



COURSE OVERVIEW SE0014 Analysis & Design of Reinforced Concrete Structures

Course Title

Analysis & Design of Reinforced Concrete Structures

Course Date/Venue

Session 1: August 25-29/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Session 2: November 10-14,2024/Boardroom, Warwick Hotel Doha, Doha, Qatar



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.

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


Al Khobar	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.
Doha	US\$ 6,000 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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:


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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.

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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.



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:



Mr. Steve Magalios, CEng, PGDip (on-going), MSc, BSc, is a **Survey & Pipeline Engineer** with almost **40 years** of extensive **On-shore/Offshore** experience in the **Oil & Gas, Construction, Refinery and Petrochemical** industries. His expertise widely covers in the areas of **Pipeline Operation & Maintenance, Pipeline Systems, Pipeline Design & Construction, Pipeline Repair Methods, Pipeline Engineering, Pipeline Integrity Management System (PIMS), Pipeline Pigging, Piping & Pipe Support Systems, Piping Systems & Process Equipment, Piping System Repair & Maintenance, Piping Integrity Management, Computer Aided Design (CAD), Building & Road Design Skills, Civil Engineering Design, Structural Reliability Engineering, Road Construction & Maintenance, Concrete Structures & Building Rehabilitation, Reinforced Concrete Structures Protection, Geosynthetics & Ground Improvement Methods, Blueprint Reading & Interpretation, Blue Print Documentation, Mechanical Drawings, P&ID, Flow Diagram Symbols, Land Surveying & Property Evaluation, Cartographic Representation, Soil Classification, Cadastral Surveying & Boundary Definition, Project Engineering & Design, Construction Management, Project Planning & Execution, Site Management, Site Supervision, Effective Resource Management, Project Evaluation, FEED Management, EPC Projects Design, Project Completion & Workover, Quality Control and Team Management.** He is also well-versed in Lean & Sour Gas, Condensate, **Compressors, Pumps, Flare Knockout Drum, Block Valve Stations, New Slug Catcher, Natural Gas Pipeline & Network, Scraper Traps, Burn Pits, Risk Assessment, HSE Plan & Procedures, Quality Plan & Procedures, Safety & Compliance Management, Permit-to-Work Issuer, ASME, API, ANSI, ASTM, BS, NACE, ARAMCO & KOC Standards, MS Office tools, AutoCAD, STAAD-PRO, GIS, ArcInfo, ArcView, Autodesk Map** and various programming languages such as FORTRAN, BASIC and AUTOLISP. Currently, he is the **Chartered Professional Surveyor Engineer & Urban-Regional Planner** wherein he is deeply involved in providing exact data, measurements and determining properly boundaries. He is also responsible in preparing and maintaining sketches, maps, reports and legal description of surveys.

During his career, Mr. Magalios has gained his expertise and thorough practical experience through challenging positions such as a **Project Site Construction Manager, Construction Site Manager, Project Manager, Deputy PMS Manager, Head of the Public Project Inspection Field Team, Technical Consultant, Senior Consultant, Consultant/Lecturer, Construction Team Leader, Lead Pipeline Engineer, Project Construction Lead Supervising Engineer, Lead Site Engineer, Senior Site Engineer Lead Engineer, Senior Site Engineer, R.O.W. Coordinator, Site Representative, Supervision Head and Contractor** for international Companies such as the Penspen International Limited, Eptista Servicios de Ingenieria S.I., J/V ILF Pantec TH. Papaioannou & Co. – Emenergy Engineering, J/V Karaylannis S.A. – Intracom Constructions S.A., Ergaz Ltd., Alkyonis 7, Palaeo Faliro, Piraeus, Elpet Valkaniki S.A., Asprofos S.A., J/V Depa S.A. just to name a few.

Mr. Magalios is a **Registered Chartered Engineer** and has **Master and Bachelor** degrees in **Surveying Engineering** from the **University of New Brunswick, Canada** and the **National Technical University of Athens, Greece**, respectively. Further, he is currently enrolled for **Post-graduate** in **Quality Assurance** from the **Hellenic Open University, Greece**. He has further obtained a **Level 4B Certificates** in **Project Management** from the **National & Kapodistrian University of Athens, Greece** and **Environmental Auditing** from the **Environmental Auditors Registration Association (EARA)**. Moreover, he is a **Certified Instructor/Trainer**, a **Chartered Engineer** of **Technical Chamber of Greece** and has delivered numerous trainings, workshops, seminars, courses and conferences internationally.





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

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

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

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

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

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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