Adyapan School

# Molecular Biology

**Duration - 2 months**

**Industry** Certification

Skill India Certified

**250+** Partner Companies

Adyapan School

# From genes to function Master molecular biology.

From cells to molecular mechanisms - become industry-ready.

This immersive program builds a rigorous, progressive understanding of molecular biology- from foundational cell structure through advanced techniques used in modern research and industry. Learners move from core theory into practical laboratory skills, culminating in a capstone project applying genetic engineering, qPCR, or protein analysis to a real biological question.

| 8 | 30+ | 20,000+ |
|---|---|---|
| MODULES | PROGRAM OFFERINGS | STUDENTS |

250+ PARTNERED COMPANIES

Biocon Dr.Reddy

adyapanschool.com

# Adyapan School

ABOUT ADYAPAN SCHOOLS

## Where education meets real-world impact

**Not just a course — a platform to launch your career.**

Adyapan Schools was built with a single conviction: learning works best when it happens in the real world. We partner with top companies, mentors, and industry platforms to ensure every student graduates with a portfolio of work that speaks louder than a certificate.

Our programs combine rigorous coursework with live client projects, giving you the skills and proof-of-work that employers actually want.

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### MISSION

To equip ambitious learners with practitioner-level digital marketing skills through mentor-led, project-based education that bridges the gap between learning and earning.

### VISION

To be India's most trusted launchpad for the next generation of marketing leaders — defined not by degrees but by the real work.

# Adyapan School

## Everything you need to grow fast

PROGRAM HIGHLIGHTS

### Live Industry Projects

Work on campaigns for real brands alongside your coursework. Build portfolio projects that prove your expertise to employers.

### 1-on-1 Mentorship

Dedicated mentors from Google, Microsoft, Mastercard and more. Get personalized guidance and industry connections.

### AI-Powered Marketing

Learn cutting-edge AI tools alongside evergreen fundamentals. Stay ahead of the curve in a rapidly evolving landscape.

### Dual Certification

Earn both a Course Completion and Internship Certificate — accredited by Skill India Digital Hub and NSDC.

### Internship Guarantee

Graduate with an internship completion certificate from a live brand project. Concrete, resume-ready proof of work.

### Industry Network

Join a network of alumni at Amazon, Google, Adobe, Microsoft. Access exclusive hiring events and referral opportunities.

# Adyapan School

CURRICULUM

# 8 weeks. 8 modules. Infinite impact.

WEEK 1

## Foundations of Cell Biology

- Discussion of curriculum
- Cellular structure and organelle function in prokaryotic and eukaryotic cells, with comparative analysis across cell types
- Membrane transport mechanisms: passive diffusion, active transport, endocytosis, and exocytosis
- Cell signaling and communication: receptor types, signal transduction cascades, and second messenger systems
- Introduction to the cell cycle: phases, checkpoints, and the regulatory proteins that govern progression

WEEK 2

## Cell Metabolism, Death & Biomolecules

- Cellular metabolism: glycolysis, the citric acid cycle, oxidative phosphorylation, and energy coupling
- Cell cycle control mechanisms, tumor suppressors, and the molecular basis of programmed cell death (apoptosis)
- DNA structure and function: nucleotide chemistry, double helix architecture, and chromatin organization
- RNA and protein structure: types of RNA, primary through quaternary protein structure, and the chemical properties that define each biomolecule class

WEEK 3

## The Central Dogma of Molecular Biology

- The concept of genetic material: historical experiments (Griffith, Avery, Hershey-Chase) and the evidence that DNA carries hereditary information
- Central Dogma overview: the directional relationship between replication, transcription, and translation
- Regulatory layers that modify gene expression before, during, and after each step of the central dogma
- Introduction to non-coding RNAs (miRNA, siRNA, lncRNA) and their roles in gene regulation

CURRICULUM

# 8 weeks. 8 modules. Infinite impact.

WEEK 4

## DNA Replication & Genome Integrity

- DNA replication machinery in prokaryotes: origins of replication, helicase, primase, DNA polymerase III, and ligase
- Eukaryotic replication: multiple origins, the replisome complex, telomere maintenance, and the role of histones
- Types of DNA damage: spontaneous mutations, base modifications, strand breaks, and environmental mutagens
- Mutagenesis and DNA repair pathways: base excision repair, nucleotide excision repair, mismatch repair, and double-strand break repair

WEEK 5

## Transcription & RNA Processing

- Transcription in prokaryotes: RNA polymerase structure, sigma factors, promoter recognition, elongation, and termination
- Transcription in eukaryotes: RNA polymerases I, II, and III, transcription factors, enhancers, and silencers
- Post-transcriptional modifications in eukaryotes: 5' capping, 3' polyadenylation, and pre-mRNA splicing by the spliceosome
- Alternative splicing, RNA editing, and their contributions to proteome diversity

WEEK 6

## Translation & Gene Regulation

- Translation in prokaryotes and eukaryotes: ribosome structure, initiation complexes, elongation, translocation, and termination
- Post-translational modifications: phosphorylation, glycosylation, ubiquitination, and protein folding with chaperones
- Gene control in prokaryotes: the lac operon and trp operon as models of inducible and repressible transcription regulation
- Eukaryotic gene regulation: chromatin remodeling, histone modification, DNA methylation, and transcription factor networks

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CURRICULUM

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WEEK 7

## Core Molecular Techniques

- Blotting techniques: Southern blotting for DNA detection, Northern blotting for RNA analysis, and Western blotting for protein identification
- Polymerase chain reaction (PCR): principles, primer design, thermocycling parameters, gel electrophoresis, and troubleshooting
- Real-time quantitative PCR (qPCR): SYBR Green vs. TaqMan chemistry, relative vs. absolute quantification, and data normalization using reference genes
- ELISA, immunofluorescence, and immunoprecipitation: antibody-based detection principles and their applications in research and diagnostics


WEEK 8

## Advanced Applications

- CRISPR-Cas9 and next-generation gene-editing tools: mechanism of action, guide RNA design, delivery methods, and therapeutic applications
- Computational genomics and proteomics: sequence alignment, BLAST, primer design tools, and bioinformatics pipelines for analyzing next-generation sequencing data
- Cellular signaling pathways in disease: MAPK, PI3K-Akt, and Wnt pathways, the role of oncogenes and tumor suppressors, and epigenetic dysregulation in cancer
- Capstone project

# Adyapan School

WHO THIS IS FOR

## This course is perfect for

- Students & Career Switchers
- Aspiring Molecular Biologists & Research Scientists
- Biotechnology, Microbiology & Biochemistry Students
- Researchers & Lab Professionals (Genetics & Cellular Studies)
- Bioinformatics & Genomics Enthusiasts
- Healthcare, Drug Discovery & Biomedical Research Aspirants

CERTIFICATIONS


ALUMNI NETWORK

## Our alumni work at world-class companies

Amazon | Adobe | Google | Autodesk | Microsoft | Deloitte

### Your career switch is one click away.

Ready to begin? Apply at adyapanschool.com or email us at support@adyapan.com

Apply Now