



Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: Solid Mechanics

Unit ID: ENPG9301

Credit Points: 15.00

Prerequisite(s): Nil

Co-requisite(s): Nil

Exclusion(s): (ENGRG2301)

ASCED: 030701

Description of the Unit:

This unit introduces the basics of stress and strain analysis in mechanics of solids. Students learn about different types of stress and strain, explore how materials behave under load, and conduct experiments relevant to the field of solid mechanics. They also apply their understanding to solve engineering problems. By the end, students have a solid foundation in stress and strain principles and their practical application in engineering.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment.

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	■	■	■	■	■	■

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:

Knowledge:

- K1.** Describe the fundamental principles of mechanics of solids, including stress, strain, and deformation.
- K2.** Recognize different types of loads and their effects on solid materials.

Skills:

- S1.** Apply mathematical equations and formulas to calculate stress, strain, and deflection in solid structures under various loading conditions.
- S2.** Perform laboratory experiments to validate theoretical predictions.
- S3.** Solve engineering problems related to the design and analysis of solid components and structures

Application of knowledge and skills:

- A1.** Apply principles of mechanics of solids to solve real-world engineering problems encountered in engineering.
- A2.** Communicate and present engineering concepts and solutions effectively using appropriate technical terminology and visualization techniques

Unit Content:

Topics may include:

1. Axial stress and axial strain
2. Shear stress and shear strain
3. General beam bending theory
4. Beam subjected to combined bending and axial loads
5. Composite beams
6. Shear stresses in beams
7. Torsion of circular bars and tubes
8. Stress transformation equations and Mohr`s circle
9. Stress analysis under plane stress conditions
10. Deflection of beams
11. Buckling of columns

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are be embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students will demonstrate the ability to effectively communicate, inter-act and work with others both individually and in groups. Students will be required to display skills in-person and/or online in: <ul style="list-style-type: none"> Using effective verbal and non-verbal communication Listening for meaning and influencing via active listening Showing empathy for others Negotiating and demonstrating conflict resolution skills Working respectfully in cross-cultural and diverse teams. 	Not applicable	Not applicable
FEDTASK 2 Leadership	Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in: <ul style="list-style-type: none"> Creating a collegial environment Showing self-awareness and the ability to self-reflect Inspiring and convincing others Making informed decisions Displaying initiative 	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: <ul style="list-style-type: none"> Reflecting critically Evaluating ideas, concepts and information Considering alternative perspectives to refine ideas Challenging conventional thinking to clarify concepts Forming creative solutions in problem solving. 	Not applicable	Not applicable
FEDTASK 4 Digital Literacy	Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: <ul style="list-style-type: none"> Finding, evaluating, managing, curating, organising and sharing digital information Collating, managing, accessing and using digital data securely Receiving and responding to messages in a range of digital media Contributing actively to digital teams and working groups Participating in and benefiting from digital learning opportunities. 	Not applicable	Not applicable
FEDTASK 5 Sustainable and Ethical Mindset	Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in: <ul style="list-style-type: none"> Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts Committing to social responsibility as a professional and a citizen Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses Embracing lifelong, life-wide and life-deep learning to be open to diverse others Implementing required actions to foster sustainability in their professional and personal life. 	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, S1, S3, A2	Participation in all learning activities including attendance and participation in lectures and tutorials, exercises, recommended and supplementary readings or other activities. Undertake problem solving of engineering problems relevant to mechanics of solids in both invigilated and non-invigilated settings.	Assessed tutorials, Quizzes, Oral Assessments	40 -60%
K1, K2, S1, S3, A1	Relates fundamental knowledge of mechanics of solids to observations in a controlled environment and/or to solve a design oriented based problem.	Presentation or design report	10 - 30%
S2, A2	Undertake an experiment relevant to mechanics of solids to validate the application of theory in practice	Lab report	10 - 30%

Adopted Reference Style:

IEEE ()

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)