Source Outline

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1. Staff c

Contact details and consultation times for course convenor

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Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Please see the course Moodle. Demonstrators will be announced closer to semester start.

2. Important links

Moodle
Lab Access
Computing Facilities
Student Resources
Course Outlines
Engineering Student Support Services Centre

3. Course details

Credit points

This is a 6 unit-of-credit (UoC) course, and involves 4 hours per week (h/w) of face-to-face contact.

Contact hours

Day	Time	Location

Summary and Aims of the course

This course will teach you to analyse real world structural mechanics problems using the finite element method. You will be introduced to the mathematical basis of finite element analysis, on which nearly all structural analysis software is built. You will learn how to apply commercially available finite element software to solve real-world engineering problems. The course will cater to the specific challenges of engineers across all mechanical disciplines (Aerospace, Manufacturing, Mechanical and Mechatronic). Any student wishing to extend their structural analysis skills should take this course.

The primary aim of this course is to train you to solve complex engineering structural mechanics problems with finite element analysis. The course will provide deep insight into the operation of finite element analysis software by teaching you the underlying computational methods involved. You will be taught to execute a detailed finite element study including planning, modelling, meshing, solving, evaluating results and validating against real world data.

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

Learning Outcome		**EA Stage 1 Competencies**
1.	Apply fundamental finite element analysis techniques to solve simple engineering problems	2.1, 2.2
2.	Explain the underlying mathematics behind finite element analysis software solvers	1.2, 3.2
3.	Plan and execute appropriaTQQ EMC q87.391 27364 273.2	

4. Teaching strategies

The approach to teaching in this class is shaped by a range of formal and informal best-practice approaches. The objective, when at all possible, is for you to experience the concepts in multiple modes (theory, example problems, simulations, demonstrations, etc.). New teaching strategies and teaching technologies are deployed every year to ensure that the course is as up-to-date as possible to leading teaching standards.

This course includes two face-to-face teaching methods:

1. Lectures to introduce fundamental finite element analysis concepts
2. Software laboratories to apply fundamental concepts in common finite element analysis packages

In addition to the face-to-face teaching, a range of blended techniques will be used through Moodle to engage you with independent learning. The major assignment, for example, includes a significant research component which will allow you to study an engineering problem which is specific to your own interests.

5. Course schedule

Week	Date	Name

6. Assessment

Assessment overview

Assessment	Weight	Due date and submission requirements	Deadline for absolute fail	Marks returned	Group Project? (# Students per group)	Length

Assignments

Group Assignment

Finite Element Analysis is numerically intensive and is exclusively solved by powerful computers for all real engineering problems. Modern software packages hide the majority of complex tasks from the user. Unfortunately, this level of automation can lead to the false belief that FEA is an infallible tool. It is important that you as an engineer understand the computations being conducted on your behalf in order to understand their limitations and possible errors that can appear in your analyses. This assignment will teach you the fundamentals of the Finite Element Method through hand calculations and simple programming.

As in the professional practice of engineering, you will not choose the team that you work with; however, you may assign the different elements of the task among team members as you see fit. A group ‘peer assessment’ tool will be used to measure team member contribution and marks adjusted accordingly.

Feedback given on this report is intended to assist you in understanding the expectations of the Major Project draft and final reports.

Major Project

You will complete a flexible major project which will form the largest component of the assessment for the course. You may choose from a selection of project topics partially prewritten by the demonstrators. The topics will be broad enough to encourage you to solve the problem creatively.

The project will be a current FE simulation challenge in scientific or engineering literature or from a relevant engineering discipline. The assessment will be broken into pieces to ensure that adequate progress is being made throughout the semester:

Presentation

All submissions are expected to be neat

details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

7. Learning resources for students

Microsoft Teams and OneNote

Microsoft's new communication platform, Microsoft Teams, will be used for most communication in this course. It has native apps for Windows, Android, iOS and more. OneNote will be used to distribute the class notes (embedded in Teams).

myAccess and Matlab

UNSW myAccess provides access to your engineering software from many different devices. This course will use Matlab extensively, which is available through myAccess and the computer labs.

Learning Management System

The Moodle LMS, https://moodle.telt.unsw.edu.au/ will also be used for this course

UNSW Library

UNSW Library website: https://www.library.unsw.edu.au/

Textbooks (Suggested)

Chandrupatla, T. R., Belegundu, A. D. (2011) Introduction to Finite Elements in Engineering, 4th Ed, Prentice Hall (Pearson)
Cook, R. D., Malkus, D. S., Plesha, M. E., Witt, R. J. (2002). Concepts and Applications of Finite Element Analysis, 4th Ed, John Wiley & Sons.

8. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, recent improvements resulting from student feedback include:

Introducing a group assignment to smooth your transition into the course.
Spreading assessments out over the semester more evenly.
Streamlining the topic selection process so that you are provided with more structure.

Academic honesty and plagiarism

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals