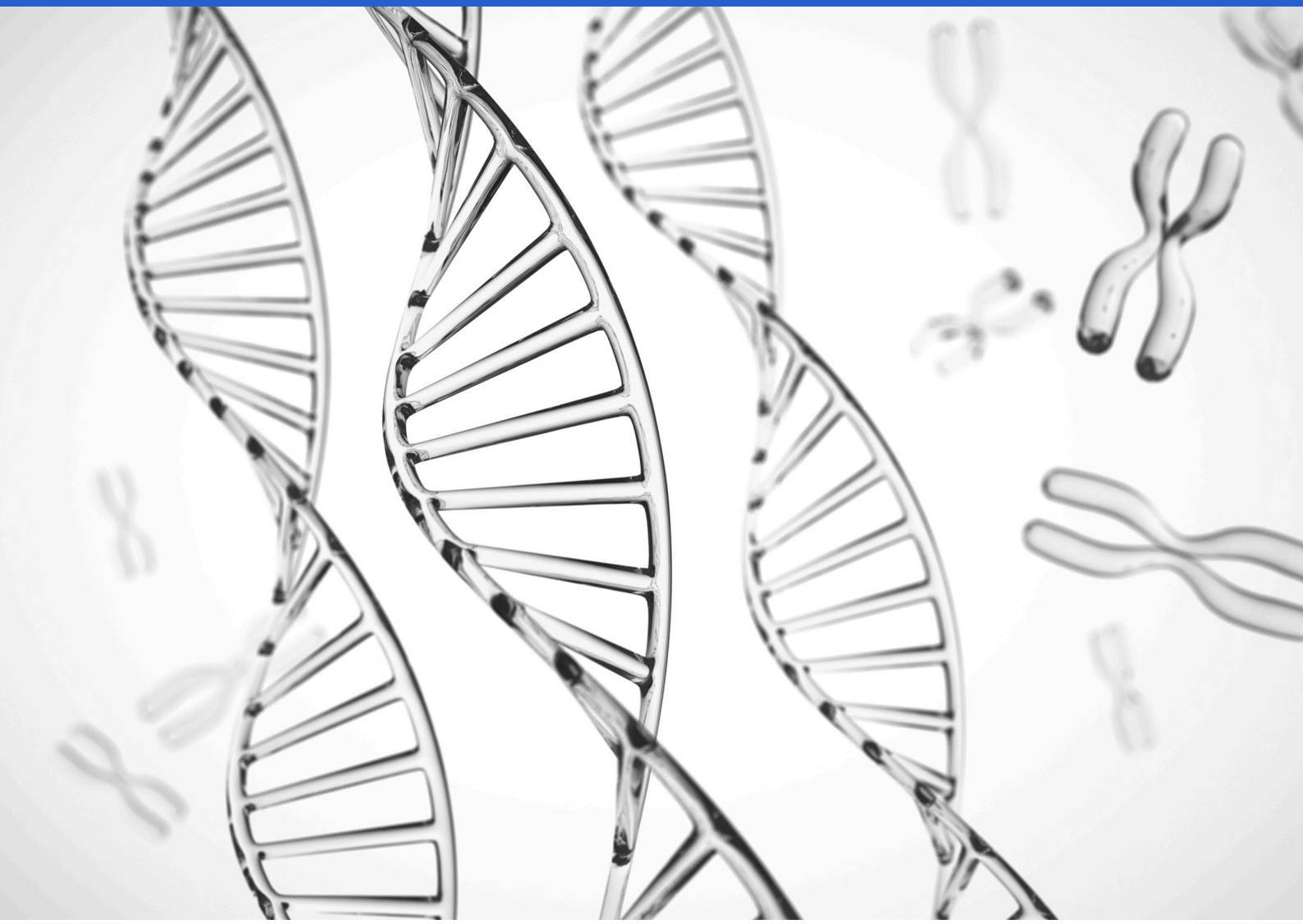
PRESENTED BY:
BDG LIFESCIENCES



BIOINFORMATICS

BASICS TO ADVANCED

10 DAY PROGRAM

EVERY DAY 120 MIN LIVE SESSION

WWW.BDGLIFESCIENCES.COM

INTRODUCTION

Ever wondered how scientists decode DNA, track viruses, design medicines, or even predict protein structures using artificial intelligence?
Bioinformatics is the powerful field where biology meets computers, data science, and AI. It is the technology behind genome sequencing, vaccine development, personalized medicine, and modern drug discovery.

This 10-Day “Basics to Advanced Bioinformatics” Program is designed especially for high school students who are:

- Curious about biotechnology, medicine, or AI
- Preparing for science fairs
- Interested in research for college applications
- Exploring future careers in biomedical sciences

In this program, students will not just learn theory — they will work with real scientific databases and professional tools used by researchers worldwide.

TRAINERS

The training programs at BDG Lifesciences are conducted by highly experienced resource persons with strong academic and research backgrounds in bioinformatics, computational biology, drug discovery, molecular modeling, genomics, and artificial intelligence applications in life sciences. Our trainers include research professionals and subject-matter experts who have worked on real-world research projects, guided students for science fairs and publications, and delivered advanced workshops internationally. With over a decade of experience mentoring students—from high school to postgraduate levels—our team focuses on building strong conceptual foundations while providing hands-on exposure to industry-standard tools and research methodologies. The teaching approach emphasizes clarity, structured progression, practical application, and personalized guidance to ensure students not only understand the concepts but also gain confidence in applying them independently.

OVERVIEW

This is an intensive 10-day program (120 minutes per session) that combines conceptual understanding with guided hands-on practice.

DAY 1 | FOUNDATIONS OF BIOINFORMATICS

Students are introduced to:

- What bioinformatics is and why it matters
- Real-world applications in medicine and research
- Major biological databases including:
  - NCBI
  - SWISSPROT
  - PDB
  - DDBJ
  - EMBL
  - CATH
  - SCOP(E)

Hands-on exploration helps students learn how scientists retrieve and interpret biological data.

DAY 2 | PROTEIN PRIMARY STRUCTURE ANALYSIS

Students learn how to analyze protein sequences using:

- ProtParam
- ProtScale
- TMHMM

They explore how proteins are structured and how scientists predict important characteristics from sequence data.

DAY 3 | PROTEIN INTERACTIONS & VISUALIZATION

Students perform:

- Protein-Protein Interaction analysis using STRING
- Protein structure visualization using RasMol and PyMOL

This introduces structural biology in an accessible and visual way.

DAY 4 | SEQUENCE ALIGNMENT & PRIMER DESIGN

Students learn:

- Pairwise sequence alignment using BLAST
- Basics of primer designing

These skills are fundamental in genetic research and laboratory experiments.

DAY 5 | MULTIPLE SEQUENCE ALIGNMENT & PHYLOGENETICS

Students work with:

- Clustal
- MEGA X

They construct and interpret phylogenetic trees to understand evolutionary relationships.

DAY 6 | GENOME BROWSING & CASE STUDY

Students explore:

- Genome browsing using NCBI MapViewer
- UCSC Genome Browser
- Case study analysis of SARS-CoV-2 genome

This connects computational tools with real-world biological problems.

DAY 7 | PROTEIN STRUCTURE PREDICTION & MUTATION ANALYSIS

Students use:

- Phyre2
- Template identification
- Domain analysis
- Mutation and sequence profile analysis

They begin understanding how mutations affect protein function.

DAY 8 | FUNCTIONAL ANNOTATION

Students perform InterProScan analysis to identify domains and functional regions within proteins.

DAY 9 | ALLOSTERIC ANALYSIS

Students explore AlloSigMA analysis to understand how structural changes affect protein function.

DAY 10 | AI-DRIVEN PROTEIN MODELING

tudents are introduced to:

- AI-driven homology modeling
- AlphaFold-based protein structure prediction

This session demonstrates how artificial intelligence is transforming modern biology.

FEE- $ 199 US

An investment that is minimal compared to the advanced scientific exposure, hands-on training, and research skills students will gain. At this accessible price point, it provides a powerful foundation for future academic success, science fair excellence, and long-term career development in medicine, biotechnology, and AI-driven life sciences.

NOTE-

- All live sessions will be conducted via Zoom.
- A concise summary of each session will be provided to participants for revision and reinforcement.
- The recording of each session will be shared for future reference and review.
- A Certificate of Completion will be awarded by BDG Lifesciences upon successful completion of the program.

BENEFITS OF THIS COURSE

REAL RESEARCH EXPOSURE

Students work with authentic scientific tools and databases used by researchers globally — not simplified simulations.

STRONG CONCEPTUAL FOUNDATION

They build deep understanding in:

- Molecular biology
- Protein structure
- Genomics
- Computational analysis

This prepares them for advanced STEM coursework.

SCIENCE FAIR & RESEARCH ADVANTAGE

Skills learned can be directly applied to:

- Biology research projects
- Computational biology investigations
- Independent science fair studies

COLLEGE APPLICATION DIFFERENTIATION

Participation demonstrates:

- Initiative beyond classroom curriculum
- Exposure to advanced biomedical tools
- Early engagement with research methodology

EARLY EXPOSURE TO AI IN LIFE SCIENCES

Students gain first-hand experience in how AI tools like AlphaFold are revolutionizing structural biology and drug discovery.

THIS 10-DAY PROGRAM SERVES AS A FOUNDATIONAL INTRODUCTION AS WELL AS A SCREENING/ENTRY PATHWAY FOR DEEPER 3–5 MONTH MENTORED RESEARCH PROGRAMS