Adyapan School

Bioinformatics Algorithms

Duration - 2 months

Industry Certification

Skill India Certified

250+ Partner Companies

Adyapan School

Powering modern Bioinformatics.

From sequences to scalable solutions - become industry-ready.

This immersive Bioinformatics Algorithms program takes you beyond foundational concepts into real-world computational biology challenges. Learn sequence alignment algorithms, dynamic programming, graph-based methods, and genome assembly techniques through hands-on problem-solving and guided implementations. With a strong focus on algorithmic thinking and performance optimization, you'll graduate with the ability to design efficient solutions, analyze biological data at scale, and contribute to advanced research and industry applications in bioinformatics.

8	30+	20,000+
WEEKS	PROGRAMS OFFERED	STUDENTS

250+ PARTNERED COMPANIES

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.

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 Biological Computing & Algorithm Design

- Discussion of curriculum
- Understand the role of algorithms in solving core biological problems
- Review essential mathematics for bioinformatics
- Study algorithmic complexity
- Understand the difference between exact algorithms, heuristic methods, and approximation algorithms in biology
- Set up your coding environment
- Explore the Bioinformatics Algorithms

WEEK 2

String Algorithms & Pattern Matching

- Understand the biological motivation for string algorithms
- Implement brute-force pattern matching and analyse its limitations on large genomic sequences
- Study the Knuth-Morris-Pratt (KMP) algorithm
- Implement the Boyer-Moore algorithm and understand the bad character and good suffix heuristics
- Introduction to suffix arrays and suffix trees
- Solve frequent words, clump finding, and approximate pattern matching problems on real genomic data

WEEK 3

Dynamic Programming in Sequence Analysis

- Understand dynamic programming (DP) principles
- Implement the Needleman-Wunsch algorithm for global pairwise sequence alignment from scratch
- Implement the Smith-Waterman algorithm for local alignment
- Study the longest common subsequence (LCS) problem and its relationship to sequence alignment scoring
- Implement sequence alignment with linear space using Hirschberg's divide-and-conquer algorithm
- Apply DP to RNA secondary structure prediction

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WEEK 4

Graph Algorithms & Genome Assembly

- Understand graph representations in bioinformatics
- Study Eulerian paths and Hamiltonian paths
- Implement de Bruijn graph construction and understand how it models sequencing read overlap
- Study the Overlap-Layout-Consensus (OLC) assembly approach
- Implement contig assembly from de Bruijn graphs and handle repeat-induced complexity and dead ends
- Explore real assembly tools and connect their logic back to the graph algorithms implemented

WEEK 5

Probabilistic Models & Motif Finding

- Understand the biological importance of motif finding
- Implement the Greedy Motif Search algorithm and analyse its limitations in finding optimal solutions
- Study randomised algorithms
- Implement the Gibbs Sampler algorithm for motif discovery and understand its convergence behaviour
- Introduction to Hidden Markov Models (HMMs)
- Apply HMMs to CpG island detection, gene finding, and profile HMMs for multiple sequence alignment

WEEK 6

Clustering Algorithms & Comparative Genomics

- Understand the role of clustering in genomics
- Implement k-means clustering from scratch and apply it to simulated gene expression datasets
- Study hierarchical clustering
- Introduction to the Farthest First Traversal and k-centre clustering problem for genomic applications
- Implement the Lloyd algorithm for soft k-means clustering using expectation-maximisation (EM)
- Study genome rearrangement algorithms

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CURRICULUM

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WEEK 7

Phylogenetic Algorithms & Sequence Evolution

- Understand models of molecular evolution
- Implement distance-based phylogenetic tree construction
- Study the four-point condition for additive trees and implement the algorithm for tree topology testing
- Implement maximum parsimony using the Fitch algorithm for small character-based phylogenetic datasets
- Introduction to maximum likelihood phylogenetics
- Understand bootstrapping in phylogenetics and implement a basic bootstrap confidence estimation workflow

WEEK 8

Capstone Algorithms Project & Competitive Problem Solving

- Integrate all algorithmic concepts into a comprehensive end-to-end bioinformatics pipeline of your choice
- Choose a project track
- Implement benchmarking and unit testing for your algorithms using Python's unittest and timeit modules
- Study space and time optimisation strategies for scaling algorithms to chromosome and whole-genome level data
- Present and document your project with clear algorithmic explanations, complexity analysis, and biological interpretation of results

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WHO THIS IS FOR

This course is perfect for

- Students & Career Switchers
- Aspiring Bioinformatics Professionals
- Researchers Working with Genomic & Sequence Data
- AI, Data Science & Computational Genomics Enthusiasts
- Life Science Students Learning Algorithmic Approaches
- Researchers & Lab Professionals

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