AI Applications in Structural Engineering Training Course

Professional Development Training Course Outline

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

Course Introduction

Artificial Intelligence (AI) is transforming the structural engineering industry by enabling smart structural design, predictive analytics, digital twins, Building Information Modeling (BIM), machine learning, generative design, structural health monitoring, computer vision, predictive maintenance, finite element optimization, and intelligent infrastructure management. Modern engineering organizations are increasingly adopting AI-powered solutions to improve design accuracy, automate repetitive engineering tasks, reduce project risks, optimize construction schedules, and enhance the resilience and sustainability of civil infrastructure. Engineers equipped with AI skills can significantly improve decision-making while reducing costs and project delivery time.

AI Applications in Structural Engineering Training Course provides participants with practical knowledge of Artificial Intelligence, Machine Learning (ML), Deep Learning, Generative AI, Computer Vision, Digital Twin Technology, Predictive Modeling, BIM Analytics, IoT-enabled Structural Monitoring, Big Data Analytics, and Automation in Structural Engineering. Through real-world engineering case studies and hands-on exercises, participants will learn how AI is revolutionizing structural analysis, bridge engineering, high-rise buildings, smart cities, earthquake engineering, asset management, and infrastructure inspection while preparing for the future of digital engineering.

Programme Curriculum

AI Applications in Structural Engineering Training Course

Introduction

Artificial Intelligence (AI) is transforming the structural engineering industry by enabling smart structural design, predictive analytics, digital twins, Building Information Modeling (BIM), machine learning, generative design, structural health monitoring, computer vision, predictive maintenance, finite element optimization, and intelligent

infrastructure management. Modern engineering organizations are increasingly adopting AI-powered solutions to improve design accuracy, automate repetitive engineering tasks, reduce project risks, optimize construction schedules, and enhance the resilience and sustainability of civil infrastructure. Engineers equipped with AI skills can significantly improve decision-making while reducing costs and project delivery time.

AI Applications in Structural Engineering Training Course provides participants with practical knowledge of Artificial Intelligence, Machine Learning (ML), Deep Learning, Generative AI, Computer Vision, Digital Twin Technology, Predictive Modeling, BIM Analytics, IoT-enabled Structural Monitoring, Big Data Analytics, and Automation in Structural Engineering. Through real-world engineering case studies and hands-on exercises, participants will learn how AI is revolutionizing structural analysis, bridge engineering, high-rise buildings, smart cities, earthquake engineering, asset management, and infrastructure inspection while preparing for the future of digital engineering.

Course Duration

5 days

Course Objectives

Upon completion of this course, participants will be able to:

1. Understand Artificial Intelligence fundamentals in structural engineering.
2. Apply Machine Learning algorithms for structural performance prediction.
3. Implement Predictive Maintenance models for infrastructure assets.
4. Utilize Digital Twin Technology for smart infrastructure management.
5. Integrate Building Information Modeling (BIM) with AI-driven analytics.
6. Perform Structural Health Monitoring (SHM) using AI and IoT sensors.
7. Apply Computer Vision for automated crack and defect detection.
8. Develop Generative AI solutions for conceptual structural design.
9. Optimize structural systems using Finite Element Analysis (FEA) with AI.
10. Analyze engineering datasets using Big Data Analytics and visualization.
11. Improve project delivery through AI-powered Construction Automation.
12. Assess infrastructure resilience using Predictive Risk Assessment techniques.
13. Implement ethical, secure, and sustainable AI Engineering Governance practices.

Target Audience

1. Structural Engineers
2. Civil Engineers
3. Bridge Engineers
4. Construction Project Managers
5. BIM Engineers and BIM Managers
6. Infrastructure Asset Managers
7. Engineering Consultants and Researchers
8. Government Engineers, Municipal Authorities, and Engineering Students

Course Modules

Module 1: Fundamentals of AI in Structural Engineering

- Introduction to Artificial Intelligence
- Machine Learning fundamentals

- Engineering data lifecycle
- AI applications across structural engineering
- Future trends in smart infrastructure
- **Case Study:** AI-assisted structural design optimization for commercial buildings.

Module 2: Machine Learning for Structural Analysis

- Supervised learning techniques
- Regression models for load prediction
- Classification models for structural damage
- Model validation techniques
- Performance evaluation metrics
- **Case Study:** Predicting beam deflection using machine learning models.

Module 3: Computer Vision for Structural Inspection

- Image processing fundamentals
- Crack detection using deep learning
- Drone-based bridge inspections
- Automated defect recognition
- Damage classification systems
- **Case Study:** Automated bridge crack detection using convolutional neural networks (CNNs).

Module 4: Structural Health Monitoring and Digital Twins

- IoT sensors for infrastructure monitoring
- Real-time monitoring systems
- Digital Twin implementation
- Predictive maintenance strategies
- Performance dashboards
- **Case Study:** Digital Twin deployment for long-span bridge monitoring.

Module 5: AI in BIM and Construction Automation

- AI-enabled Building Information Modeling
- Automated quantity take-off
- Construction scheduling optimization
- Clash detection using AI
- Smart project management
- **Case Study:** AI-enhanced BIM implementation in a high-rise construction project.

Module 6: Predictive Analytics and Risk Assessment

- Infrastructure risk modeling
- Failure prediction techniques
- Lifecycle cost optimization
- Resilience assessment
- Disaster preparedness modelling
- **Case Study:** AI prediction of structural failures after seismic events.

Module 7: Generative AI and Structural Design Optimization

- Generative design concepts
- AI-assisted conceptual modeling
- Structural optimization algorithms
- Sustainable material selection
- Multi-objective optimization
- **Case Study:** Generative AI optimization for steel frame design.

Module 8: AI Strategy, Ethics, and Future Engineering

- AI governance frameworks
- Engineering ethics and AI
- Data privacy and cybersecurity
- Emerging AI technologies
- Organizational AI implementation roadmap
- **Case Study:** Enterprise AI adoption strategy for an engineering consultancy.

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:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com