Unit Outline (Higher Education)

Institute / School: Institute of Innovation Science and Sustainability

Unit Title: MECHANICS OF SOLIDS

Unit ID: ENGIN2301

Credit Points: 15.00

Prerequisite(s): (ENGIN1005 for undergraduate Students only)

Co-requisite(s): Nil

Exclusion(s): (ENCOR2030)

ASCED: 030903

Description of the Unit:

This unit 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 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						
Intermediate			✔			
Advanced						

Learning Outcomes:

On successful completion of the unit 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.

Unit 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

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment 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 proble solving strategies are outlined during lectures. Some practice is undertaken during tutorials.	Assessed Tutorials or quizzes or tests	30 - 40%

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
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 proble solving strategies are outlined during lectures. Some practice is undertaken during tutorials.	Examination/test(s)	40 - 60%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date:

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