COURSE OVERVIEW SE0014
Analysis & Design of Reinforced Concrete Structures

Course Title
Analysis & Design of Reinforced Concrete Structures

Course Date/Venue
August 24-28, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
SE0014

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Analysis and Design of Reinforced Concrete Structures. It covers the reinforced concrete structures and principles of reinforced concrete design; the codes and standards for design; the load considerations and analysis methods, flexural analysis of beams and basic design of slabs; the advanced flexural design of beams, shear and torsion in beams and deflection control in beams and slabs; designing a one-way and two-way slabs; and the best practices and standards for detailing of reinforcement in beams and slabs.

Further, the course will also discuss the differences in design approach for short and long columns under axial loads and bending; the interaction diagrams in the design of reinforced concrete columns; the considerations and methodologies for the design of slender columns subject to buckling; the types, design considerations, and detailing of reinforced concrete walls for structural and seismic requirements; and the foundation design basics, seismic design principles and ductility requirements and detailing for seismic resistance.

During this interactive course, participants will learn the seismic analysis methods, equivalent static force and dynamic analysis methods and designing of structural elements for seismic loads; the performance-based seismic design and systematic methods and techniques for retrofitting existing reinforced concrete structures; the durability and fire resistance of reinforced concrete structures; the principles and design of prestressed concrete elements; and the approaches and materials for sustainable reinforced concrete construction.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on analysis and design of reinforced concrete structures
- Discuss reinforced concrete structures, principles of reinforced concrete design and the codes and standards for design
- Carryout load considerations and analysis methods, flexural analysis of beams and basic design of slabs
- Illustrate the advanced flexural design of beams, shear and torsion in beams and deflection control in beams and slabs
- Design a one-way and two-way slabs and apply best practices and standards for the detailing of reinforcement in beams and slabs
- Identify the differences in design approach for short and long columns under axial loads and bending
- Utilize interaction diagrams in the design of reinforced concrete columns
- Discuss the considerations and methodologies for the design of slender columns subject to buckling
- Recognize the types, design considerations, and detailing of reinforced concrete walls for structural and seismic requirements
- Determine the foundation design basics, seismic design principles and ductility requirements and detailing for seismic resistance
- Employ seismic analysis methods, equivalent static force and dynamic analysis methods and design of structural elements for seismic loads
- Illustrate performance-based seismic design and apply systematic methods and techniques for retrofitting existing reinforced concrete structures
- Enhance durability and fire resistance of reinforced concrete structures
- Discuss the principles and design of prestressed concrete elements including the approaches and materials for sustainable reinforced concrete construction

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspect and considerations of Analysis and Design of Reinforced Concrete Structures for civil engineers, structural engineers, structural engineers, architecture professionals, construction managers and building inspectors seeking to enhance their knowledge in reinforced concrete design.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Prof. Engin Aktas, PhD, MSc, BSc, is an **international expert** with over **25 years** of extensive experience in **Structural Reliability**, **Earthquake Engineering**, **Design of Concrete and Steel Structures**, **Structural Damage Assessment & Safety Evaluation** and **Structural Health Monitoring**. He has been a **Senior Professor** to all personnel ranging from students to post graduate students at universities and industrial clients. He has been teaching in the areas of **Theory of Matrix Structural Analysis**, **Engineering Mechanics**, **Mechanics of Materials**, **Civil Engineering System Analysis**, **Statistics for Civil Engineers**, **Structural Dynamics**, **Operations Research**, **Structural Optimization**, **Design of Reinforced Concrete Structures**, **Design of Steel Structures and Structural Reliability**.

During his career life, Professor Aktas performed the design, construction and installation of numerous buildings and industrial structures. Previously, he was the **Structural Design Engineer** with an international company handling multi-million design projects. He is renowned for his enthusiasm and tremendous instructing skills. Moreover, he had been a **Post-Doctoral Fellow** of **NRL/ASEE** and the recipient of the **Naval Research Laboratory/American Society for Engineering Education Fellowship** for his dedication and contributions to his field and was engaged with the **US Naval Research** for a project on "**Damage Detection on Composite Wing of Unmanned Air Vehicle using FBG sensors**".

Professor Aktas has **PhD** and **Master** degrees in **Civil Engineering** from the **University of Pittsburgh** (**USA**) and **Bachelor** degree in **Civil Engineering** from **Middle East Technical University** (**Turkey**). Further, he had served as a **Post-Doctorate** in **US Naval Research Laboratory** (**ASEE/NRL Fellow**) in **Washington DC**, **USA**. Moreover, he is a **Certified Instructor/Trainer** and a well-respected member of the **Union of Chambers of Engineers and Architects of Turkey**, the **Earthquake Engineering Association of Turkey** and the **International Association for Bridge Maintenance and Safety** (**IABMAS**).

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 24th of August 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Overview of Reinforced Concrete Structures**: Materials, Properties, & The Significance of Reinforced Concrete in Construction*
0900 - 0930	***Principles of Reinforced Concrete Design**: Basic Concepts including Stress-Strain Relationships, Durability, & The Role of Reinforcement*
0930 – 0945	*Break*
0945 – 1030	***Codes & Standards for Design**: Review of Key Codes & Standards (e.g., ACI, Eurocode) Guiding Reinforced Concrete Design*
1030 – 1130	***Load Considerations & Analysis Methods**: Understanding Dead, Live, & Dynamic Loads & their Application in Structural Analysis*
1130 – 1245	*Break*
1245 – 1320	***Flexural Analysis of Beams**: Theory & Principles Behind the Flexural Analysis of Reinforced Concrete Beams*
1320 - 1420	***Basic Design of Slabs**: Types of Slabs, Load Distribution, & Introductory Design Considerations*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 25th of August 2025***

0730 – 0830	***Advanced Flexural Design of Beams**: Detailed Methodologies for the Design of Beams Under Various Loading Conditions*
0830 - 0930	***Shear & Torsion in Beams**: Analysis & Design Approaches for Shear & Torsional Forces in Reinforced Concrete Beams*
0930 – 0945	*Break*
0945 – 1100	***Deflection Control in Beams & Slabs**: Calculation Methods & Limits for Deflections in Beams & Slabs*
1100 – 1230	***Design of One-way & Two-way Slabs**: Detailed Design Procedures for One-Way & Two-Way Slab Systems*
1230 – 1245	*Break*
1245 – 1420	***Reinforcement Detailing Practices**: Best Practices & Standards for the Detailing of Reinforcement in Beams & Slabs*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3:	***Tuesday, 26th of August 2025***
0730 – 0830	***Design Principles of Short & Long Columns**: Differences in Design Approach for Short & Long Columns Under Axial Loads & Bending*
0830 - 0930	***Interaction Diagrams for Column Design**: Utilization of Interaction Diagrams in the Design of Reinforced Concrete Columns*
0930 – 0945	*Break*
0945 – 1100	***Design of Slender Columns**: Considerations & Methodologies for the Design of Slender Columns Subject to Buckling*
1100 – 1230	***Reinforced Concrete Walls**: Types, Design Considerations, & Detailing of Reinforced Concrete Walls for Structural & Seismic Requirements*
1230 – 1245	*Break*
1245 – 1320	***Foundation Design Basics**: Design of Shallow & Deep Foundations in Reinforced Concrete Structures*
1320 - 1420	***Case Study**: Column and Wall Design Analysis: Practical Application of Column & Wall Design Concepts in Real-World Scenarios*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4:	***Wednesday, 27th of August 2025***
0730 – 0830	***Seismic Design Principles**: Overview of Seismic Design Considerations for Reinforced Concrete Structures*
0830 - 0930	***Ductility Requirements & Detailing for Seismic Resistance**: Detailed Examination of Ductility Considerations & Reinforcement Detailing for Seismic Resistance*
0930 – 0945	*Break*
0945 – 1100	***Seismic Analysis Methods**: Methods of Seismic Analysis, including Equivalent Static Force & Dynamic Analysis Methods*
1100 – 1230	***Design of Structural Elements for Seismic Loads**: Specific Design Considerations for Beams, Columns, & Walls Under Seismic Loading*
1230 – 1245	*Break*
1245 - 1320	***Performance-Based Seismic Design**: Concepts & Application of Performance-Based Approaches to Seismic Design*
1320 – 1420	***Seismic Retrofitting Techniques**: Methods & Techniques for Retrofitting Existing Reinforced Concrete Structures for Improved Seismic Performance*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5:	***Thursday, 28th of August 2025***
0730 – 0830	***Design for Durability & Fire Resistance**: Considerations for Enhancing the Durability & Fire Resistance of Reinforced Concrete Structures*
0830 – 0930	***Prestressed Concrete Fundamentals**: The Principles & Design of Prestressed Concrete Elements*
0930 – 0945	*Break*
0945 – 1130	***Sustainability in Reinforced Concrete Design**: Approaches & Materials for Sustainable Reinforced Concrete Construction*
1130 - 1200	***Case Studies in Complex Structures**: Analysis of the Design & Construction of Complex Reinforced Concrete Structures*

1200 - 1215	*Break*
1215 – 1300	***Innovations in Reinforced Concrete**: Overview of New Materials, Techniques, & Technologies in Reinforced Concrete Design*
1300 - 1315	***Course Conclusion***
1315 – 1415	***COMPETENCY EXAM***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises: -

Course Coordinator

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