

# MECH 7002 ADVANCED COMPUTER AIDED ENGINEERING

**Credit Points** 10

**Legacy Code** 301022

**Coordinator** Richard Yang ([https://directory.westernsydney.edu.au/search/name/Richard Yang/](https://directory.westernsydney.edu.au/search/name/Richard%20Yang/))

**Description** This unit focuses on advanced topics in computer aided engineering and their applications in mechanical engineering in analysing a wide range of engineering problems. The objective of this unit is to advance students' knowledge and skill level on the finite element method (FEM)-based computer aided engineering (CAE) and its advanced applications in the fields of solid mechanics, fluid mechanics, thermodynamics and heat transfer and product design and development as well. Academic skills on research and communication are ensured to be achieved through conducting FEM-based CAE projects.

**School** Eng, Design & Built Env

**Discipline** Mechanical Engineering

**Student Contribution Band** HECS Band 2 10cp

**Level** Postgraduate Coursework Level 7 subject

## Restrictions

Students must be enrolled in 3693 Master of Engineering, 3695 Graduate Certificate in Engineering, or the Master of Research.

## Assumed Knowledge

Students are assumed to have a good understanding on basics of finite element method and analysis, fundamentals and advanced topics in mechanics of materials, fundamentals on fluid mechanics and heat transfer and thermal dynamics.

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. apply the basic and fundamental principles of finite element method on solving typical engineering problems with aids from computer modelling and simulation;
2. investigate and explain boundary conditions, mesh generation, error control and other practical considerations in finite element models for conducting finite element analyses for different types of problems;
3. implement finite element method into design process for optimal solution;
4. apply commonly-used finite element programs to solve practical engineering problems in the following fields: a. Solid mechanics b. Flumechanics c. Thermodynamics and heat transfer d. Optimisation design e. Product design and development

## Subject Content

1. Review on fundamentals of finite element method
2. Finite element methods (spring, bar, beam, solid, shell and plate elements)
3. Boundary conditions, mesh generation, error control and other practical considerations

4. Finite element analysis on Solid Mechanics Problems (Linear and Nonlinear Finite Element Analysis)
5. Finite element analysis on Fluid Mechanics Problems
6. Finite element analysis on Thermodynamics and Heat Transfer Problems
7. FEA-based design optimisation
8. Computer aided engineering and product design and development

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/ Group Task
Tutorial Assignments	3 x approx. 6 pages each	30	N	Individual
Four Lab Reports	4 x approx. 5 pages each	20	N	Individual
CAE Project	15-min oral presentation conducted in class and marked individually (5%) and CAE project report marked as group work(30%)	35	Y	Individual
Two Quizzes	1 hour each including ten minutes reading time	15	N	Individual

Teaching Periods

## Spring

**Parramatta City - Macquarie St**

### Day

**Subject Contact** Richard Yang ([https://directory.westernsydney.edu.au/search/name/Richard Yang/](https://directory.westernsydney.edu.au/search/name/Richard%20Yang/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=MECH7002\\_22-SPR\\_PC\\_D#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MECH7002_22-SPR_PC_D#subjects))