

Course No. 1540

Steel Structure Design & Engineering Training Course

CIVIL & STRUCTURAL ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Reinforced Concrete Design Training Course is a specialized professional program designed to develop the technical knowledge and practical skills required to analyze, design, and evaluate reinforced concrete structures. The course provides participants with a structured understanding of reinforced concrete behavior under different loading conditions, enabling them to make sound engineering decisions related to structural safety, strength, serviceability, durability, and constructability.

The program covers the fundamental principles of reinforced concrete design, including material properties, structural systems, load assessment, load combinations, flexural behavior, shear resistance, axial loading, deflection, cracking, and reinforcement detailing. Participants will examine how concrete and reinforcing steel interact to resist structural actions and how these principles are translated into practical structural design solutions for buildings and infrastructure projects.

The Reinforced Concrete Design Training Course also focuses on the design of key structural elements, including beams, slabs, columns, foundations, walls, and structural connections. Participants will develop the ability to determine design actions, select suitable dimensions and reinforcement arrangements, verify structural capacity, and review design assumptions. Particular attention is given to achieving a balanced relationship between structural performance, material efficiency, constructability, and project requirements.

The course further addresses advanced considerations such as durability, serviceability, structural detailing, seismic effects, construction requirements, and the evaluation of existing reinforced concrete structures. Participants will explore common design and construction deficiencies and learn how to identify potential issues before they affect structural performance, project quality, or long-term asset reliability.

Through practical exercises, engineering case studies, design scenarios, and structured discussions, participants will strengthen their ability to connect structural analysis with practical reinforced concrete design. The program is relevant to government infrastructure, commercial developments, industrial facilities, residential buildings, oil and gas projects, institutional facilities, and major construction programs where reliable and efficient reinforced concrete design is essential.

Objectives

- Analyze the fundamental principles of reinforced concrete behavior and structural response during the training program.
- Evaluate the mechanical properties of concrete and reinforcing steel and their influence on structural design decisions.
- Apply appropriate methods for determining structural loads and load combinations for reinforced concrete structures.
- Analyze the behavior of reinforced concrete members subjected to bending, shear, axial forces, and combined actions.
- Design reinforced concrete beams and slabs based on strength and serviceability requirements.
- Evaluate reinforced concrete columns under axial and combined loading conditions and determine suitable reinforcement arrangements.
- Design reinforced concrete foundations according to applied loads, soil conditions, stability requirements, and structural performance criteria.
- Assess deflection, cracking, durability, and other serviceability requirements affecting reinforced concrete structures.
- Develop reinforcement detailing solutions that support structural integrity, constructability, inspection, and long-term performance.
- Evaluate structural design calculations, drawings, and reinforcement details to identify technical inconsistencies and potential design issues.
- Apply appropriate approaches for considering seismic and lateral effects in reinforced concrete structural systems.
- Develop practical recommendations for improving structural safety, design efficiency, constructability, and long-term durability.

Who Should Attend

This course is designed for civil and structural engineers involved in structural analysis, reinforced concrete design, engineering consultancy, construction, and project delivery. It is particularly relevant to structural design engineers, civil engineers, project engineers, construction engineers, site engineers, technical office engineers, design reviewers, engineering consultants, and professionals responsible for preparing or reviewing reinforced concrete calculations and drawings.

The program is also suitable for engineering and construction managers, project managers, technical managers, contractors, quality control professionals, quantity and technical specialists, and professionals involved in reviewing engineering submissions and construction documentation. It can support professionals who need to evaluate structural alternatives, assess design risks, review reinforcement details, and coordinate structural requirements with architectural, mechanical, electrical, and construction disciplines.

The course is especially relevant to professionals working on government buildings, commercial developments, residential projects, industrial facilities, oil and gas infrastructure, power facilities, water and utility projects, hospitals, educational institutions, transportation facilities, and major infrastructure programs. It is also valuable for managers and decision-makers who require a stronger understanding of reinforced concrete design principles when reviewing technical proposals, project risks, engineering quality, and construction requirements.

Learning Outcomes

- Explain the fundamental principles governing the behavior and design of reinforced concrete structures.
- Identify the mechanical properties of concrete and reinforcing steel and evaluate their significance in structural design.
- Determine appropriate structural loads and load combinations for reinforced concrete design applications.
- Analyze reinforced concrete members subjected to flexure, shear, axial loads, and combined actions.
- Design reinforced concrete beams and slabs and determine appropriate reinforcement requirements.
- Evaluate reinforced concrete columns under different loading conditions and develop suitable reinforcement arrangements.
- Design reinforced concrete foundations while considering structural loads, soil conditions, stability, and serviceability.
- Assess deflection, cracking, durability, and other serviceability requirements for reinforced concrete members.
- Develop reinforcement detailing solutions that improve structural integrity and facilitate construction and inspection.
- Review structural calculations, design assumptions, drawings, and reinforcement schedules to

identify potential deficiencies.

- Evaluate the influence of lateral and seismic actions on reinforced concrete structural systems.
- Prepare practical technical recommendations for improving structural safety, efficiency, durability, and constructability.

Course Outline

DAY 01

Fundamentals of Reinforced Concrete Structural Design

- Principles of reinforced concrete structural behavior
- Properties of concrete and reinforcing steel
- Concrete strength, stiffness, cracking, creep, and shrinkage
- Reinforcement characteristics and bond behavior
- Structural systems used in reinforced concrete buildings
- Identification and classification of structural loads
- Dead loads, live loads, environmental loads, and imposed actions
- Load combinations and design considerations
- Basic principles of structural analysis for reinforced concrete structures

PRACTICAL APPLICATION

Evaluation of a reinforced concrete structural system and identification of load paths

DAY 02

Reinforced Concrete Beam and Slab Design

- Flexural behavior of reinforced concrete members
- Analysis of singly and doubly reinforced concrete sections
- Design principles for reinforced concrete beams
- Calculation of bending moments and reinforcement requirements
- Shear behavior and shear reinforcement design
- Development length, anchorage, lap splices, and reinforcement continuity
- Design of one-way and two-way reinforced concrete slabs

DAY 02 — CONTINUED

- Serviceability requirements for beams and slabs
- Deflection and crack control considerations

PRACTICAL APPLICATION

Design and review of reinforced concrete beams and slabs under representative loading conditions

DAY 03

Reinforced Concrete Column and Foundation Design

- Behavior of reinforced concrete columns under axial compression
- Design of short and slender reinforced concrete columns
- Combined axial load and bending effects
- Column reinforcement arrangements and detailing requirements
- Structural stability and second-order effects
- Principles of reinforced concrete foundation design
- Isolated, combined, strip, and raft foundation systems
- Bearing pressure, punching shear, flexure, and foundation stability
- Reinforcement detailing for foundations and column connections

PRACTICAL APPLICATION

Design of a reinforced concrete column and foundation system and evaluation of structural adequacy

DAY 04

Advanced Design, Seismic Considerations, and Structural Detailing

- Structural behavior under lateral and seismic actions
- Reinforced concrete frames and lateral load-resisting systems
- Ductility and capacity design principles
- Structural walls and their role in resisting lateral forces

DAY 04 — CONTINUED

- Design considerations for seismic regions
- Reinforcement detailing for structural integrity and ductility
- Construction joints, expansion joints, and reinforcement continuity
- Durability requirements and environmental exposure considerations
- Review of common design and detailing deficiencies

PRACTICAL APPLICATION

Review of a reinforced concrete structural model and identification of design and detailing issues

DAY 05

Design Review, Constructability, and Structural Performance

- Review of reinforced concrete design calculations and assumptions
- Evaluation of structural drawings and reinforcement details
- Coordination between structural design and construction requirements
- Constructability considerations in reinforced concrete projects
- Quality control requirements for reinforcement and concrete works
- Common construction defects and their structural implications
- Assessment of existing reinforced concrete structures
- Principles of structural inspection, maintenance, and durability management
- Optimization of reinforcement and structural dimensions without compromising safety
- Integrated case study: Analysis and design review of a reinforced concrete structure

FINAL WORKSHOP

Preparation of a practical reinforced concrete design review and improvement action plan



Register or Request More Information

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

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