Seismic Engineering for High-Rise Buildings Training Course

Professional Development Training Course Outline

Category	Architectural Engineering	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Seismic Engineering for High-Rise Buildings is a high-demand, future-focused structural engineering discipline designed to address the growing need for earthquake-resistant skyscraper design, performance-based seismic analysis, and resilient urban infrastructure development. With increasing urbanization in seismic zones, engineers must integrate advanced concepts such as base isolation systems, energy dissipation devices, nonlinear dynamic analysis, and AI-assisted structural modeling to ensure safety, durability, and compliance with modern building codes.

Seismic Engineering for High-Rise Buildings Training Course provides an in-depth understanding of state-of-the-art seismic design methodologies for tall structures, combining theoretical principles with real-world applications. Participants will explore Eurocode 8, ASCE 7, performance-based design (PBD), and computational simulation tools like ETABS, SAP2000, and BIM-integrated seismic modeling, enabling them to design high-rise buildings capable of withstanding major seismic events while maintaining structural integrity and occupant safety.

Programme Curriculum

Seismic Engineering for High-Rise Buildings Training Course

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Course Objectives

1. Master earthquake-resistant design principles for high-rise structures
2. Apply performance-based seismic engineering (PBSE) techniques
3. Understand structural dynamics and modal response analysis
4. Design using base isolation and damping systems
5. Implement nonlinear time history analysis (NTHA)
6. Utilize AI-driven structural health monitoring systems
7. Interpret seismic hazard maps and geotechnical data
8. Apply Eurocode 8 and ASCE 7 compliance standards
9. Develop resilient skyscraper design strategies
10. Integrate BIM with seismic structural modeling
11. Evaluate soil-structure interaction effects
12. Enhance retrofit strategies for existing high-rise buildings
13. Optimize wind and seismic load combination design

Target Audience

- Structural Engineers
- Civil Engineers
- Geotechnical Engineers
- Architecture Professionals
- Construction Project Managers
- Urban Planners
- Engineering Consultants
- Graduate Engineering Students

Course Modules

Module 1: Fundamentals of Seismic Engineering

- Earthquake generation mechanisms
- Seismic wave propagation types
- Fault lines and tectonic plates
- Basic structural response behavior
- Introduction to seismic risk assessment
- **Case Study:** 2010 Haiti Earthquake structural failures

Module 2: Structural Dynamics for High-Rise Buildings

- Single and multi-degree of freedom systems
- Natural frequency and damping ratio
- Resonance in tall buildings
- Mode shapes and vibration analysis
- Dynamic load response modelling
- **Case Study:** Taipei 101 wind-seismic interaction study

Module 3: Seismic Codes and Standards

- Eurocode 8 framework
- ASCE 7 seismic provisions
- National building code compliance
- Load combination requirements
- Code-based design limitations
- **Case Study:** San Francisco code evolution after Loma Prieta

Module 4: Earthquake Load Calculation

- Seismic weight estimation
- Base shear computation
- Response modification factors
- Load distribution techniques
- Equivalent static method
- **Case Study:** Kobe earthquake building response comparison

Module 5: Soil-Structure Interaction (SSI)

- Soil classification systems
- Foundation flexibility effects
- Liquefaction risks
- Dynamic soil response
- Site amplification effects
- **Case Study:** Mexico City 1985 amplified seismic damage

Module 6: Performance-Based Design (PBD)

- Performance objectives definition
- Damage states classification
- Nonlinear behavior modeling
- Drift control mechanisms
- Acceptance criteria analysis
- **Case Study:** Los Angeles retrofitted hospital performance

Module 7: Base Isolation Systems

- Elastomeric bearings
- Friction pendulum systems
- Isolation efficiency metrics
- Energy dissipation principles
- Installation techniques
- **Case Study:** Christchurch Hospital seismic isolation success

Module 8: Energy Dissipation Devices

- Viscous dampers
- Tuned mass dampers
- Hysteretic dampers
- Metallic yielding systems
- Seismic energy absorption modelling
- **Case Study:** Taipei 101 tuned mass damper performance

Module 9: Nonlinear Time History Analysis

- Ground motion selection
- Acceleration records scaling
- Material nonlinear behavior
- Response spectrum integration
- Simulation interpretation
- **Case Study:** Northridge earthquake building simulations

Module 10: High-Rise Structural Systems

- Moment-resisting frames
- Shear wall systems
- Core-outrigger systems
- Tube structural systems
- Hybrid structural solutions
- **Case Study:** Burj Khalifa structural system design

Module 11: Retrofit and Rehabilitation

- Structural strengthening methods
- Jacketing techniques
- FRP applications
- Seismic upgrading strategies
- Cost-benefit retrofit analysis
- **Case Study:** San Francisco soft-story retrofit program

Module 12: BIM for Seismic Design

- 3D structural modeling
- Clash detection in seismic design
- Integrated simulation workflows
- Digital twin technology
- Data-driven design optimization
- **Case Study:** BIM-based Tokyo high-rise project coordination

Module 13: Wind and Seismic Interaction

- Aeroelastic effects
- Combined load cases
- Tall building sway control
- Comfort criteria analysis
- Dynamic interaction modelling

- **Case Study:** Shanghai Tower wind-seismic hybrid design

Module 14: Structural Health Monitoring (SHM)

- Sensor technologies
- Real-time data acquisition
- Damage detection algorithms
- AI-based predictive maintenance
- Smart infrastructure systems
- **Case Study:** Golden Gate Bridge monitoring system

Module 15: Advanced Seismic Innovations

- AI in seismic prediction
- Smart materials in construction
- Self-healing concrete
- Modular seismic-resistant design
- Future resilient cities
- **Case Study:** Japan smart earthquake-resistant buildings

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	02 Oct 2026	Online	$2,000
21 Sep 2026	02 Oct 2026	Physical	$3,000
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0

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

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