

CIVL 7005 ADVANCED NUMERICAL METHODS IN ENGINEERING

Credit Points 10

Legacy Code 301024

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Description The finite element method is an essential tool for the analysis and design of machine parts and civil engineering structures. The objective of this unit is to introduce the principles of finite element method and the applications of one, two and three dimensional elements in solving various engineering problems.

School Eng, Design & Built Env

Discipline Structural Engineering

Student Contribution Band HECS Band 2 10cp

Level Postgraduate Coursework Level 7 subject

Restrictions

Students must be enrolled in a postgraduate program

Assumed Knowledge

Students should have prior knowledge of strain, stress and deflection analysis of simple structures as well as knowledge of energy principle for structural analysis.

Learning Outcomes

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

1. Apply the principles of finite element theory to analyse the mechanical behaviours of 1D, 2D and 3D structural components;
2. Formulate finite element algebraic equations for elasticity;
3. Determine the element stiffness matrices for 1D, 2D and 3D elements;
4. Evaluate the workings and limitations of commercial finite element packages;
5. Solve practical engineering problems by using finite element method.

Subject Content

1. Constitutive stress-strain relationships in elasticity;
2. Strain-displacement relationship;
3. Potential energy in elastic body;
4. Principle of minimum potential energy;
5. Finite element method for 1D analysis;
6. Shape functions;
7. 2D plane stress analysis including triangular elements, quadrilateral elements;
8. Finite elements for plates and shells;
9. 3D solid elements;
10. Constraints and pressure loadings;
11. Stress and strain results.

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
2 x 1-hour In-Class Quiz (20% each)	1 hour each	40	N	Individual
10 x Tute Assessment (in-class)	2 pages each	5	N	Individual
Final Exam (short answers)	2 hours	55	N	Individual

Teaching Periods

Spring

Parramatta City - Macquarie St

Day

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View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=CIVL7005_22-SPR_PC_D#subjects)