MECH 7002 ADVANCED COMPUTER AIDED ENGINEERING

Credit Points 10

Legacy Code 301022

Coordinator Richard Yang (https://directory.westernsydney.edu.au/search/name/Richard Yang/)

Description This subject 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 subject 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

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Postgraduate Coursework Level 7 subject

Restrictions

Students must be enrolled in a postgraduate program or in the 8083 Bachelor of Research Studies.

Assumed Knowledge

Students should have a good understanding of the basics of finite element method and analysis, the fundamentals and advanced topics in mechanics of materials, the 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.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Numerical Problem Solving	3 x approx. 6 pages each	30	N	Individual	N
Practical	4 x approx. 5 pages each	20	N	Individual	N
Applied Project	Presentation (15 mins) Standard Technical Report 8000 Words	35	Y	Group/ Individual	Y
Quiz	1 hour (each)	15	N	Individual	N

Teaching Periods

Spring (2025)

Parramatta City - Macquarie St

Hybrid

Subject Contact Richard Yang (https://directory.westernsydney.edu.au/search/name/Richard Yang/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=MECH7002_25-SPR_PC_3#subjects)