

Course No. 1535

Structural Engineering Design Training Course

CIVIL & STRUCTURAL ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Structural Engineering Design Training Course is a specialized professional program designed to develop the technical knowledge and practical skills required to analyze and design safe, efficient, and reliable structural systems. The course provides a comprehensive understanding of structural engineering principles, load assessment, structural systems, reinforced concrete design, steel structure design, foundation design, and structural stability, with strong emphasis on practical engineering applications.

The program focuses on the complete structural design process, beginning with understanding architectural and functional requirements, selecting appropriate structural systems, establishing load paths, and performing structural analysis, through to the design and verification of major structural elements. Participants will examine how structural design decisions influence safety, constructability, project cost, durability, and long-term performance.

The Structural Engineering Design Training Course addresses vertical and lateral loading conditions, including dead loads, imposed loads, wind actions, seismic effects, and other relevant design considerations. Participants will develop a stronger understanding of beams, columns, slabs, foundations, steel members, structural connections, and stability requirements, while learning how to evaluate structural performance against strength and serviceability criteria.

The course also emphasizes structural modeling, interpretation of analysis results, design review, engineering coordination, and identification of potential design errors. Participants will learn how to critically review structural calculations, drawings, assumptions, and analytical outputs rather than relying solely on software-generated results.

Through practical exercises and project-based case studies, participants will strengthen their ability to develop technically sound structural solutions for commercial buildings, government facilities, industrial structures, infrastructure projects, and other major developments. The program supports better engineering decisions, improved design quality, enhanced constructability, and more effective management of structural risks throughout the project lifecycle.

Objectives

- Analyze the fundamental principles of structural analysis and design and relate them to practical engineering projects during the course.
- Evaluate architectural, functional, and project requirements to select an appropriate structural system.
- Apply systematic methods for identifying structural loads and assessing their effects on structural members and systems.
- Design major structural elements while considering strength, stability, durability, and serviceability requirements.
- Evaluate structural performance under vertical and lateral loading conditions.
- Apply reinforced concrete and structural steel design principles to practical engineering applications.
- Analyze structural modeling results and verify the engineering reasonableness of critical outputs and assumptions.
- Assess structural stability, deformation, buckling, and load-carrying capacity according to the characteristics of each structural element.
- Develop structural design solutions that balance safety, efficiency, economy, and constructability.
- Apply systematic structural design review techniques to identify errors, inconsistencies, and coordination issues.
- Improve coordination between structural, architectural, mechanical, and electrical design requirements.
- Develop professional recommendations for improving structural design quality and reducing engineering and construction risks.

Who Should Attend

The Structural Engineering Design Training Course is designed for structural and civil engineers involved in the analysis, design, review, construction, and management of structural projects. It is particularly relevant to structural design engineers, civil engineers, project engineers, structural consultants, design review engineers, construction engineers, and engineering professionals working within consulting firms, contractors, developers, and engineering organizations.

The course is also suitable for engineering managers, design managers, project managers,

construction managers, structural engineering consultants, quality assurance and quality control professionals, technical supervisors, and professionals responsible for reviewing structural calculations, drawings, specifications, and design submissions. It is valuable for professionals involved in evaluating structural alternatives, managing design changes, and assessing technical risks.

The program is particularly relevant to professionals working on government buildings, commercial developments, residential projects, industrial facilities, oil and gas infrastructure, public-sector projects, institutional buildings, and major construction and infrastructure developments where structural safety, design quality, constructability, and project performance are critical considerations.

Learning Outcomes

- Explain the fundamental principles of structural engineering analysis and design and apply them to practical projects.
- Identify appropriate structural systems based on building function, architectural requirements, loading conditions, and project constraints.
- Analyze vertical and lateral loads and determine their effects on structural systems and individual members.
- Design beams, columns, slabs, and other major structural elements using appropriate engineering principles.
- Evaluate reinforced concrete elements for strength, serviceability, stability, and detailing requirements.
- Analyze and design structural steel members under different loading conditions.
- Evaluate foundation design requirements based on structural loads and relevant soil conditions.
- Interpret structural analysis and modeling results and identify abnormal or technically inconsistent outputs.
- Review structural drawings, calculations, and design assumptions to identify potential errors and inconsistencies.
- Assess the effects of wind and seismic actions on structural stability and overall building performance.
- Improve structural detailing to support constructability, safety, durability, and quality of execution.
- Prepare technical recommendations for improving structural design efficiency, reliability, and risk management.

Course Outline

DAY 01

Fundamentals of Structural Analysis and Design

- Principles, objectives, and requirements of structural engineering design
- Relationship between architectural requirements and structural systems
- Types of structural systems and criteria for structural system selection
- Load paths and transfer of loads from structural members to foundations
- Dead loads, imposed loads, environmental loads, and special loading conditions
- Influence of building function and occupancy on structural design decisions
- Fundamentals of structural analysis and engineering modeling
- Load cases and load combinations
- Strength, resistance, serviceability, and structural reliability concepts
- Structural stability and deformation requirements
- Reading and interpreting structural drawings

PRACTICAL APPLICATION

Analyze a representative structural system and identify its primary load paths

DAY 02

Reinforced Concrete Structural Design

- Properties of concrete and reinforcement and their influence on structural design
- Principles of reinforced concrete beam design
- Design of columns under axial loads and bending moments
- Design principles for different types of reinforced concrete slabs
- Shear, bending moment, and reinforcement requirements
- Deflection, cracking, and serviceability considerations
- Reinforcement detailing and constructability requirements
- Design considerations under different load combinations
- Review of reinforced concrete structural drawings and details

DAY 02 — CONTINUED

- Common design and construction issues in reinforced concrete structures

PRACTICAL APPLICATION

Design selected reinforced concrete elements and review the resulting calculations

DAY 03

Structural Steel Design and Lateral Loading

- Characteristics and applications of structural steel systems
- Selection of suitable steel sections for structural members
- Design principles for steel beams and columns
- Strength, stability, and buckling verification
- Design principles for structural connections
- Bolted and welded connection considerations
- Fundamentals of wind load effects on structures
- Introduction to seismic structural design principles
- Lateral load-resisting systems
- Structural drift, torsion, and overall stability

PRACTICAL APPLICATION

Analyze a representative steel structural system under vertical and lateral loading

DAY 04

Foundation Design, Structural Modeling, and Design Verification

- Fundamentals of structural foundation design
- Relationship between soil conditions and structural loads
- Design principles for isolated, combined, and strip foundations
- Fundamentals of raft and deep foundation systems
- Bearing capacity and settlement considerations

DAY 04 — CONTINUED

- Transfer of structural loads from columns and walls to foundations
- Principles of structural modeling and engineering analysis software
- Defining materials, sections, supports, loads, and boundary conditions
- Interpretation and verification of structural analysis results
- Identification of modeling errors and inappropriate design assumptions
- Coordination between analytical models and structural drawings

PRACTICAL APPLICATION

Review a structural model, assess its results, and identify opportunities for improvement

DAY 05

Structural Design Review, Optimization, and Risk Management

- Systematic approaches to structural design and calculation review
- Verification of design assumptions, criteria, and engineering parameters
- Review of structural loads and load combinations
- Assessment of critical structural members and potential weaknesses
- Structural optimization for safety, efficiency, and economy
- Improving constructability and reducing design-to-construction conflicts
- Coordination between structural and multidisciplinary engineering requirements
- Managing design changes, technical comments, and design revisions
- Identification and management of structural engineering risks
- Development of structural design review checklists
- Integrated case study covering structural analysis, design, verification, and review

FINAL WORKSHOP

Develop an action plan for improving structural design quality, technical review, and project performance



Register or Request More Information

Course page: <https://quest-training.com/courses/structural-engineering-design-training-course>

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