

# Unit Outline (Higher Education)

**Institute / School:** Institute of Innovation, Science & Sustainability

**Unit Title:** Engineering Dynamics

**Unit ID:** ENGRG2303

**Credit Points:** 15.00

**Prerequisite(s):** (ENGRG1002)

**Co-requisite(s):** Nil

**Exclusion(s):** (ENGIN2302)

**ASCED:** 030701

**Description of the Unit:**

Within mechanical engineering, the understanding of how objects move and interact is fundamental to the design of engineering systems. This unit further develops the concepts of Newtonian mechanics which were introduced in the first-year physics unit. These concepts are the foundation of the field of engineering dynamics. The unit features an application-based treatment in order for students to be able to readily assimilate the theory and concepts introduced.

**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	<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 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 unit the students are expected to be able to:

### Knowledge:

- K1.** Describe the concepts of particle and rigid body as used in engineering dynamics.
- K2.** Explain the kinematics of particles in various coordinates.
- K3.** Describe the kinetics of particles and rigid bodies.

### Skills:

- S1.** Model the behaviour of mechanical systems mathematically.
- S2.** Communicate your work to others in a clear and scientific manner.
- S3.** Explain how mathematics is used to model the behaviour of dynamical systems.

### Application of knowledge and skills:

- A1.** Apply mathematical modelling to rigid body kinetics
- A2.** Use mathematical methods to predict the performance of dynamical systems.

### Unit Content:

Topics may include:

#### 1. Revision of rectilinear and curvilinear motion

Kinematics of a particle

- rectangular coordinates
- normal and tangential coordinates
- polar coordinates

#### 2. Relative motion

#### 3. Kinetics of a particle

- $F = ma$
- work and energy
- impulse and momentum

#### 4. Mass moment of inertia

#### 5. Kinetics of a rigid body

- $F = m.a$
- Work & Energy

#### 6. Introduction to vibration system and vibration analysis.

### 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 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"> <li>Using effective verbal and non-verbal communication</li> <li>Listening for meaning and influencing via active listening</li> <li>Showing empathy for others</li> <li>Negotiating and demonstrating conflict resolution skills</li> <li>Working respectfully in cross-cultural and diverse teams.</li> </ul>	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"> <li>Creating a collegial environment</li> <li>Showing self-awareness and the ability to self-reflect</li> <li>Inspiring and convincing others</li> <li>Making informed decisions</li> <li>Displaying initiative</li> </ul>	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"> <li>Reflecting critically</li> <li>Evaluating ideas, concepts and information</li> <li>Considering alternative perspectives to refine ideas</li> <li>Challenging conventional thinking to clarify concepts</li> <li>Forming creative solutions in problem solving.</li> </ul>	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"> <li>Finding, evaluating, managing, curating, organising and sharing digital information</li> <li>Collating, managing, accessing and using digital data securely</li> <li>Receiving and responding to messages in a range of digital media</li> <li>Contributing actively to digital teams and working groups</li> <li>Participating in and benefiting from digital learning opportunities.</li> </ul>	Not applicable	Not applicable

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
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"> <li>• Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts</li> <li>• Committing to social responsibility as a professional and a citizen</li> <li>• Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses</li> <li>• Embracing lifelong, life-wide and life-deep learning to be open to diverse others</li> <li>• Implementing required actions to foster sustainability in their professional and personal life.</li> </ul>	Not applicable	Not applicable

### Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S1, S3, A1, A2	Within the unit the assigned tutorial questions will form part of the assessed work.	Assessed tutorial problems, quizzes, short Q&As.	10 - 20%
S2, A2	A practical laboratory based exercise and/or project will be undertaken during the unit.	Laboratory reports and/or demonstrations.	10 - 30%
K2, K3, S3, A2	Assessment of all or part of the unit contents via examination.	Examination, final test.	40 - 60%

### Adopted Reference Style:

IEEE

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

Fed Cite - [referencing tool](#)