

CIVL 4001 APPLIED MECHANICS

Credit Points 10

Legacy Code 300986

Coordinator Baolin Wang (<https://directory.westernsydney.edu.au/search/name/Baolin Wang/>)

Description Applied mechanics deals with the mechanical responses of structural components under various loading and support conditions. This subject will introduce the theoretical foundations and solution methods for the stability and dynamic responses of beams, columns and plates and their associated applications in engineering practices.

School Eng, Design & Built Env

Discipline Structural 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 Undergraduate Level 4 subject

Pre-requisite(s) CIVL 3014

Assumed Knowledge

Student should have prior knowledge of strain, stress and deflection analysis of simple structures.

Learning Outcomes

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

1. Explain the buckling and vibration behaviours of structural components;
2. Derive the governing equations for the buckling and vibration of structural components;
3. Solve the governing equations analytically for buckling and vibration of beams, columns and plates;
4. Solve the governing equations numerically for buckling and vibration of beams, columns and plates;
5. Apply the buckling and vibration analysis to solve practical engineering problems.

Subject Content

1. Introduction to the buckling behaviour of structures; Governing equations for the buckling of columns;
2. Analytical solutions for simple column buckling cases;
3. Applications of buckling analysis of columns in structural design;
4. Introduction to the vibration behaviour of structures; Governing equations for the free vibration of beams;
5. Analytical solutions for simple beam free vibration cases;
6. Applications of vibration analysis of beams in engineering practices;
7. Introduction to the thin plate theory; Governing equations for the buckling of plates;
8. Analytical solutions for simple plate buckling cases;
9. Governing equations for the vibration of plates; analytical solutions for simple plate vibration cases;
10. Applications of buckling and vibration analysis of plates in engineering practices;

11. Numerical methods for buckling and vibration analysis of structures;
12. Analysis of complex buckling and vibration cases for beams, columns and plates by numerical methods.

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 |
|------------|----------------------------|---------|-----------|------------------------|-----------|
| Case Study | 2 x 1 hour each (20% each) | 40 | N | Individual | Y |
| Case Study | 2 page each | 5 | N | Individual | Y |
| Case Study | 2 hours | 55 | N | Individual | Y |

Teaching Periods

Sydney City Campus - Term 2 (2025)

Sydney City

On-site

Subject Contact Eileen An (<https://directory.westernsydney.edu.au/search/name/Eileen An/>)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=CIVL4001_25-SC2_SC_1#subjects)