



Course Outline (Higher Education)

Institute:	Institute of Innovation Science and Sustainability
Course Title:	MECHANICS OF SOLIDS
Course ID:	ENGIN2301
Credit Points:	15.00
Prerequisite(s):	(ENCOR1000 or ENCOR1021 or ENGIN1005)
Co-requisite(s):	Nil
Exclusion(s):	(ENCOR2030)
ASCED:	030903

Description of the Course:

This course introduces stress and strain analyses of beams and columns under a variety of boundary and loading conditions in the domain of elastic mechanics, and their mathematical and graphic presentations.

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

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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:

On successful completion of the course the students are expected to be able to:

Knowledge:

- K1.** Develop a comprehensive understanding of theoretical principles of mechanics of solids
- K2.** Explain and justify the effects of deviations from ideal behaviour in continuum systems of solids

Skills:

- S1.** Fluently analyse systems of solids and develop simplified models using appropriate theories
- S2.** Fluently apply static equilibrium and mechanics of solids theory to calculate the stress and deformation of common structural members such as beams, shafts, cables, struts and columns
- S3.** Breakdown an extended problem to synthesize an optimal solution for the design of a structural members subjected to design constraints

Application of knowledge and skills:

- A1.** Fluently apply mathematical analysis of systems of solids under different loading and boundary conditions to determine stress and strain.
- A2.** Perform laboratory experiment to observe the behaviour of structural members under given conditions, conduct theoretical and comparative analyses, and write an experiment report.

Course Content:

Topics may include:

- Axial stress and axial strain
- Shear stress and shear strain
- General beam bending theory
- Beam subjected to combined bending and axial loads
- Composite beams

- Shear stresses in beams

- Torsion of circular bars and tubes

- Stress transformation equations and Mohr`s circle
- Stress analysis under plane stress conditions
- Deflection of beams
- Buckling of columns

Values:

- V1.** Appreciate the relevance and importance of the study of solid mechanics to engineering practice.
- V2.** Appreciate that learning will be a lifelong process.

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the [Higher Education Graduate Attributes Policy](#) (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes**

and assessment for each FedUni course, and all attributes must be directly assessed in each program

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1, K2 and K3; S1, S2 and S3, A1	1, 2 and 4
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	K1, K2 and K3; S1, S2 and S3, A1	1, 2 and 4
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	Not applicable	Not applicable
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K3 and A2	2 and 3
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1, K2, S1, S2, A1	Participation in all learning activities including attendance and participation in lectures and tutorials, exercises, recommended and supplementary readings or other activities. The theories and exemplary problem solving strategies are outlined during lectures. Some practice is undertaken during tutorials.	Assessed Tutorials or quizzes or tests	30 - 40%
K1, K2, S1, S2, S3, S4, A1	Relates fundamental knowledge of mechanics of solids to observations in a controlled environment and/or to solve a design oriented based problem.	Presentation and/or design report	10 - 30%
K3, A2	Undertake an experiment relevant to mechanics of solids to validate the application of theory in practice	Lab report	10 - 20%
K1, K2, S1, S2, A1	Participation in all learning activities including attendance and participation in lectures and tutorials, exercises, recommended and supplementary readings or other activities. The theories and exemplary problem solving strategies are outlined during lectures. Some practice is undertaken during tutorials.	Examination/test(s)	40 - 60%

Adopted Reference Style:

Other (Refer to the library website for more information: IEEE)

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

Fed Cite - [referencing tool](#)

