PRESENTED BY:
BDG LIFESCIENCES

MOLECULAR BIOINFORMATICS & IN SILICO GENETIC ENGINEERING

10 DAY PROGRAM WITH CASE STUDIES

EVERY DAY 90 MIN LIVE SESSION

WWW.BDGLIFESCIENCES.COM

INTRODUCTION

How do scientists move from understanding DNA to designing genetic modifications and predicting protein structures — all using computers? Molecular Bioinformatics and In Silico Genetic Engineering represent the modern approach to studying and manipulating genes using computational tools before laboratory experimentation begins.

This 10-Day Program introduces high school students to the complete journey of molecular biology — from DNA sequences to protein structure prediction and genetic engineering strategies. Students will explore how researchers analyze genes, predict mutations, model proteins in 3D, and design genetic experiments digitally.

This program is ideal for students interested in:

- Genetics and molecular biology
- Biotechnology and biomedical engineering
- Gene editing and genetic research
- Science fair research projects
- Future careers in medicine and life sciences

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 structured 10-day program combines core molecular biology concepts with practical computational applications.

DAY 1 – DNA TO PROTEIN FOUNDATIONS

Students begin with:

- DNA structure and replication
- RNA transcription
- Protein translation and gene expression
- Retrieval of multiple nucleotide sequences
- ORF (Open Reading Frame) prediction

This builds the foundation for understanding gene structure and coding regions.

DAY 2 – GENE STRUCTURE & REGULATION

Students learn:

- Exon prediction
- Splice site prediction
- Promoter prediction

They understand how genes are organized and regulated within the genome.

DAY 3 – RNA & VARIATION ANALYSIS

Students perform:

- RNA sequence retrieval
- RNA structure prediction
- SNP (Single Nucleotide Polymorphism) analysis
- Protein sequence retrieval

This introduces genetic variation and its biological implications.

DAY 4 – PROTEIN STRUCTURE & FUNCTION

Students explore:

- Primary protein structure prediction
- Secondary structure prediction
- Functional domain analysis

They begin understanding how sequence determines structure and function.

DAY 5 – 3D MODELLING & MUTAGENESIS

Students perform:

- Homology modeling (3D protein structure prediction)
- Protein mutagenesis analysis

This introduces structural bioinformatics and mutation impact studies.

DAY 6 – STRUCTURAL & EXPERIMENTAL DESIGN TOOLS

Students learn:

- Protein structure analysis
- Primer designing

These skills connect computational analysis to experimental planning.

DAY 7 – GENETIC ENGINEERING TOOLS

Students explore:

- Restriction mapping
- Gene silencing strategies
- SNP analysis (advanced interpretation)

This introduces core concepts used in genetic manipulation.

DAYS 8–10 – CASE STUDIES

Students apply all learned concepts through:

- Three structured gene-based case studies
- Complete computational workflow from sequence to structural and functional interpretation

This ensures practical application of the entire learning process.

FEE- $ 172 US

For this small fee, students gain hands-on exposure to molecular bioinformatics and in silico genetic engineering techniques that introduce university-level research concepts at an early stage. Compared to the long-term academic advantage and strong research foundation it builds, this investment is minimal while offering significant value for students aspiring to pursue careers in genetics, biotechnology, or biomedical research.

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

DEEP UNDERSTANDING OF MOLECULAR BIOLOGY

Students move beyond textbook learning and understand how genes and proteins are analyzed in real research settings.

REAL COMPUTATIONAL RESEARCH EXPOSURE

They gain hands-on experience in:

- Gene structure analysis
- Mutation studies
- Protein modeling
- Genetic engineering planning

These are university-level research skills introduced early.

SCIENCE FAIR & RESEARCH ADVANTAGE

Students can apply these tools to:

- Mutation-based disease studies
- Gene function analysis projects
- Protein structure investigations

This significantly strengthens science fair competitiveness.

COLLEGE APPLICATION DIFFERENTIATION

Participation demonstrates:

- Advanced academic initiative
- Exposure to bioinformatics and genetic engineering
- Readiness for rigorous STEM pathways

FOUNDATION FOR ADVANCED RESEARCH PROGRAMS

This program serves as:

- A stepping stone to CRISPR and gene editing research
- Preparation for mentored bioinformatics projects
- A strong base for biotechnology and medical careers