

# MECH 4002 COMPUTER AIDED ENGINEERING

Credit Points 10

Legacy Code 301000

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

**Description** This subject describes the basics and fundamentals of computer aided engineering focusing on the advanced topics of finite element methods, which is a powerful numerical tool for analysing a wide range of engineering problems. Through applied projects students will apply the finite element method (FEM)-based computer aided engineering (CAE) and its applications in the fields of solid mechanics, fluid mechanics, thermodynamics and heat transfer and product design and development as well. The development of students' academic skills in research and communication are also achieved through the completion of FEM-based CAE projects.

**School** Eng, Design & Built Env

**Discipline** Mechanical Engineering

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

Check your fees via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 4 subject

**Pre-requisite(s)** ENGR 3020

## 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 solid mechanics
5. Apply commonly-used finite element programs to solve practical engineering problems in fluid mechanics and thermodynamics and heat transfer

## Subject Content

Review on fundamentals of finite element method  
 3-D finite element methods (solid, shell and plate elements)  
 Boundary conditions, mesh generation, error control and other practical considerations  
 Finite element analysis on Solid Mechanics Problems (Linear and Nonlinear Finite Element Analysis)  
 Finite element analysis on Fluid Mechanics Problems  
 Finite element analysis on Heat Transfer Problems  
 FEA-based design optimisation  
 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.

| Type                      | Length                                      | Percent | Threshold | Individual/<br>Group Task |
|---------------------------|---------------------------------------------|---------|-----------|---------------------------|
| Numerical Problem Solving | 3 × approximately 1000 words each           | 30      | N         | Individual                |
| Practical                 | 4 × approximately 1,000 words each          | 20      | N         | Individual                |
| Quiz                      | 1 hour (per Quiz)                           | 15      | N         | Individual                |
| Presentation              | 3 minutes (presentation) 8,000-10,000 words | 35      | Y         | Both (Individual & Group) |

Teaching Periods

## Sydney City Campus - Term 1 (2024)

### Sydney City

#### On-site

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

View timetable ([https://classregistration.westernsydney.edu.au/event/timetable/?subject\\_code=MECH4002\\_24-SC1\\_SC\\_1#subjects](https://classregistration.westernsydney.edu.au/event/timetable/?subject_code=MECH4002_24-SC1_SC_1#subjects))

## Spring (2024)

### Penrith (Kingswood)

#### On-site

**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/event/timetable/?subject\\_code=MECH4002\\_24-SPR\\_KW\\_1#subjects](https://classregistration.westernsydney.edu.au/event/timetable/?subject_code=MECH4002_24-SPR_KW_1#subjects))

## Parramatta City - Macquarie St

#### On-site

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

View timetable ([https://classregistration.westernsydney.edu.au/event/timetable/?subject\\_code=MECH4002\\_24-SPR\\_PC\\_1#subjects](https://classregistration.westernsydney.edu.au/event/timetable/?subject_code=MECH4002_24-SPR_PC_1#subjects))

## Sydney City Campus - Term 3 (2024)

### Sydney City

#### On-site

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

View timetable ([https://classregistration.westernsydney.edu.au/event/timetable/?subject\\_code=MECH4002\\_24-SC3\\_SC\\_1#subjects](https://classregistration.westernsydney.edu.au/event/timetable/?subject_code=MECH4002_24-SC3_SC_1#subjects))