

Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: Engineering Design 1

Unit ID: ENGRG1003

Credit Points: 15.00

Prerequisite(s): Nil

Co-requisite(s): Nil

Exclusion(s): ENGIN1004, ENGIN3002

ASCED: 039999

Description of the Unit:

This unit uses active learning to apply basic statics and engineering methods for building, design and testing. Theories of statics are introduced to analyse structures including beams and trusses. Material properties and their integration in the analysis and design process are also covered. The unit includes a major group project where students design a solution to an engineering problem with defined boundaries and specifications. Students learn how to select and apply analysis methods and make justifiable design decisions to achieve the set outcomes. The engineering builds will be tested and assessed for performance and efficiency.

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	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<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.** Develop a comprehensive understanding of actions, and internal and external reactions in rigid body equilibrium, including the principles of statics and their application in engineering design.
- K2.** Demonstrate knowledge of the key properties of structural materials, and their relevance to specific engineering applications.
- K3.** Explain measurement systems, and their significance in assessing the performance and integrity of structural designs.

Skills:

- S1.** Recognize different structural systems and simplify physical structures into reliable models for analysis and design.
- S2.** Determine reactions, internal member forces in basic beam and truss systems and apply design methods to select and propose members effectively.
- S3.** Assess the mechanical properties of structural material to guide engineering designs regarding structural performance and environmental considerations.

Application of knowledge and skills:

- A1.** Demonstrate effective teamwork skills by collaborating with team members to define professional goals and discern the practices that lead to successful teamwork in a multicultural context.
- A2.** Utilize appropriate engineering and mathematical techniques to justify design decisions, considering factors such as structural integrity, safety, and efficiency.
- A3.** Perform laboratory experiments, analyse results, and report the behaviour of structural members and systems professionally.

Unit Content:

Topics may include:

- Structures and loads
- Equilibrium and reactions
- Mechanical properties of materials
- Material properties and selection
- Centre of gravity, centroid, moments of inertia and area
- Analysis of beams and trusses
- Shear force and bending moment diagrams
- Deflection, strains and sensors

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, S1-S3, A2	Active participation in classes and other forms of learning activities including workshops or lab sessions and completing required readings and practices.	Worksheets, tests	10% - 30%
K1-K3, S1-S3, A1-A3	Apply fundamental statics and engineering mechanics methods to build a solution for an engineering problem.	Major design project	30% - 50%
K1, K2, S1-S3, A2	Test(s) on any or all of the material covered in the unit.	Final test/Exam	30% - 50%

Adopted Reference Style:

IEEE

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

Fed Cite - [referencing tool](#)