Structural Failure Investigation 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

Structural Failure Investigation Training Course is designed to develop advanced expertise in forensic structural engineering, failure analysis, root cause investigation, and structural risk assessment. The course equips engineers, consultants, inspectors, and technical professionals with modern investigation techniques used to analyze structural collapse, material degradation, design deficiencies, construction defects, and operational failures. Participants will gain practical knowledge of forensic engineering methodologies, non-destructive testing (NDT), structural health monitoring (SHM), damage assessment, and evidence-based failure diagnosis to improve safety, reliability, and lifecycle performance of critical infrastructure.

With increasing global demand for resilient infrastructure, sustainable construction, predictive maintenance, and advanced asset integrity management, organizations require professionals who can identify failure mechanisms and prevent future incidents. This training integrates real-world case studies, international investigation standards, digital engineering tools, and risk-based decision-making approaches to enhance professional capability in investigating bridges, buildings, industrial facilities, offshore structures, and civil infrastructure failures. Participants will develop the skills required to conduct systematic investigations, prepare technical reports, and recommend effective corrective and preventive actions.

Programme Curriculum

Structural Failure Investigation Training Course

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Course Duration

5 days

Course Objectives

By the end of this course, participants will be able to:

1. Understand advanced principles of structural failure investigation and forensic engineering analysis.
2. Apply systematic root cause analysis (RCA) techniques for structural incidents.
3. Identify failure mechanisms including fracture, fatigue, corrosion, buckling, and overload failures.
4. Conduct professional structural damage assessment and condition evaluation.
5. Apply modern non-destructive testing (NDT) and diagnostic technologies.
6. Interpret engineering drawings, specifications, inspection records, and technical evidence.
7. Develop effective failure investigation plans and site assessment strategies.
8. Analyze material behavior using metallurgical and structural engineering concepts.
9. Utilize digital engineering, BIM, and structural monitoring technologies for investigations.
10. Prepare comprehensive forensic engineering reports and technical documentation.
11. Evaluate construction defects and design-related structural vulnerabilities.
12. Implement risk management, reliability engineering, and preventive maintenance strategies.
13. Develop industry-ready expertise in structural resilience, safety improvement, and infrastructure sustainability.

Target Audience

1. Structural Engineers and Civil Engineers
2. Forensic Engineering Specialists
3. Construction Managers and Project Engineers
4. Building Inspectors and Regulatory Professionals
5. Maintenance and Asset Integrity Engineers
6. Architects and Design Consultants
7. Oil & Gas, Energy, and Industrial Facility Professionals
8. Insurance, Claims, and Technical Investigation Specialists

Course Modules

Module 1: Fundamentals of Structural Failure Investigation

- Principles of **forensic structural engineering and failure analysis**
- Types and classifications of structural failures

- Investigation workflow and evidence preservation methods
- Roles of investigators, consultants, and stakeholders
- International standards and best practices
- **Case Study: Building Collapse Investigation**

Module 2: Structural Failure Mechanisms and Damage Assessment

- Failure modes-**fatigue, fracture, corrosion, creep, and buckling**
- Load path analysis and structural behavior evaluation
- Structural distress symptoms and warning indicators
- Damage mapping and field inspection techniques
- Failure progression analysis
- **Case Study: Bridge Structural Failure**

Module 3: Root Cause Analysis and Failure Diagnosis

- Advanced **Root Cause Analysis (RCA)** methodologies
- Fault tree analysis and failure mode assessment
- Human, design, material, and environmental factors
- Evidence-based engineering conclusions
- Corrective and preventive action planning
- **Case Study: Industrial Structure Failure**

Module 4: Material Failure Analysis and Testing Techniques

- Material degradation mechanisms
- Concrete deterioration and steel failure analysis
- Metallurgical investigation methods
- Non-destructive testing (**NDT**) applications
- Laboratory testing interpretation
- **Case Study: Steel Structure Failure**

Module 5: Advanced Inspection Technologies and Digital Investigation

- Structural Health Monitoring (**SHM**) systems
- Drone inspection and remote assessment technologies
- 3D scanning and digital documentation
- BIM-based failure investigation approaches
- Artificial Intelligence (**AI**) applications in structural diagnostics
- **Case Study: Infrastructure Digital Assessment**

Module 6: Construction Defects and Design Failure Investigation

- Design errors and engineering negligence assessment
- Construction quality failures
- Workmanship-related structural problems
- Code compliance evaluation
- Lessons learned from major failures
- **Case Study: Concrete Structure Failure**

Module 7: Structural Failure Reporting and Legal Considerations

- Preparing professional forensic engineering reports
- Technical evidence documentation
- Expert witness responsibilities
- Insurance and liability investigation processes
- Communication of engineering findings
- **Case Study: Litigation Support Investigation**

Module 8: Risk Management, Prevention, and Future Structural Resilience

- Structural risk assessment frameworks
- Predictive maintenance strategies
- Asset integrity management
- Disaster resilience and climate adaptation
- Future trends in structural safety engineering
- **Case Study: Aging Infrastructure Assessment**

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
21 Sep 2026	25 Sep 2026	Online	$1,000
21 Sep 2026	25 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

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

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