

Module Title Dynamics	Reference EN2500 SCQF SCQF Level 8 SCQF Points 15 ECTS Points 7.5
Keywords Plane Mechanism, Rotating Machine Balance, One Degree-of-Freedom (1-DOF) Vibration, Damping, Free and Forced Vibration, Transmissibility, Vibration Isolation, Impulse, Momentum, Energy	Created December 2003 Approved March 2004 Amended August 2011 Version No. 2

This Version is No Longer Current

The latest version of this module is available [here](#)

Prerequisites for Module

Statics & Dynamics (EN1700) or its equivalent.

Corequisite Modules

None.

Precluded Modules

None.

Aims of Module

To provide the student with the ability to understand, apply and discuss the modelling concepts and theories associated with free and forced vibration of 1-DOF systems and the concepts and theories associated with the dynamics of planar mechanisms,

Indicative Student Workload

	Full Time	Part Time
<i>Contact Hours</i>		
Assessment	3	3
Laboratory	6	6
Lectures	28	28
Tutorials	12	12

Directed Study

Coursework	16	16
Preparation		
Directed	10	10
Self-Study		

Private Study

Private Study	75	75
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Mode of Delivery

This module is lecture based with tutorials, directed self-study, laboratory work and private study.

rotating machines, rigid body and impulsive systems.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1. Analyse the dynamics of planar mechanisms.
2. Evaluate practical balancing techniques and analyse out-of-balance forces associated with rotating machines.
3. Investigate and solve problems involving free vibration of 1-DOF systems.
4. Analyse forced vibration of 1-DOF systems including the concept of vibration isolation and transmissibility.
5. Apply the concept of dynamic equivalence to model vibrating systems.

Indicative Module Content

Kinematics of planar mechanisms with revolute (pin) and prismatic (sliding joint); forces and torques arising in planar mechanisms owing to inertia forces and moments associated with acceleration of links. Free vibration of undamped 1-DOF systems. Dynamic equivalence of engineering systems. Free and

Assessment Plan

	Learning Outcomes Assessed
Component 1	1,3,5
Component 2	1,2,3,4,5

Component 2 is a closed book examination. (50% weighting)

Component 1 involves two coursework/laboratory assessments one covering LO1 and the other covering LO3 and LO5. (50% weighting)

Indicative Bibliography

1. MERIAM, J.L. AND KRAIGE L.G., 2016. Engineering Mechanics: Dynamics. 8th ed. Hoboken, NJ: Wiley.
2. RAO, S.S., 2017. Mechanical Vibrations. 6th ed. Upper Saddle River, NJ: Prentice Hall.
3. THOMSON, W.T., 2013. The Theory of Vibration with Applications. 5th ed. Cheltenham: Nelson Thornes.

forced vibration of damped
1-DOF systems. Transient
response to simple inputs.
Steady-state sinusoidal response.
Vibration isolation and forces
transmitted to supports. Impulse
force, impact and momentum.
Kinetic and potential energy.
Balancing of rigid rotors. Single
plane and two-plane balancing.