Digital Form-Finding Techniques 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

Digital Form-Finding Techniques represent a cutting-edge intersection of computational design, parametric architecture, and generative engineering, enabling designers and engineers to evolve complex geometries through algorithm-driven processes rather than manual drafting. Digital Form-Finding Techniques Training Course introduces participants to advanced methodologies such as tensile structure optimization, mesh relaxation, physics-based simulation, and AI-driven generative form-finding, equipping them with the skills to design highly efficient, structurally responsive, and aesthetically innovative architectural systems. The course integrates tools like Grasshopper, Rhino, Kangaroo Physics, and Karamba3D, making it highly relevant to modern BIM-integrated design workflows and smart construction ecosystems.

In today's fast-evolving built environment, computational form-finding, sustainable structural optimization, and digital fabrication readiness are critical skills for architects, engineers, and designers. This course bridges theoretical principles with hands-on applications, enabling participants to transform conceptual sketches into optimized structural forms using parametric modeling, evolutionary algorithms, and real-time simulation tools. By the end of the training, learners will be capable of generating performance-driven architectural systems aligned with green building standards, smart cities development, and advanced digital construction technologies.

Programme Curriculum

Digital Form-Finding Techniques Training Course

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Course Duration

5 days

Course Objectives

1. Master parametric design workflows for architectural form generation
2. Apply computational form-finding algorithms in real-world projects
3. Understand structural optimization and topology optimization techniques
4. Develop skills in physics-based simulation (Kangaroo, FEA tools)
5. Integrate Grasshopper scripting for generative design solutions
6. Explore AI-assisted generative architecture and machine learning design tools
7. Implement tensile and shell structure modeling techniques
8. Optimize geometry using digital fabrication constraints and BIM integration
9. Analyze performance through structural and environmental simulation tools
10. Design sustainable systems using eco-parametric design strategies
11. Translate conceptual ideas into algorithm-driven architectural systems
12. Enhance workflow efficiency using computational design automation
13. Prepare for industry demands in smart construction and digital engineering ecosystems

Target Audience

1. Architects and architectural designers
2. Structural and civil engineers
3. Computational design specialists
4. Urban planners and landscape architects
5. BIM managers and CAD technicians
6. Architecture students and postgraduate researchers
7. Digital fabrication and 3D printing professionals
8. Construction technology consultants and innovators

Course Modules

Module 1: Fundamentals of Digital Form-Finding

- Introduction to form-finding theory
- Historical evolution of structural geometry

- Basics of computational design thinking
- Overview of parametric modeling
- Tools: Rhino + Grasshopper basics
- **Case Study:** Frei Otto’s tensile membrane structures (Olympic Stadium roof systems)

Module 2: Parametric Design Systems

- Node-based parametric workflows
- Rule-based geometry generation
- Data-driven design logic
- Adaptive form manipulation
- Real-time parametric adjustments
- **Case Study:** Zaha Hadid Architects’ parametric façade systems

Module 3: Physics-Based Simulation

- Kangaroo Physics fundamentals
- Force simulation and mesh relaxation
- Structural equilibrium modeling
- Real-time deformation studies
- Material behavior simulation
- **Case Study:** ICD/ITKE Research Pavilion (University of Stuttgart)

Module 4: Structural Optimization & Topology Design

- Load path optimization techniques
- Topology optimization algorithms
- Lightweight structure design
- Stress distribution mapping
- Performance-driven geometry
- **Case Study:** Airbus lightweight aerospace structural components

Module 5: AI & Generative Design in Architecture

- Machine learning in design generation
- Evolutionary algorithms
- Design space exploration
- Constraint-based AI modeling
- Automated form iteration systems
- **Case Study:** Autodesk Generative Design in automotive chassis development

Module 6: Digital Fabrication Integration

- CNC, laser cutting, and 3D printing workflows
- Fabrication-aware design constraints
- Material optimization strategies
- Assembly logic and modular design
- Prototyping for construction
- **Case Study:** ICD Pavilion robotic fabrication systems

Module 7: Environmental & Performance Simulation

- Solar analysis and daylighting optimization
- Wind flow simulation
- Energy efficiency modeling
- Climate-responsive design strategies
- Environmental performance feedback loops
- **Case Study:** The Edge Building (Amsterdam) sustainable performance system

Module 8: Advanced Integrated Design Project

- End-to-end computational workflow
- Multi-objective optimization
- BIM integration and documentation
- Real-time design validation
- Presentation and visualization techniques
- **Case Study:** Heydar Aliyev Center computational workflow analysis

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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