

Short Course in

Structural Analysis and Design of Reinforced Concrete Structures

Short Course Overview

This three-day course has been specifically designed to provide the underpinning skills and knowledge necessary to be able to meet the design requirements for the analysis and design of reinforced concrete structures according to Australian Standards and includes:

- Key design considerations and present various methods of analysis suitable for different types of structural systems.
- Detailed demonstration of the application of the design requirements and corresponding methods for analysis of real-world structures using a structural design software package (*SPACE GASS*).
- Review the content of structural reports and explains how to utilise results obtained from *SPACE GASS* to produce structural reports and detailing requirements with clarity and conciseness.

The course is designed for civil and/or mechanical engineers who wish to gain further knowledge and skills on structural engineering analysis and modern design methods.

Learning Outcomes

On completion of this course, participants will be able to:

- Apply design procedures according to Australian standards.
- Complete the structural analysis and design of a reinforced concrete structure.
- Produce structural reports and detailing based on results obtained from a structural engineering software program (*SPACE GASS version 2021*).

Duration

The course will be delivered over three days. It runs from 9:30am to 3:45pm per day, with tea and lunch breaks.

Delivery Methods

The School provides a high level of support with tuition by discipline experts and exposure to industry structural design software. The delivery mode of this short course consists of face-to-face lectures integrated with workshops.

About the Presenter

Dr Themelina Paraskeva holds a PhD degree and a MSc in Structural Engineering. Her teaching areas are design of structures, structural dynamics, and nonlinear analysis methods. She has worked as a Structural Engineer for more than ten years, in heavy civil engineering projects and smaller-scale works. Themelina is a Lecturer and Course Coordinator for Civil Engineering at the School of Engineering, Edith Cowan University.

Course Details

Date: 10-12 October 2022

Time: 9:30 AM – 3:45 PM

Venue: Building 23, School of Engineering, ECU Joondalup Campus

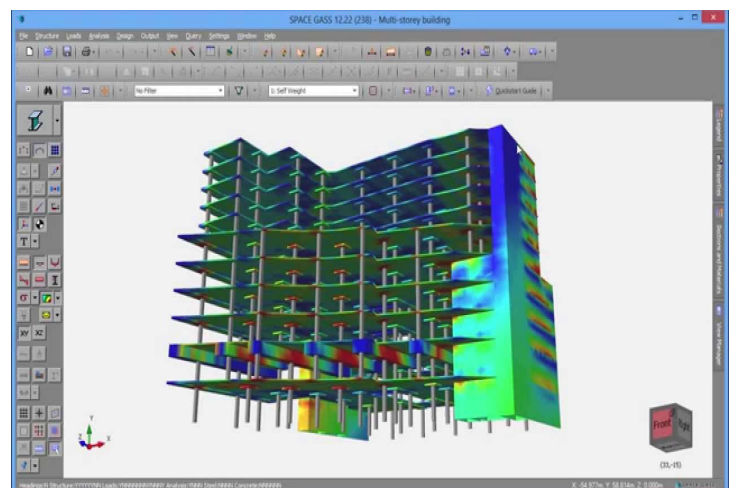
Cost: \$2,900 plus GST

*This cost includes tea and lunch.

**ECU students and alumni are eligible to receive a discount. Contact seadmin@ecu.edu.au for more information.

Bookings and Enquiries

Any general enquiries regarding the course, please contact seadmin@ecu.edu.au.



Appendix 1 – Short Course Program

Day 1	
Part A: Structural analysis and design requirements	
1.1	Design procedures This section provides a broad overview on design procedures according to Australian Standards for reinforced concrete structures.
1.2	Actions and combinations of actions This section focuses on the actions and loads that must be considered in the structural analysis and design of a structure, as well as the combinations of those actions and loads. Further explanations on the calculation of the wind loads, as well as the consideration of earthquake loads and other dynamic loads are provided.
Part B: Application in SPACE GASS	
In this part of the course, students develop a numerical model of a reinforced concrete structure in SPACE GASS, by applying the structural analysis and design requirements introduced in Part A.	
Day 2	
Part A: Structural analysis methods	
2.1	Dynamic Frequency (Modal) Analysis This section introduces structural dynamics, and explains the significance of the dynamic frequency (modal) analysis of the structure before conducting any other method of analysis. It provides the basic concepts on the estimation of the dynamic characteristics and the natural vibration frequencies of a real-world structure. It focuses on understanding the natural modes of vibration and their contribution to the performance of the structure under various types of loads. Guidelines on how to identify possible simulation errors through the frequency analysis will also be provided.
2.2	Structural analysis methods This section presents the various methods of analysis, such as (i) static analysis, including both elastic and non-linear; (ii) dynamic response analysis; and (iii) dynamic time-history analysis. It explains the applicability of each method of structural analysis considering Australian Standards requirements.
Part B: Application in SPACE GASS.	
In this part of the course, students select and apply suitable methods for analysis and design of a real-world structure in SPACE GASS.	

Day 3

Part A: Structural design reports

3.1 Developing efficient structural design reports

One of the major tasks of a Structural Engineer, besides conducting a good analysis and design of the structural model, is how to interpret the design in the form of a structural report. The structural report must be as clear and simple as possible, in order for the reviewer to interpret and understand the important parts of the analysis and the design of the structure. The structural report is one of the primary requirements of a structural design submission.

This part of the course, aims to provide an overview of the sections that should be considered in a structural report. Students will learn how to export the required results from the structural design software (SPACE GASS), and how to process the obtained data to include them into the structural report.

Part B: Detailing of reinforcement

3.2 Developing detailing of reinforcement

Detailing of the reinforcement involves the translation of a good structural design from the computer into the final structure. If the drawings are poor, the actual reinforcing provided on site may not match the designer's expectations. Poor quality drawings result in increased costs in the material supply and construction sectors and loss in valuable time. Detailing is also important for durability, as poor placement of reinforcement leads to insufficient cover and long term problems.

The aim of this part of the course is to provide the guiding principles for the detailing requirements according to Australian Standards. It also aims to guide professionals towards a uniform method of communicating the design requirements to the construction team with clarity and conciseness, to ensure that there will be no confusion from misinterpretation of the drawings.

Examples of good detailing will be developed based on the results and drawings obtained by the numerical analysis of the structural model in SPACE GASS during the practical component of this session.