Evolutionary Design Algorithms Training Course

Professional Development Training Course Outline

Category	Architectural Engineering	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Evolutionary Design Algorithms Training Course is focused on advanced computational intelligence techniques inspired by biological evolution. It explores how Evolutionary Design Algorithms are transforming modern engineering, AI-driven optimization, generative design, and complex system modeling. Participants will gain hands-on expertise in genetic algorithms, evolutionary strategies, swarm intelligence, multi-objective optimization, and adaptive design systems used across aerospace, architecture, robotics, data science, and industrial automation.

In today’s era of AI-driven innovation, generative engineering, and smart optimization systems, evolutionary design methods are becoming a cornerstone of next-generation computational problem-solving. This training equips learners with practical and theoretical mastery of bio-inspired algorithms, machine learning integration, heuristic optimization, and autonomous design evolution frameworks, enabling them to build scalable, efficient, and adaptive solutions for real-world engineering and digital transformation challenges.

Programme Curriculum

Evolutionary Design Algorithms Training Course

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5 days

Course Objectives

1. Master Evolutionary Computation & Genetic Algorithms
2. Apply Bio-Inspired Optimization Techniques
3. Design Adaptive Generative Systems
4. Develop Multi-Objective Optimization Models
5. Implement Swarm Intelligence Algorithms
6. Understand Fitness Function Engineering
7. Build Self-Evolving Design Systems
8. Integrate Machine Learning with Evolutionary Algorithms
9. Optimize Complex Engineering Design Problems
10. Use Heuristic Search & Stochastic Optimization
11. Apply Industrial AI Optimization Frameworks
12. Develop Autonomous Decision-Making Models
13. Execute Real-Time Evolutionary Simulation Systems

Target Audience

1. AI & Machine Learning Engineers
2. Data Scientists & Analysts
3. Mechanical & Industrial Engineers
4. Software Developers & Algorithm Designers
5. Robotics Engineers
6. Research Scientists & Academics
7. Product Design & Innovation Specialists
8. Graduate Students in Computational Engineering

Course Modules

Module 1: Foundations of Evolutionary Computation

- Introduction to evolutionary principles
- Biological inspiration in computing
- Search space exploration concepts
- Fitness landscape analysis
- Evolutionary cycle mechanics
- **Case Study:** Optimization of aerodynamic car body design using genetic algorithms

Module 2: Genetic Algorithms (GA)

- Chromosome encoding techniques
- Selection, crossover, mutation strategies

- Fitness evaluation methods
- Constraint handling in GA
- Parameter tuning techniques
- **Case Study:** Scheduling optimization in manufacturing systems

Module 3: Evolutionary Strategies (ES)

- Continuous optimization models
- Self-adaptive mutation control
- Recombination strategies
- Covariance matrix adaptation
- Performance benchmarking
- **Case Study:** Structural optimization of high-rise buildings

Module 4: Swarm Intelligence Systems

- Particle Swarm Optimization (PSO)
- Ant Colony Optimization (ACO)
- Collective behavior modeling
- Distributed intelligence systems
- Swarm convergence analysis
- **Case Study:** Network routing optimization in telecom systems

Module 5: Multi-Objective Optimization

- Pareto optimality concepts
- Trade-off analysis methods
- Non-dominated sorting techniques
- Constraint balancing
- Decision front visualization
- **Case Study:** Aircraft wing design balancing fuel efficiency and lift

Module 6: Hybrid Evolutionary Algorithms

- Combining GA, PSO, ES techniques
- Hybrid architecture design
- Performance enhancement strategies
- Algorithm fusion methods
- Adaptive hybrid tuning
- **Case Study:** Smart energy grid load balancing optimization

Module 7: AI Integration in Evolutionary Design

- Machine learning-assisted evolution
- Deep learning + evolutionary synergy
- Reinforcement learning integration
- Data-driven fitness functions
- Predictive optimization models
- **Case Study:** AI-driven robotic arm movement optimization

Module 8: Industrial Applications & Generative Design

- CAD-integrated evolutionary systems
- Generative design automation
- Industrial simulation tools
- Real-time adaptive optimization
- Deployment in enterprise systems
- **Case Study:** Generative architecture design for sustainable smart cities

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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