**Python for Bioinformatics**

**Module 1: Introduction to Python and Basic Programming**

Introduction, Variables, Data types, Expressions, Type conversion, Keywords, Operators, Input statement, Conditional statements, Loops

**Module 2: String Handling, Modular Programming, and Data Structures**

Introduction, Structure, Objectives, String basics in Python, accessing characters, String methods, Data structures, Lists, Dictionaries, Modular programming, Functions, Modules

**Module 3: File Handling and Object Oriented Concept**

Introduction, Accessing characters, String methods, working with directories, Object-oriented programming, Classes in Python, Inheritance, Polymorphism.

**Module 4: Basic Concept of Biopython Module**

install Biopython, Sequence object in Biopython, Sequence object operations, Mutable sequence, Sequence Record object, Sequence input-output module, Accessing sequences from FASTA and GenBank

**Module 5: Pattern Matching with Regular Expressions**

Importance of patterns in bioinformatics sequences, Searching for a pattern using regular expression, Character groups in regular expression, Quantifiers in regular expression, Positions in regular expression, Finding multiple matches in regular expression, String splitting using regular expression

**Module 6: Data Handling and Visualization in Bioinformatics**

Data handling, Data visualization, Working with NumPy, Working with Pandas, Working with Matplotlib, Bar plot, Histogram plot, Scatter plot, Working with ggplot.

**Module 7: Mini Projects on Bioinformatics**

Cluster analysis, Project code: Cluster analysis, Detailed description of the project, Drug discovery, Project code: Drug discovery, Detailed description of the project

**WHAT YOU WILL LEARN**

* Understand core Python programming concepts for data analysis.
* Manipulate and analyze biological data effectively using Python.
* Create and manage functions and modules in Python code.
* Visualize complex datasets to identify patterns and insights.
* Implement file-handling techniques for various data types.
* Apply programming skills to real-world bioinformatics projects.

**Reference Book:**

* 1. Shahnaz Verma, Parul Fatima. (2024). PYTHON FOR BIOINFORMATICS: using machine learning for drug discovery, cluster analysis, and phylogenetics (english edition). BPB PUBLICATIONS.
  2. Idris, I. (2014). Python data analysis: learn how to apply powerful data analysis techniques with popular open-source Python modules. Packt Pub. http://site.ebrary.com/id/10962285