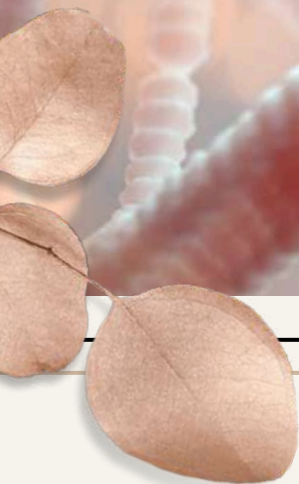




**Dr.Omics** Labs  
The Doctor of your DNA



# MASTERING NGS AND ADVANCED ANALYSIS

INDUSTRIAL BIOINFORMATICS

**3-MONTHS**

INTERNSHIP



# Your NGS Internship journey starts here

At Dr.Omics Labs, we're excited to offer you an opportunity to embark on an incredible journey of discovery and innovation in the field of Next-Generation Sequencing (NGS).



## *About Us*

Dr.Omics Labs is a leader in the field of bioinformatics and genomics research. We are committed to pushing the boundaries of scientific knowledge and fostering the next generation of bioinformatics experts.

## **The Internship Experience**

- Our Industrial Bioinformatics Long-term Internship program is designed to provide you with a comprehensive understanding of NGS technologies, data analysis, and their real-world applications.

## **Four Months Internship Program Highlights**

- Hands-on experience with Next-Generation Sequencing (NGS).
  - One month NGS project
  - Expert-led workshops and training.
  - Access to cutting-edge bioinformatics tools.
  - Networking opportunities.
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# Coursework Overview (Modules)

1. Beginners to Advanced Bioinformatics  
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  2. Python, Biopython and its Application in NGS  
Data Analysis Techniques  
—
  3. R and Introduction to Bioconductor  
—
  4. HR Session  
—
  5. DNA Sequencing (Variant calling),  
Annotation  
—
  6. One month project on NGS  
—
-

# Module 1: Beginners to Advanced Bioinformatics

- Introduction to Bioinformatics
- NCBI Database Overview
- Genbank Database Practical Exercises
- UCSC Genome Browser Overview
- UCSC Genome Browser Hands-on Exercises
- Pubmed Database Introduction
- Clinvar Database Overview
- KEGG Database Overview and Exercises
- Protein Databases Overview
- Protein Data Bank (PDB) Overview
- Online BLAST Introduction and Exercises
- Standalone BLAST Setup and Initial Exercises
- Standalone BLAST Advanced Exercises
- Multiple Sequence Alignment with ClustalW
- Multiple Sequence Alignment with MEGA



# Module 2: Python, Biopython and its Application in NGS Data Analysis Techniques

## 2.1) Python Programming

- Introduction to Python language
- Role of Programming in Bioinformatics
- Installation of Python on various platforms
- Installation of IDE
- Print function
- Comments
- User input
- Command line arguments
- Data types
- Variables and rules to create a variable
- In-built functions of python
- Slicing and indexing in String
- String and data formatting
- Control statements (if -else, If -elif-else, for loop, etc)
- Python data structure (List, Set, Tuple, etc)
- Methods of data structures
- Function introduction & its requirement
- Exception Handling, File Handling & Pandas Library



## 2.2) Biopython

- Introduction to Biopython
- Installation of Biopython
- Conversion of a string into a biological sequence
- Obtaining complement, reverse complement, transcribe, reverse transcribe, and translation from a sequence
- Finding GC content from a sequence
- SeqIO object:
- Reading various biological file formats such as Fasta and GenBank
- Analysis of fasta sequences
- Finding GC content of a fasta file containing multiple sequences and storing the data in a file
- Converting a GenBank file into fasta format
- Accessing NCBI's Entrez databases: Entrez Guidelines (EInfo, ESearch, etc)



# Module 3: R and Introduction to Bioconductor

## 3.1) R Programming

- Introduction to the R language
- Importance of R in Bioinformatics
- Installation of R
- Installation of IDE (R studio)
- Print, cut, and paste functions
- Comments
- Variables
- Data types
- Functions of math
- Operators
- Installation of packages
- String formatting
- Learning Control Statements (if -else, while loop, break, etc.)
- R Data Structures (Lists, Vectors, Arrays, etc)
- File Handling & User-Defined Functions



### 3.2) Introduction to Bioconductor

- Bioconductor package installation
- Sequence analysis
- Basics of seqinr package
- Import and export FASTA sequences
- Reverse complement
- GC content
- Retrieving genbank and fasta files from NCBI
- Statistical study for Analysis (z-test, t-test, etc)
- Plot generation for data visualization (box plot, PCA plot, Heatmap, Volcano Plot)

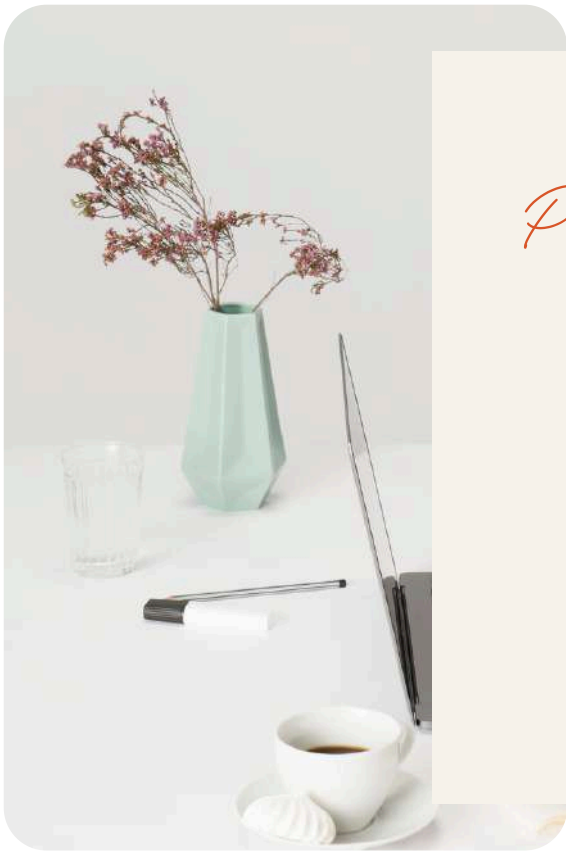




## Module 4: DNA Seq (Variant calling), Annotation

- Introduction and installation of tools
- Data retrieval & quality check of reads
- Mapping of reads using reference Genome
- Understanding Mapping Output
- Variant detection
- Visualization of variation
- Annotation and variant effect prediction
- Determining effect of coding non-synonymous mutation on protein function ability





## Program Structure

- Duration: 3 months
- Coursework: 2 months
- Project: 1 month

## From Theory to Practice: Bridging the Gap in Genomic Research

- **Comprehensive NGS Training:** Understand NGS fundamentals, data generation, and quality control.
  - **Bioinformatics Tools and Resources:** Master NGS analysis tools and explore essential genomic databases.
  - **Professional Development:** Enhance your resume and gain mentorship from experienced professionals
  - **Real-world Project:** Engage in variant calling, and functional annotation project.
  - **HR Session:** Gain invaluable HR expertise through interactive sessions.
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# Frequently Asked Questions

**Q: Are these courses suitable for those new to the field without prior experience?**

A: Yes, our courses are designed to cater to beginners with no prior experience in the field. We provide foundational content suitable for all skill levels.

**Q: Will I receive a certification upon completing the course?**

A: Absolutely, a digital certificate will be awarded upon course completion. You'll receive this certificate via email.

**Q: Do the courses include practical projects and research opportunities?**

A: Certainly, our courses incorporate practical projects and research opportunities to ensure hands-on learning and the practical application of acquired knowledge.

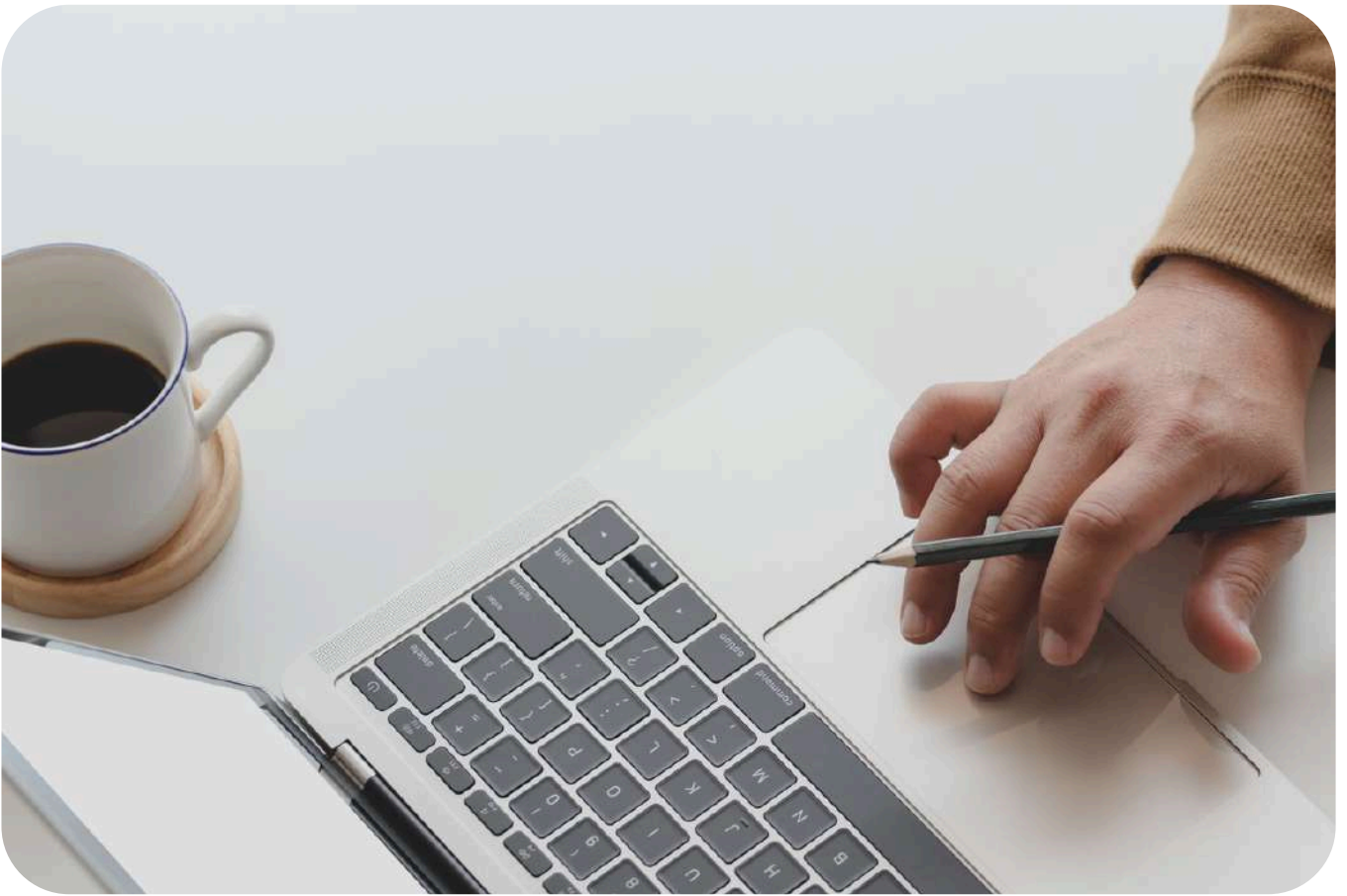
**Q: Can I access class recordings if I miss a class?**

A: Yes, class recordings are available. We'll send you the recording link via email if you miss a class, typically on the day following the live session.

**Q: Can I continue to access course materials and resources after finishing the course?**

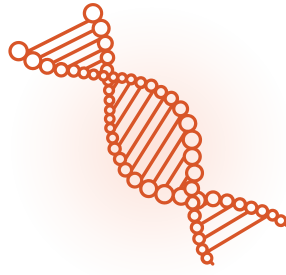
A: Absolutely, you'll retain access to course materials and resources even after completing the course. These materials will be shared with you via email or WhatsApp.

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## Terms and Conditions

- **Maintaining Discipline during the Tenure.**
  - **It is mandatory to maintain 85% attendance for all students.**
  - **Students must maintain an average 'A2' grade throughout their training period.**
  - **Project completion is a must for research.**
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*Thank you!*



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OUR CERTIFICATIONS & GRANTS

