Workflows
68	Generating Automated Analysis Reports
69	Workflow Automation Techniques
70	Scheduling and Running Scripts
	Introduction to Machine Learning (Scikit-Learn)
73	Applications of Machine Learning in Biotechnology
74	Supervised Learning Concepts
75	Unsupervised Learning Concepts
76	Data Preprocessing for Machine Learning
77	Feature Extraction and Selection for Biological Data
78	Classification Algorithms
79	Regression Algorithms
80	Clustering Algorithms
81	Model Evaluation Metrics
82	Model Validation Techniques
	R Programming for Data Analytics
84	Introduction to R Programming
85	R Environment and Tools
86	R Data Types
87	R Data Structures
88	Control Flow Statements
89	Functions in R
90	Importing Data into R
91	Exporting Data from R
92	Data Manipulation Techniques
	Tidyverse and Data Wrangling
94	Introduction to Tidyverse
95	Data Manipulation using dplyr
96	Data Cleaning using tidyr
97	Data Import using readr
98	Text Data Handling using stringr
99	Functional Programming using purrr
	Data Visualization with ggplot2

101	Introduction to Grammar of Graphics
102	Creating Basic Plots with ggplot2
103	Aesthetic Mappings
104	Faceting Techniques
105	Custom Themes and Styling
106	Visualization of Biological Data
	Biostatistics for Data Analytics
108	Introduction to Biostatistics
109	Descriptive Statistical Methods
110	Probability and Probability Distributions
111	Hypothesis Testing Methods
112	Correlation Analysis
113	Regression Analysis
114	Non-Parametric Statistical Tests
115	Experimental Design Principles
116	Statistical Analysis of Biological Data
	2 Project For Data Analytics