12 SESSIONS, 8 EXERCISES, & 2 PROJECTS

- **Class 1 - Overview of the program, Bash & Linux setup**
- **Class 2 - Linux commands**
- **Class 3 - Linux commands/Bioinformatics analysis using Bash**
- **Class 4 - Bioinformatics analysis using Bash**
- **Class 5 - Overview of R**
- **Class 6 - Advanced R**
- **Class 7 - Introduction to Python (Variables and Data structures)**
- **Class 8 - Conditional statements and Loops**
- **Class 9 - Loops/ Functions & Methods**
- **Class 10 - Object-oriented programming**
- **Class 11 - Biopython**
- **Class 12 - Biopython/EDA**

RESEARCH AREAS

- **Prostate Cancer**
- **Breast Cancer**
- **Alzheimer's Disease**
- **Infectious Disease**
- **Autoimmune Disease**

PROJECT 1: TRANSCRIPTOMICS PROJECT

Linux & Bash: RNA-Seq Analysis.

PROJECT 2: GENOMICS PROJECT

Biopython: Functional annotation (Genome Annotation) using WGS from NCBI, and also Phylogenetic analysis.

Week	Date & Time	Topic	Areas Covered
Week 1	**Monday, 4th of November, 2024.** **3PM GMT - 5PM GMT.**	**Overview of the program, Bash & Linux setup.**	• **Overview of the program** • **Importance of Linux and Bash in Bioinformatics** • **Bioinformatics File Formats** • **Understanding Sequencing processes.**

			• Working with Bioinformatic Databases • Overview of RNA-seq • Windows Subsystem for Linux (WSL).
	Wednesday, 6th of November, 2024. 3PM GMT - 5PM GMT.	Linux commands.	• Key Linux Commands for Setup and Navigation • Bash Shortcuts & Variable commands • File and Directory Operations • IO Redirection and Piping • Setting Permissions and Managing Processes.
	Friday, 8th of November, 2024. 3PM GMT - 5PM GMT.	Linux commands/Bioinformatics analysis using Bash.	• Bash Scripting • Fetching Data from NCBI • Control structures in Bash • Git and GitHub with Bash.
Exercise 1 Exercise 2	Deadline Date: 12PM GMT, Friday, 8th of November, 2024. Deadline Date: 12PM GMT, Monday, 11th of November, 2024.	Exercise 1: Linux commands. Exercise 2: Bioinformatics analysis using Bash.	
Week 2	Monday, 11th of November, 2024. 3PM GMT - 5PM GMT.	Advanced Bioinformatics analysis using Bash.	• Installing Bioinformatics Softwares • RNA-Seq Analysis

			Pipeline • Automating Bioinformatics Workflows with Bash.
	Wednesday, 13th of November, 2024. 3PM GMT - 5PM GMT.	Overview of R.	• Introduction to R • R syntax and Data Types • R Scripting • Data Manipulation and Cleaning.
	Friday, 15th of November, 2024. 3PM GMT - 5PM GMT.	Advanced R.	• Bioconductor, R Packages and Libraries • Data Preprocessing with R • Normalization of RNA-Seq Data • Differential Gene Expression Analysis • Visualization of RNA-Seq Data.
Exercise 3 Exercise 4	Deadline Date: 12PM GMT, Friday, 15th of November, 2024. Deadline Date: 12PM GMT, Monday, 18th of November, 2024.	Exercise 3: Advanced Bioinformatics analysis using Bash. Exercise 4: Bioinformatics Analysis with R.	
Week 3	Monday, 18th of November, 2024. 3PM GMT - 5PM GMT.	Introduction to Python (Variables and Data structures).	• Python Variables • Python Data Types • Python Operators • Python Data Structures • String Manipulation Methods • Methods in Data Structures.
	Wednesday, 20th of November, 2024. 3PM GMT - 5PM GMT.	Conditional statements and Loops.	• If, elif, and else statements • Chained Conditional Statements

			• Conditional Statement Keywords • For Loops.
	Friday, 22nd of November, 2024. 3PM GMT - 5PM GMT.	Loops/ Functions & Methods.	• While Loops • Python Built-in Functions • User-defined Functions • Python Methods.
Exercise 5 **Exercise 6**	**Deadline Date:** 12PM GMT, Friday, 22nd of November, 2024. **Deadline Date:** 12PM GMT, Monday, 25th of November, 2024.	**Exercise 5:** Python Variables and Data structures, Conditional statements. **Exercise 6:** Python Loops, Functions & Methods.	
Week 4	Monday, 25th of November, 2024. 3PM GMT - 5PM GMT.	Object-oriented programming.	• Classes, Objects and Methods • Encapsulation • Inheritance • Object-Oriented Programming for bioinformatics tasks.
	Wednesday, 27th of November, 2024. 3PM GMT - 5PM GMT.	Biopython.	• Introduction to Biopython • Sequence Objects • Sequence Annotation Objects • Sequence Input/Output • Sequence Alignments • Pairwise Sequence Alignments • Multiple Sequence Alignment Objects • Pairwise Alignments Using pairwise2 • BLAST • BLAST and other Sequence Search

			Tools • **Accessing NCBI's Entrez Databases.**
	Friday, 29th of November, 2024. **3PM GMT - 5PM GMT.**	**Advanced Biopython/Exploratory Data Analysis using Python.**	• **Functional Annotation & Gene Ontology with Biopython** • **Phylogenetics with Bio.phylo** • **Exploratory Data Analysis & Preprocessing with Pandas** • **Data Visualization with matplotlib & Seaborn** • **Machine Learning in Genomics.**
Exercise 7 **Exercise 8**	**Deadline Date:** **12PM GMT, Friday, 29th of November, 2024.** **Deadline Date:** **Before certificate Collection, along with Presentation on Graduation Day.**	**Exercise 7:** **Object-oriented programming, Biopython.** **Exercise 8:** **Advanced Biopython/Exploratory Data Analysis using Python.**	