



Dept. of Civil Engineering | Masters module | CPD course

Introduction to Finite Element Modelling in Structural Analysis

Presented in person at UCT: 9 – 13 June 2025



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD



Introduction



Masters Programme: Structural Engineering and Materials:

The programme offers high level training in structural design, structural analysis and structural materials by providing sound theoretical background and encouraging critical and innovative thinking. Students benefit from expertise in concrete technology, concrete durability, structural performance and design, computational mechanics and finite element analysis. The programme is supported by excellent laboratory and computing facilities and draws from cutting edge research including the in-house developed structural analysis software SESKA.

All programmes can be completed in a minimum of two years full-time or may be taken over an extended

period of a maximum of five years.

CPD Courses: Three of these master's modules are offered as individual short courses in 2025. Continuing Professional Development students may take each module as a separate certificate course. CPD students are required to attend the lectures but are not required to submit assignments or write the exam.

Who Should Attend?

Applicants may register for the individual master's level courses offered by the programme as Continuing Professional Development students. CPD participants are required to have a BSc (Eng) or BEng qualification in civil, mechanical, marine or aerospace engineering. The programme has been designed to be accessible to people in full-time employment as well as full-time students. CPD students will be awarded a Certificate of Attendance which will allow them to claim CPD points.

Format

This course is presented face-to-face over 5 days at the University of Cape Town. Details will be supplied closer to the time. Venue of lectures is the PG Seminar room in the New Engineering Building (NEB) at upper campus.

Course Content

The course will provide an introduction to finite element modelling theory, typical applications in structural engineering and recommendations. The following topics are included: Fundamental approaches and solution strategies in finite element modelling; linear and non-linear structural problems; different types of non-linearity in structural engineering; implication of the various mesh types including truss, beam, plate and shell elements; the effects of h and p mesh refinements and mesh quality; different types of structural supports including rigid supports, elastic bedding, kinematic constraint supports, the influence on stress distribution and recommendations of suitable application; different treatment of concentrated loads and distributed loads and the effect of mesh resolution. The theoretical concepts will be consolidated by means of finite element modelling practicals with a focus, firstly, on design and analysis of reinforced and/or prestressed concrete structures such as deep beams, slabs, bridge decks or retention dams, and secondly, elastoplastic analysis of steel structures such as custom-built plate girders or silos.

Course Outcomes

On completion of this course students will have:

- Knowledge and understanding of the underlying principles of finite elements;
- Knowledge and understanding of the applicability and constraints of finite element analysis in structural design;
- Knowledge and understanding of the suitability of the different types of finite elements for structural problems;
- Knowledge and understanding of the different types of constitutive laws and their applicability;
- Knowledge and understanding of the different types of non-linearity occurring in structural engineering;
- Knowledge and understanding of the assumptions and applicability of linear structural analysis as opposed to non-linear analysis;
- The ability to use accurate finite element analysis of stress and deformation in simple and more complicate steel and concrete structures.

Course Convenor



Prof Sebastian Skatulla is a Professor of Structural Engineering and Mechanics in the Department of Civil Engineering and in the Centre for Research in Computational and Applied Mechanics (CERECAM). He graduated as Diplom Bau-Ingenieur (TH) from the Karlsruhe Institute of Technology (KIT) in 2003. He was awarded his PhD degree in Mechanical Engineering from the University of Adelaide in 2007 and subsequently took up a postdoctoral fellowship at the University of Nottingham conducting research in the fields of generalized continuum methods and electro-mechanical coupling of Electroactive Polymers. His current research activities are focused on computational biomechanics with an emphasis on cardiac mechanics. Recently, he started exploring the poroelasticity of sea-ice and reinforced concrete. He serves as President of the South African Association for Theoretical and Applied Mechanics (SAAM) since 2016 and as a Member of the Board of Directors of the International Society for Computing in Civil and Building Engineering (ISCCBE) since 2015.

Overview

Course	Introduction to Finite Element Modelling in Structural Analysis
Programme	Masters in Structural Engineering and Materials: Introduction to FEM in Structural Analysis (CIV5142Z): 9 – 13 Jun 2025 Stability and Design in Steel Structures (CIV5112Z): 8 – 12 Sep 2025 Digital Twins and BIM (CIV5163Z): 13 – 17 Oct 2025
Duration	9 – 13 June 2025 (5 days)
Venue	PG Seminar Room, NEB, Upper Campus, University of Cape Town
CPD Points	5 CPD points, ECSA validation no: UCTSEMIFEM2025
Fees	Standard fee R17 300 UCT staff and students: R8 650

Registration

Registration and Cancellation

- [Register for this course](#)
- Registration covers attendance of all sessions of the course and course material.
- Registrations close one week before the start of the course. Confirmation of acceptance will be sent on receipt of a registration form.
- **Cancellations must be received one week before the start of a course, or the full course fee will be charged.**
- For more information on application and registration procedures, please visit our website: www.cpd.uct.ac.za

Certificates and CPD Points

A digital certificate of attendance will be awarded to CPD participants. Participants need to attend 80% of the lectures to qualify for an attendance certificate. For further information on digital certificates please visit [Digital Certificates at UCT](#)

Please note: If you are interested in attending this course for credit purposes, you will need to register for the master's programme or as an occasional student. If you attend the course as a CPD participant, credit cannot be claimed in retrospect.

For further information on the master's programme please see the website: [Structural Engineering and Mechanics | University of Cape Town](#)

Contact details

For more information or details on CPD courses, visit our website or contact us.

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