BOOST
THE LEADING TRAINING PROVIDER

Civil Engineering

Seismic Design and Retrofitting of Structures

Course Introduction

The essence of successful seismic design lies in three critical elements:

adopting a multi-hazard approach that addresses seismic forces alongside other hazards, adhering to performance-based requirements exceeding minimum code standards, and fostering a unified understanding among design team members. Seismic design involves ensuring that buildings resist earthquakes and other hazards such as blast impacts and high winds with minimal damage.

This course provides a comprehensive understanding of seismic and wind design principles and detailing for reinforced concrete and steel structures. Participants will learn advanced techniques in accordance with global standards (e.g., ADIBC/ACI/ASCE), enabling efficient and robust structural design.

Target Audience

- civil engineers.
- Experienced Civil Engineers Seeking Professional Development
- Architects and Urban Planners
- Entrepreneurs in the Construction Industry
- Project Managers in the Construction Industry

Learning Objectives

- Gain comprehensive knowledge of designing and detailing earthquake-resistant steel and reinforced concrete structures.
- Estimate the probability and intensity of ground motions and their implications on structural design.
- Perform seismic analysis using manual methods and advanced computer tools.

- Understand capacity design concepts and structural ductility.
- Apply seismic and wind design provisions from ADIBC/ACI/ASCE standards.
- Evaluate wind design pressures and understand the impact of various windstorm types.
- Accurately calculate design pressures for structural components and cladding.
- Develop performance-based designs for seismic and wind hazards.

Course Outline

- **DAY 01**

Fundamentals of Earthquake Ground Motions and Response Analysis

Introduction to Earthquakes and Ground Motions:

- Causes and effects of earthquakes
- Seismic waves and ground record characteristics
- Design intensity and attenuation relationships

Single Degree of Freedom (SDOF) Systems:

- Free vibration response
- Response to harmonic and earthquake loading
- Elastic response spectrum and time history analysis

- **Day 02**

Seismic Analysis and Code Provisions

- Multi-Degrees of Freedom (MDOF) Systems:
- Dynamic analysis using modal and time history procedures
- Linear seismic analysis approaches

Code Provisions for Earthquake-Resistant Design:

- Seismic provisions from ADIBC/ACI/ASCE
- Inelastic behavior, ductility, and capacity design concepts

- Code-based dynamic analysis requirements

- **Day 03**

Seismic Design of Steel and Concrete Structures

- Seismic Design of Steel Buildings:
- Ductile moment-resisting frames
- Ductile steel braced frames

Solved example: Steel building seismic design

Seismic Design of Reinforced Concrete Structures:

- Ductile moment-resisting concrete frames
- Reinforced concrete shear walls
- **Solved example:** Concrete building seismic design

- **Day 04**

Wind Design Essentials

Introduction to Wind Engineering:

- Climatology of windstorms and hazard maps
- Determining site-specific wind speeds
- Basics of wind engineering and ASCE 7 wind design provisions

Wind Hazard Analysis:

- Performance-based wind design concepts
- Practical exercises in calculating wind pressures for frames and cladding

- **Day 05**

Advanced Wind Design and Performance-Based Approaches

Advanced Wind Design Techniques:

- Wind tunnel testing methodologies
- Using multi-source data for wind design solutions
- Tornado-specific design considerations using ASCE 7

Integrated Seismic and Wind Design Review:

- Performance-based approaches for multi-hazard resilience
- Case studies and course review
- Final discussion and participant feedback

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
May 12, 2025	May 16, 2025	5 days	4250.00 $	UAE - Dubai
Sept. 15, 2025	Sept. 19, 2025	5 days	4250.00 $	UAE - Dubai
Dec. 8, 2025	Dec. 12, 2025	5 days	4250.00 $	UAE - Abu Dhabi