

Department of Biotechnology

Summer Internship Report

Internship Title: Computational Biology Internship

Duration: May 22 – May 31, 2023

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Internship Overview: The 10-day Computational Biology internship at Bversity provided an invaluable opportunity to delve into the intricate world of computational analysis in biological sciences. The program, spanning from May 22 to May 31, 2023, was meticulously structured to offer a comprehensive understanding of the applications of computational tools in modern biological research.

Day 1: Orientation and Introduction The internship commenced with a detailed orientation session, where the objectives, scope, and expectations of the program were outlined. We were introduced to the faculty members and fellow interns, fostering a collaborative environment right from the start. An overview of the field of computational biology, its significance, and real-world applications set the stage for an immersive learning experience.

Day 2-3: Fundamentals of Bioinformatics The initial days were dedicated to building a solid foundation in bioinformatics. We delved into the fundamentals of genomics, proteomics, and transcriptomics, understanding the structure and function of biological molecules. Practical sessions on tools such as BLAST, FASTA, and CLUSTALW provided hands-on experience in sequence alignment and analysis.

Day 4-5: Next-Generation Sequencing (NGS) Analysis As we progressed, the focus shifted to Next-Generation Sequencing (NGS) data analysis. Through workshops and guided tutorials, we learned about preprocessing raw sequencing data, quality control measures, and the analysis of differential gene expression. Using popular software packages like Bowtie, HISAT2, and DESeq2, we explored the nuances of NGS data interpretation.

Day 6-7: Structural Bioinformatics The internship then delved into the realm of structural bioinformatics, where we studied protein structure prediction, molecular docking, and protein-ligand interactions. Hands-on sessions using tools like PyMOL and Autodock broadened our understanding of molecular modeling and its applications in drug discovery and design.

Day 8-9: Systems Biology and Network Analysis In the latter part of the internship, the focus shifted towards Systems Biology and network analysis. We learned to construct biological networks, analyze signaling pathways, and interpret large-scale omics data. Utilizing software such as Cytoscape and STRING, we explored the interconnectedness of biological entities and their implications in disease mechanisms.

Day 10: Project Presentation and Conclusion The culmination of the internship was marked by a project presentation session. Each intern had the opportunity to showcase

their understanding and skills through a mini-project, applying the concepts learned throughout the program. It was a moment of pride and accomplishment as we presented our findings to faculty members and peers.

- Understanding the significance of computational tools in modern biological research.
- Proficiency in bioinformatics techniques such as sequence alignment, NGS analysis, and structural modeling.
- Interpretation of biological networks and pathways using systems biology approaches.
- Practical experience with industry-standard software and tools used in computational biology research.

