



Reinforced Concrete Structural Design Course

3 – 7 January 2027
Manama (Bahrain)



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Introduction

Reinforced concrete structures represent a pivotal sector within industrial construction, especially pertinent to the oil and gas industry for onshore applications. Consequently, the advanced design of reinforced concrete structures course delves into the foundational principles of concrete structure design with an emphasis on strength, serviceability, and robustness, framed within the scope of code-based concepts.

The objective of this advanced design of reinforced concrete structures course is to train engineers to be familiar with using key design codes such as ACI American Concrete Institute, BS British Standards, UBC Uniform Building Code, and ASCE American Society of Civil Engineers will be interpreted, fostering practical methodologies aimed at enhancing business safety and operability.

This advanced design of reinforced concrete structures course aims to familiarize engineers with the American Concrete Institute Standard ACI and British Standards BS. Participants in the advanced design of reinforced concrete structures course will be introduced to the fundamentals of codes and standards, with a particular focus on the probability of failure as it aligns with ACI and BS directives.

The advanced design of reinforced concrete structures course will cover the basics of design elements, including retaining walls, liquid tanks, foundations for machinery, and steel tank foundations, such as separators and Knock-Out Drums KOD. The methodology of design and the essential steps for both creating and critiquing designs will be thoroughly explored.

Target Groups

- Civil Engineers.
- Structural Engineers.
- Architectural Engineers.

Course Objectives

By the conclusion of this advanced design of reinforced concrete structures course, participants will:

- Investigate contemporary and efficacious strategies for the design of reinforced concrete structures within the Oil and gas sector.
- Augment their competence in calculating reinforced concrete elements utilized explicitly in the Oil and gas domain.
- Expand their acumen and proficiency in leveraging new tools for the conceptualization and critical assessment of designs for upcoming projects or amendments to existing structures.
- Acquire an in-depth understanding of the design of foundations for all manner of vibrating apparatus, along with blast-resistant design for edifices.
- Illustrate factual design conundrums that can aid designers in delivering concrete structures that are safe, cost-effective, and feasible for construction.
- Grasp practical guidelines for scrutinizing concrete design, complemented by an associated checklist.

Targeted Competencies

At the end of this advanced design of reinforced concrete structures course, the target competencies will be able to:

- Understand analytical review of diverse codes and standards.
- Grasp the significance of construction quality and maintenance practices.
- Learn about dynamic analysis and design techniques for concrete in the industrial setting.
- Learn about adherence to industry conventions in structural design.
- Understand synergistic integration among various design disciplines.
- Understand what the incorporation of sustainable design principles can do to magnify a project's investment lifecycle.

Course Content

Unit 1: Introduction to Reinforced Concrete

- Explore the fundamentals of concrete technology.
- Draw comparisons between ACI and BS for concrete structure design.
- Understand the principal limitations of diverse codes ACI, BS, and European codes.
- Define the philosophical underpinnings of codes and standards.
- Identify different loads bearing on buildings.
- Assess the impact of earthquake and wind loads.
- Learn about the determination of static and dynamic equipment loads.
- Analyze foundation loads for tanks.

Unit 2: First Principles of Structural Reinforced Concrete

- What are the Basic concepts and precautions in concrete structure design?
- The various structural systems deployed.
- Learn about an array of slab types and their design.
- Understand the practical design of slabs, beams, and columns.
- Evaluate loads on horizontal vessels separators.
- Understand the role of thermal loads in heaters.
- Foundations design for heaters.
- Design foundations for towers.

Unit 3: Geotechnical Problems and Design of Foundations

- Soil investigation processes.
- Shallow foundation design philosophies.
- Pile foundation design philosophies.
- Anchor bolt design techniques.
- Foundations designed for machinery.
- Learn about the compilation of a review checklist for foundations under rotating equipment.
- Understand the potential pitfalls in foundation design under vibrating machines.

Unit 4: Design of Special Reinforced Concrete Constructions I

- Design blast-resistant buildings such as control rooms.
- Control room layout and configurations.
- Pipe rack structural configurations.
- Defining pivotal loads affecting pipe racks.
- Structural pipe rack design.
- Understand the fundamental principles and verification procedures for retaining wall design.
- Learn about the analysis of forces and loads in retaining walls.

Unit 5: Design of Special Reinforced Concrete Constructions II

- Design for reinforced concrete liquid tanks.
- Investigate structural systems for concrete tanks.
- Understand the differences between circular and rectangular tanks.
- Ring beam design specifications for circular tanks.
- What are concrete structure maintenance and repair processes?
- Learn about principles of integrity and maintenance management systems.