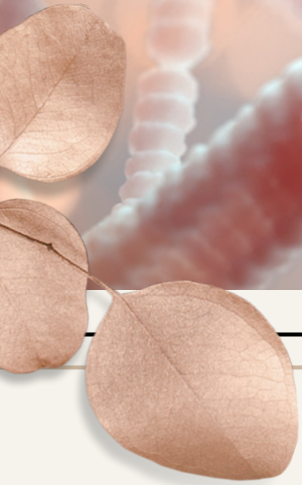
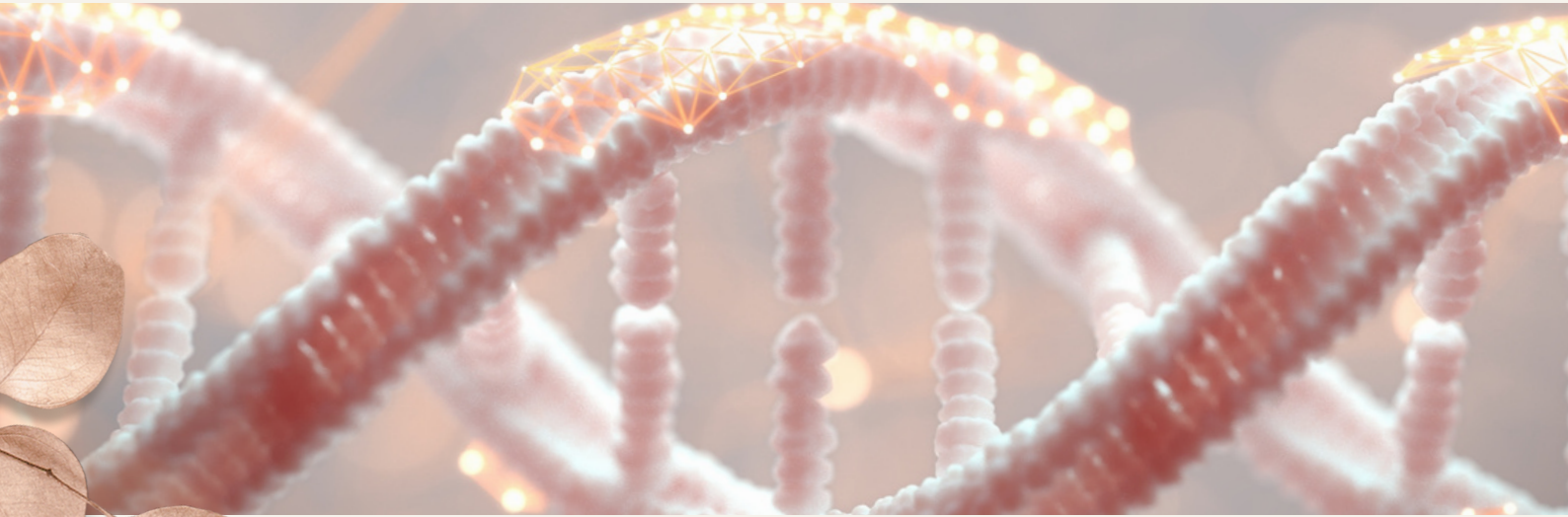




**Dr.Omics** Labs  
The Doctor of your DNA

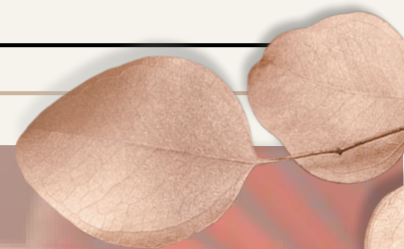
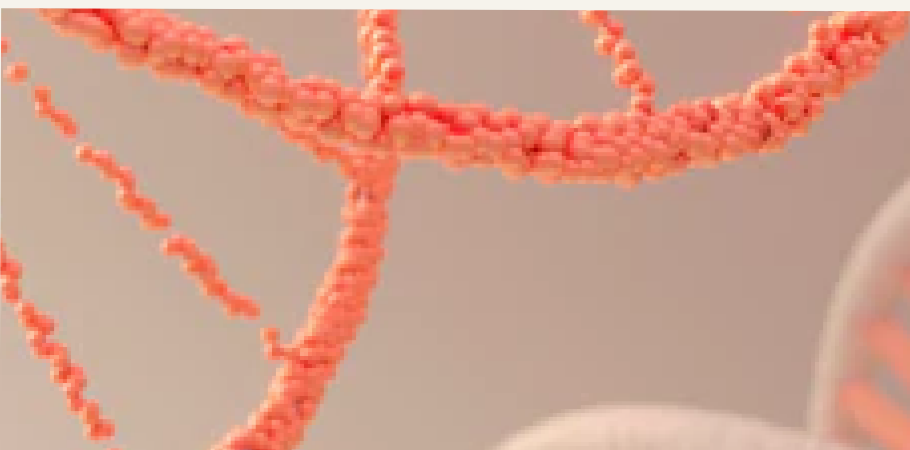


# MASTERING NGS AND ADVANCED ANALYSIS

INDUSTRIAL BIOINFORMATICS

**4-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).
  - Expert-led workshops and training.
  - One month NGS project
  - Access to cutting-edge bioinformatics tools.
  - Networking opportunities.
-



# Coursework Overview (Modules)

1. Basics of Bioinformatics & NGS  
—————
  2. Linux, & Cloud Computing  
—————
  3. Python, Biopython and its Application in NGS  
Data Analysis Techniques  
—————
  4. R and Introduction to Bioconductor  
—————
  5. DNA Sequencing (Variant calling),  
Annotation  
—————
  6. RNA Sequencing (Reference Based)  
—————
  7. HR Session  
—————
-

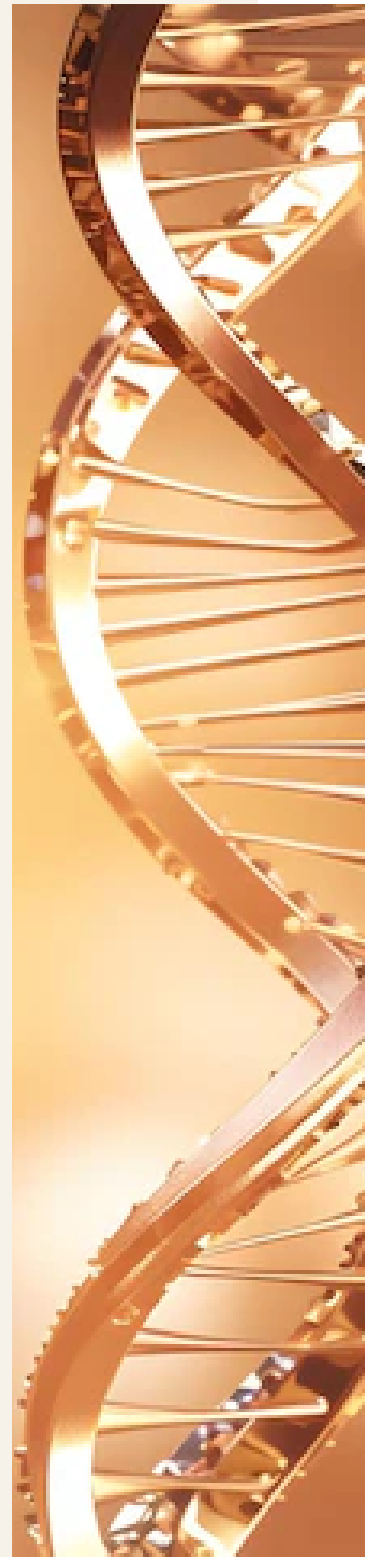
# Module 1: Basics of Bioinformatics & NGS

## 1.1) Basics Bioinformatics

- Defining & Understanding Bioinformatics
- Introduction to genomic bioinformatics
- Learning Databases (GenBank, PubMed, KEGG, Clinvar, UCSC, Uniprot, PDB )
- Understanding Bioinformatics Tools (BLAST, Stand-alone BLAST, Mega)
- Introduction to the Linux system
- Bridge the gap between biotechnology and bioinformatics

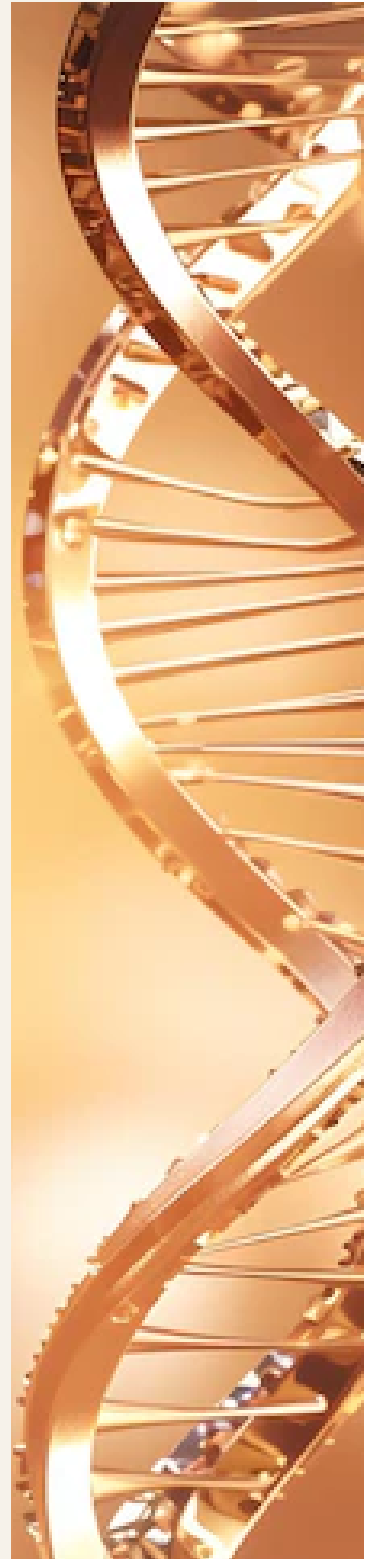
## 1.2) Next Generation Sequencing

- Role of Bioinformatics in NGS
- Introduction to Next-Generation Sequencing
- Introduction to types of NGS techniques
- NGS Applications
- NGS Platforms
- Understanding Data analysis techniques using NGS
- Scope of NGS



# Module 2: LINUX & Cloud Computing

- Linux overview and significance
- File and directory operations (create, copy, move, delete)
- Text file editing and creation
- Process management (introduction and termination)
- Basic networking and ownership overview
- Conclusion and further resources
- Basics of Cloud technology (AWS)
- Basics of Pipeline Engineering



# Module 3: Python, Biopython and its Application in NGS Data Analysis Techniques

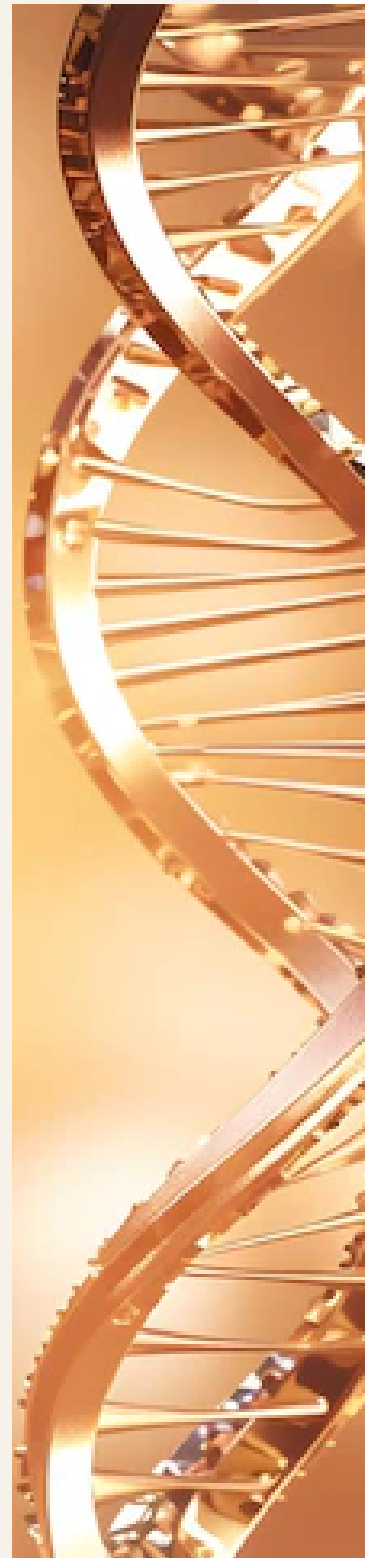
## 3.1) Python Programming

- 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



### 3.2) 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 4: R and Introduction to Bioconductor

## 4.1) R Programming

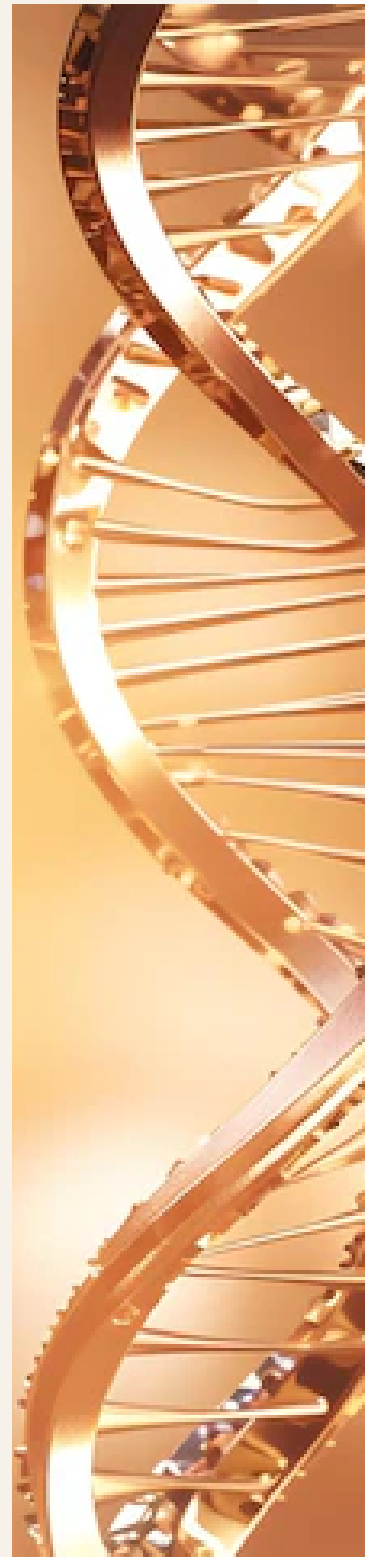
- Introduction to the R language
- Importance of R in Bioinformatics
- Installation of R
- Installation of IDE (R studio)
- Print, cut, and paste functions
- Comments
- Variables
- Data types
- Functions of math
- Operators
- Installation of packages
- String formatting
- Learning Control Statements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





## 4.2) 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 5: 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



# Module 6: RNA Sequencing (Reference Based)

## 5.1 Reference based

- Introduction to RNA Seq
- Necessary Tools installation
- Learn how Data Retrieval is done
- Quality Check of reads using FASTQC, FastP
- Trimming and cleaning of data using Cutadapt
- Understanding mapping of reads on reference genome and file formats (SAM, BAM) with Hisat2
- Visualization techniques
- Gene Expression Quantification & Analyzation
- Pathway & Gene ontology enrichment analysis using StringTie, DESeq2
- Pathway Network analysis using KEGG





## 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.
-

# 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.**
-



NEED MORE INSIGHT & SUPPORT?

# CONTACT US!

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*Thank you!*



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

OUR CERTIFICATIONS & GRANTS

