

# Bioinformatics On Job Training ( Basic Module )



**SciFixia**

**Comprehensive Hands On Training in Bioinformatics**

*A practical approach to understanding biological data through  
Computational and statistical analysis.*

**Charges**

**4500/-**

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## **About Us**

SciFixia is a Pune-based learning hub offering **practical, industry-oriented training in Life Sciences and Information Technology**. We focus on **hands-on, on-job learning** using real data, real tools, and real-world problem solving.

Our certified programs help learners build strong **technical skills, analytical thinking, and industry readiness** through interactive and application-driven training.

At **SciFixia**, we are committed to making quality education accessible and preparing future-ready professionals for today's evolving industries.

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**Duration - 120 hrs = 2.5 Months (Mon to Fri)**

**Timing - 2 hrs/Day**

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## Why Choose SciFixia

### Real-time industry training :

- Learn practical skills aligned with current industry standards and research needs.

### Hands-on with real datasets :

- Work directly on real-world biological and genomic data.

### Genomics & computational biology focus :

- Specialized training designed for modern bioinformatics careers.

### Online sessions :

- Interactive live classes conducted.

### Certification with job-ready skills :

- Receive a recognized certificate with practical, career-focused expertise.

## **Module 1: Introduction to Biological data and Bioinformatics**

### **Theory :**

- 1.1 What is Bioinformatics?
- 1.2 Scope and Need of Bioinformatics
- 1.3 Biological Information Flow
- 1.4 Types of Biological Data

### **Practical :**

- P1: Familiarization with bioinformatics resources
  - P2: Exploring biological data types using public databases
  - P3: Identifying different data formats (FASTA, GenBank – introduction only)
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## **Module 2: Biological Databases & Data Formats**

### **Theory:**

- 2.1 Primary & secondary databases
- 2.2 Sequence, structure, pathway databases
- 2.3 Importance of standard file formats

### **Practical :**

- P1: Downloading nucleotide & protein sequences
  - P2: Understanding FASTA & FASTQ
  - P3: Annotation files (GFF/GTF)
  - P4: Alignment & variant formats (SAM/BAM, VCF)
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## **Module 3: Linux & Command Line for Data Analysis**

### **Theory :**

- 1.1 Introduction to Linux
- 1.2 Linux File System & Command-Line Basics
- 1.3 File Handling & Navigation
- 1.4 Permissions & Execution

### **Practical :**

- P1: Basic Linux Commands
  - P2: File Handling & Navigation
  - P3: Viewing & Searching Files
  - P4: File Compression & Permissions
  - P5: Executing Bioinformatics Tools on Linux
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## **Module 4 : Sequence Analysis**

### **4.1 Sequence Searching**

#### **Theory :**

- 4.1.1 Introduction to Sequence Similarity
- 4.1.2 BLAST Overview
- 4.1.3 BLAST Statistics & Output Interpretation

#### **Practical :**

- P1: Hands-on BLAST Analysis
- P2: Identifying Homologous Sequences
- P3: Interpreting BLAST Results

## **4.2 Pairwise Sequence Alignment**

### **Theory :**

- 4.2.1 What is pairwise sequence alignment
- 4.2.2 Global vs local alignment
- 4.2.3 Scoring matrices (basic concept)
- 4.2.4 Gaps and gap penalties
- 4.2.5 Introduction to EMBOSS tools

### **Practical :**

P1: Pairwise Alignment Using EMBOSS Needle

## **4.3 Multiple Sequence Alignment & Phylogenetics**

### **Theory :**

- 4.3.1 Multiple Sequence Alignment (MSA)
- 4.3.2 Phylogenetic Analysis

### **Practical :**

- P1: Performing Multiple Sequence Alignment
- P2: Conservation Analysis
- P3: Phylogenetic Tree Construction

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## **Module 5 : Next-Generation Sequencing Concepts**

### **Theory :**

- 5.1 Sequencing technologies
- 5.2 Short-read vs long-read platforms

5.3 Types of NGS data

5.4 NGS Data Generation, Quality & Interpretation Concepts

**Practical :**

P1: Exploring raw sequencing datasets

P2: Read structure understanding

P3: Overview of NGS analysis pipeline

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**Module 6: Protein Structure & Function Analysis**

**Theory :**

6.1 Basics of Protein Structure & Function

6.2 Levels of Protein Structure

6.3 Protein Function Prediction Concepts

**Practical :**

P1: Protein Sequence Retrieval & Overview

P2: Functional Annotation of Protein Sequences

P3: Domain & Motif Identification

P4: Secondary Structure Prediction

P5: Tertiary Structure Visualization & Interpretation

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**Module 7: Protein Interaction Network & Pathway Analysis**

**Theory :**

7.1 Introduction to Network Biology

7.2 Gene/Protein Selection for Network Analysis

7.3 Pathway Enrichment Analysis

**Practical :**

P1: Exploring STRING Database

P2: Single Protein Interaction Analysis

P3: Multiple Protein Network Analysis

P4 : Network Interpretation

P5: Exporting & Visualizing Networks

P6: Pathway Enrichment Analysis

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**Module 8 : Primer Designing**

**Theory :**

8.1 Introduction to PCR & Role of Primers

8.2 Primer Design Principles

8.3 Primer Design Strategy & Validation Concepts

**Practical :**

P1: Gene Sequence Retrieval from NCBI

P2: Primer Designing Using Online Tools

P3: In-Silico Primer Validation

P4: Primer Quality Analysis & Case Study

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## **Module 9 : Modern Drug Design**

### **Theory :**

9.1 Basics of Drug Design

9.2 Drug Targets – Simple Concepts

9.3 Ligands, Pharmacophores & Drug Properties

### **Practical :**

P1: Drug Target Identification Using Databases

P2: Drug Target Evaluation Using Protein Sequence

P3: Pharmacophore Identification Using PharmaGist

P4: Structure–Activity Relationship (SAR) Analysis Using Molecular Descriptors

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## **Module 10 : Chemoinformatics**

### **Theory :**

10.1 Introduction to Chemoinformatics

10.2 Importance of Chemoinformatics

10.3 Digital Representation of Chemical Molecules

10.4 SMILES and InChI

### **Practical :**

P1: Introduction to ChemSketch

P2: Drawing Simple Bioactive Molecules

P3: Generation of SMILES and InChI

P4: Chemical Format Conversion

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**Module 11 : Mini-Project**

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**Module 12 : Assessment**

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**Module 13 : PPT and Reports**

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<b>Module</b>	<b>Description</b>
Module 1	Introduction to Biological data and bioinformatics
Module 2	Biological Databases & Data Formats
Module 3	Linux & Command Line for Data Analysis
Module 4	Sequence Analysis
Module 5	Next-Generation Sequencing Concepts
Module 6	Protein Structure & Function Analysis
Module 7	Protein Interaction Network & Pathway Analysis
Module 8	Primer Designing
Module 9	Modern Drug Design
Module 10	Chemoinformatics
Module 11	Projects
Module 12	Assessment
Module 13	PPT, Reports

## **Outcomes of the OJT**

- Understand fundamental concepts of bioinformatics and different types of biological data.
- Gain practical exposure to databases, Linux commands, and sequence analysis tools.
- Learn basic concepts of NGS, protein structure analysis, and pathway studies.
- Get an introduction to primer designing, drug design, and chemoinformatics methods.
- Develop experience in mini-project work, report preparation, and PPT presentation skills.

## **Start Your Journey in Bioinformatics with SciFixia**

Enhance your knowledge. Build practical skills. Explore real biological data.

**Join SciFixia and take your first step towards a career in  
Bioinformatics and Computational Biology.**