Earthquake Engineering and Structural Dynamics Course

5 – 9 April 2027
Addis Ababa

AGILE LEADERS
Training Center

AGILE LEADERS
Training Center

Earthquake Engineering and Structural Dynamics Course

Ref: 528_223746 **Date:** 5 – 9 April 2027 **Location:** Addis Ababa **Fees:** 6000 Euro

Overview

Earthquake Engineering and Structural Dynamics Course is a one-week advanced course for structural and seismic engineers, civil engineers, design reviewers, consultants, and technical managers who leave with a Seismic Analysis Basis and Review Pack. Participants connect ground motion to dynamic response, build and challenge structural models, select appropriate seismic analysis methods, interpret modal and response results, and identify design-review red flags. Agile Leaders Training Center links structural dynamics with defensible earthquake-engineering decisions.

Who Should Attend

- Teams responsible for seismic analysis and structural design
- Functions that review modelling assumptions and dynamic-analysis results
- Personnel who coordinate geotechnical input, load paths, and structural systems
- Consultants assessing irregular buildings and advanced analysis needs
- Technical managers who approve seismic design bases and reviews

The course assumes participants can perform structural analysis and interpret matrices, load combinations, and building models, and it leaves out introductory statics, software-specific command training, and jurisdiction-specific design certification.

Departments and Industries

The course supports departments that model, design, and review structures exposed to earthquake actions.

- Buildings, infrastructure, transport, industrial, and energy facilities
- Structural engineering, seismic design, and technical assurance
- Architecture, geotechnical coordination, and multidisciplinary design
- Engineering consultancy, peer review, and owner engineering
- Construction design management and specialist analysis teams

Learning Objectives

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

- Analyze dynamic properties of structural systems
- Build defensible seismic modelling assumptions
- Compare lateral-force, spectrum, and history methods
- Evaluate modal participation, scaling, and response combinations
- Diagnose load-path, irregularity, and result anomalies
- Build a seismic analysis review record

Course Agenda

Day 1: Ground Motion and Dynamic Response

- Earthquake Source, Path, Site, and Ground-Motion Measures
- Single-Degree-of-Freedom Equation of Motion
- Period, Frequency, Stiffness, Mass, and Damping
- Free, Forced, and Ground-Excited Response
- Elastic Response Spectrum Construction and Interpretation

Day 2: Multi-Degree Systems and Modal Analysis

- Mass and Stiffness Modelling for Buildings
- Natural Frequencies and Mode Shapes
- Modal Orthogonality and Participation Factors
- Modal Superposition and Response Combination
- Effective Modal Mass and Mode-Sufficiency Checks

Day 3: Seismic Analysis Method Selection

- Equivalent Lateral Force Procedure Boundaries
- Modal Response Spectrum Analysis Workflow
- Linear Response-History Analysis Principles
- Nonlinear Static and Dynamic Analysis Purpose
- Method Selection, Ground-Motion Input, and Scaling Record

Day 4: Structural Behaviour and Design Intent

- Seismic Load Paths and Diaphragm Actions
- Plan and Vertical Irregularity Effects
- Torsion, P-Delta, Drift, and Stability Checks
- Ductility, Capacity Design, and Energy Dissipation
- Detailing Intent and Analysis-Design Consistency

Day 5: Model and Result Review

- Exercise: Check Periods and Modal Participation
- Exercise: Review a Response-Spectrum Analysis
- Exercise: Diagnose Irregularity and Load-Path Risks
- Exercise: Challenge Drifts, Forces, and Scaling Results
- Capstone Exercise: Seismic Analysis Basis and Review Pack

Practical Exercises

The course uses suggested activities to connect dynamics principles with traceable seismic-analysis decisions.

- Suggested activity: calculate and interpret period, damping, resonance, and spectral response for a simplified structural system.
- Suggested activity: review mass, stiffness, diaphragms, supports, modifiers, eccentricity, and modal sufficiency in a building model.
- Suggested activity: compare analysis methods against structural configuration, irregularities, performance question, and available ground-motion data.
- Suggested activity: assemble a review pack with assumptions, checks, anomalies, corrective actions, and approval evidence.

FAQs

Who suits the Earthquake Engineering and Structural Dynamics Course?

It suits engineers who model, design, review, or approve seismic building analyses and assumes working knowledge of structural analysis, matrices, load combinations, and building behaviour.

How does this course differ from general structural design?

It focuses on dynamic response, modal behaviour, seismic input, analysis-method selection, irregularities, ductility, and validation of earthquake-analysis results.

Which seismic analysis methods are considered?

Participants compare equivalent lateral force, modal response spectrum, linear response history, nonlinear static, and nonlinear response-history methods according to purpose, complexity, assumptions, and evidence needs.

Is the course tied to one analysis program?

No. Exercises focus on modelling logic, method selection, checks, and result interpretation that remain applicable across suitable structural-analysis platforms.

AGILE LEADERS
Training Center

What does the capstone produce?

The capstone produces a Seismic Analysis Basis and Review Pack containing ground-motion inputs, model assumptions, modal checks, method rationale, load-path review, irregularity findings, response checks, and actions.

Conclusion

Participants take back a Seismic Analysis Basis and Review Pack linking ground motion, dynamic properties, model assumptions, modal behaviour, analysis selection, structural response, and design-review findings. The pack makes uncertainty and anomalies visible without replacing project-specific code checks or independent engineering judgment.