



# Unit Outline (Higher Education)

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

**Unit Title:** Vibration Engineering

**Unit ID:** ENGRG3301

**Credit Points:** 15.00

**Prerequisite(s):** (ENGRG2302)

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

**Exclusion(s):** (ENGIN3302)

**ASCED:** 030701

**Description of the Unit:**

This unit introduces students to the aspects of mechanical vibration and balancing in a mathematical and theoretical context. The unit will employ computational and experimental methods to highlight the concepts presented.

**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"/>	<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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Learning Outcomes:**
**Knowledge:**

- K1.** Describe the behaviour of dynamic systems in the time domain. Describe dynamic systems in the frequency domain.
- K2.** Discuss how vibration systems respond to harmonic excitation. Explain the transient response of the vibrating system.
- K3.** Relate experimental findings to the analytical model and system variables.

**Skills:**

- S1.** Demonstrate how computer algebra systems are employed for modelling and simulation.
- S2.** Solve real engineering problems through symbolic, numeric and experimental dynamic analysis.
- S3.** Evaluate analytical models and reflect on practice.
- S4.** Present findings in manners which can be appreciated by professional and lay people.

**Application of knowledge and skills:**

- A1.** Test and evaluate an existing vibrating system.
- A2.** Apply dynamic analysis techniques to a variety of real engineering applications.
- A3.** Apply existing and developing knowledge and experience to the modelling and analysis of a variety of dynamic engineering systems.

**Unit Content:**

Topics may include:

- Mathematical background (linearization and Laplace Transforms)
- Mathematical description of mechanical systems.
- Transient and free vibration.
- Harmonically-Forced Vibration System and Resonance.
- Vibration Isolation and Measurement.
- Balancing

**Learning Task and Assessment:**

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1-K3, S1-S4, A2-A3	A modelling exercise based on a real-world problem that exposes the student to numerical modelling techniques.	Numerical project, numerical assessment tasks.	30-50%
K1 - K3, S3	Assessment of all or part of the course by examination.	Mid-semester test, final test, quizzes.	40-60%
S4, A1	Demonstrate an understanding of fundamental knowledge of the topics delivered in the lectures and relate to observations, tests, or experiments to solve design-based problems.	Oral or written explanatory task, presentation.	10-30%

**Adopted Reference Style:**

IEEE

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