



Accelerated Genomic Discovery

4 MONTHS NGS RESEARCH INTENSIVE COURSE



YOUR GO TO

WITH DR.OMICS LABS

COMPREHENSIVE AND SPECIALIZED TRAINING

- **MODULES COVERING KEY AREAS OF COMPUTATIONAL RESEARCH.**
- **HIGHLY PROFESSIONAL COURSES FOR NEXT GENERATION SEQUENCING DATA ANALYSIS TECHNIQUES & PROGRAMMING FROM BASICS**



EXPOSURE

- **INDUSTRY PRACTICES AND INSIGHTS INTO THE COMMERCIAL ASPECTS OF BIOTECH RESEARCH**
- **AN INDUSTRIAL LEVEL COURSE DESIGN.**
- **COVERING EVERY TOPIC REQUIRED FOR BEING A BIOINFORMATICIAN & PROVIDING HANDS-ON PRACTICE DURING SESSION**



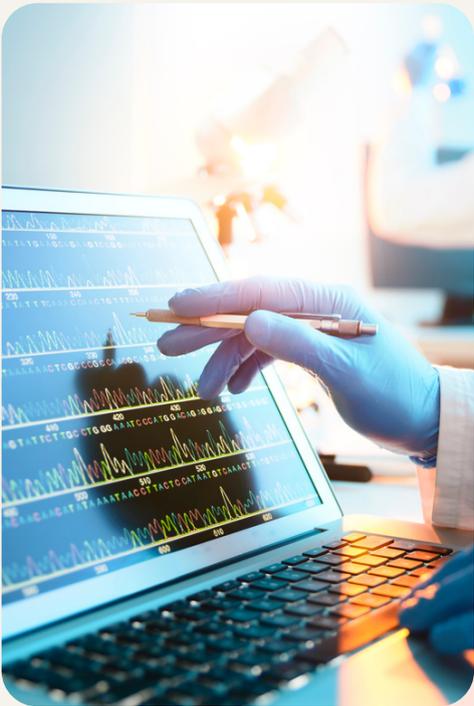
NETWORKING

- **CONNECT WITH PEERS, INDUSTRY PROFESSIONALS, AND POTENTIAL COLLABORATORS.**
- **A COLLABORATIVE AND INTERACTIVE LEARNING ENVIRONMENT THAT FOSTERS CREATIVITY AND INNOVATION.**



Next-Gen Sequencing Research Oriented Course

"Explore the forefront of genomics and bioinformatics with our NGS Research Oriented Course at Dr.Omics labs. Gain hands-on expertise in next-generation sequencing techniques and data analysis, propelling your career or research to new heights in the field of genomics."



Important tip

Study at your own pace with 24/7 access to course materials, allowing you to balance your studies with your other commitments.

- Understand the fundamental principles of NGS technologies.
 - Explore advanced sequencing methodologies and their applications.
 - Gain hands-on experience in data analysis and interpretation.
 - Critically evaluate current trends and challenges in NGS research.
 - Develop research skills for designing and implementing NGS experiments.
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Coursework Overview (Modules)

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

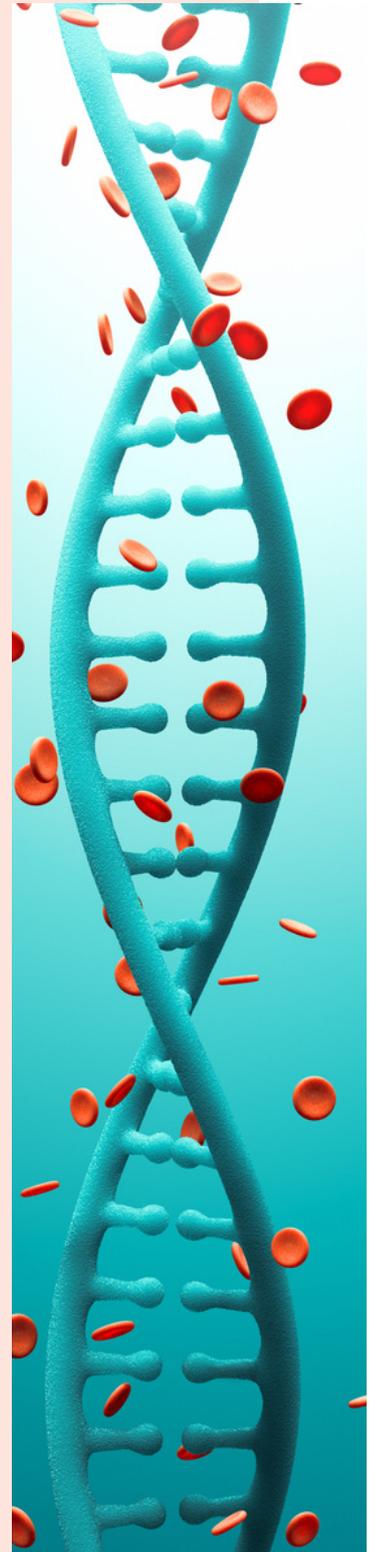
- Linux overview and significance
- File and directory operations (create, copy, move, delete)
- Text file editing and creation
- Process management (introduction and termination)
- Basic networking and ownership overview
- Conclusion and further resources
- Basics of Cloud technology (AWS)
- Basics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



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

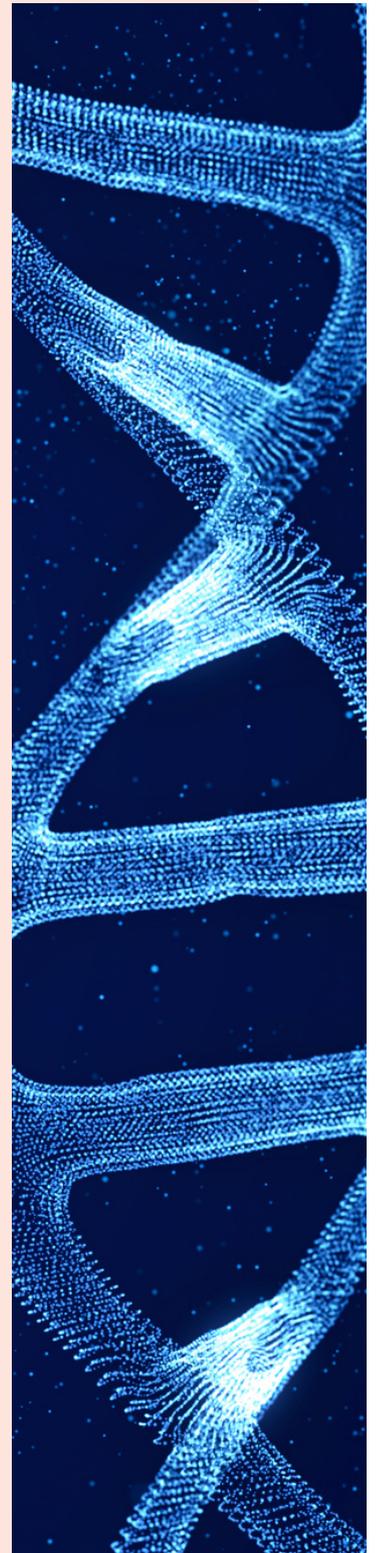
3.1) Python Programming

- 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)



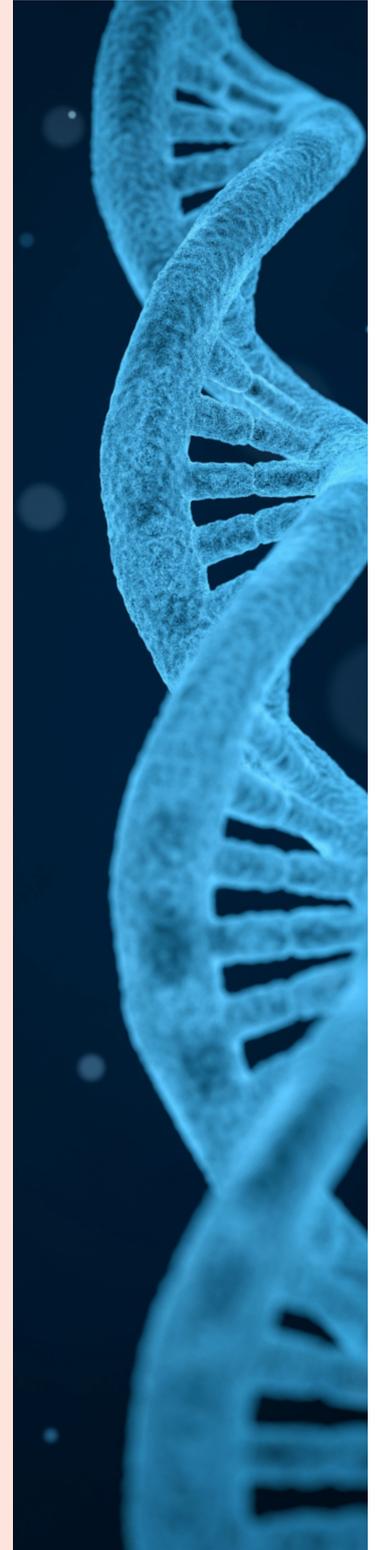
Module 5: RNA Sequencing (Reference and DeNovo based)

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

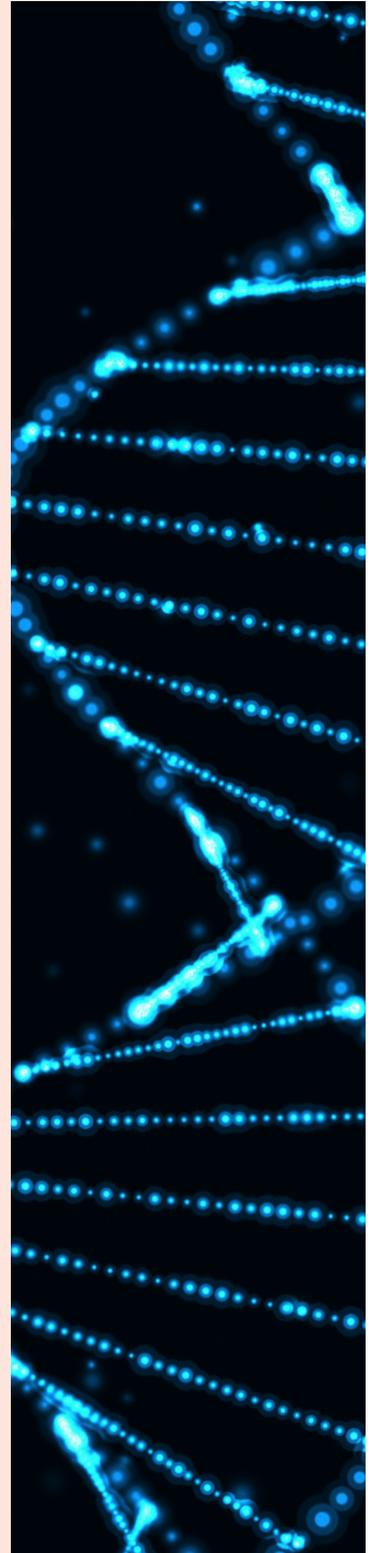
5.2 DeNovo based

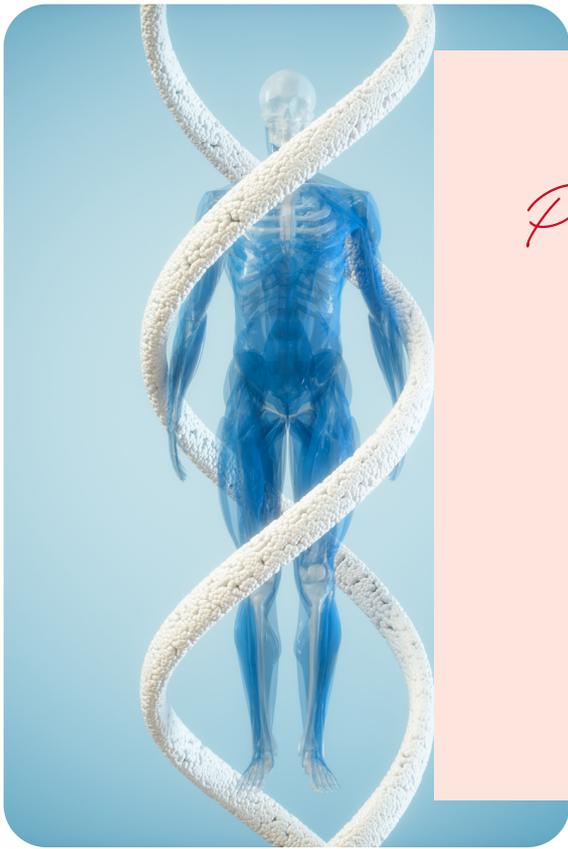
- Generation of transcriptomic assembly
- Statistical study of assembly
- Mapping and abundance calculation
- Visualization of mapped reads using Cytoscape
- Generate the count matrices for differential expression analysis



Module 6: 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: 4 months

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.
 - **Certification:** Upon successful completion, receive a prestigious NGS Research Course certificate.
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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.



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.**
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NEED MORE INSIGHT & SUPPORT?

CONTACT US!

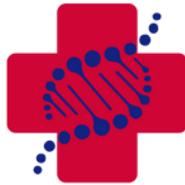
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Thank you!



Dr.Omics Labs
The Doctor of your DNA

OUR CERTIFICATIONS & GRANTS

