Module Code	MEU44B14
Module Name	Engineering Vibrations & Noise
ECTS Weighting	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. John Kennedy
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: L01. apply the principles of vibration isolation and assess designs for solutions of one of the most common problems faced by noise and vibration engineers in practice; L02. analyse and recognize multi-degree of freedom systems and apply modal methods to their solution; L03. model and analyse continuous systems; L04. apply the principles of noise control including sound absorption and sound insulation to common engineering problems; L05. assess vibration and noise exposure in the workplace; L06. apply industry standard metrics for noise and vibration monitoring; L07. predict vibration properties of systems using finite elements; L08. perform noise and vibration measurements and compare the results with those obtained by the analytical and numerical methods developed in the course. **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively - Enhanced
Module Content	Engineering systems often experience problems associated with unwanted vibration or noise which may lead to failure of physical components or complaints from communities exposed to these systems. This module will provide the student with a fundamental understanding of the problem of noise and vibration control as well as the experimental and numerical tools necessary to model and analyse these problems in engineering systems. The module will introduce the industry standard approaches to noise and vibration control which require analysis during the design phase as well as during the use of these systems. **Vibration measurement and isolation:** Forced vibration of single degree-of-freedom systems

	Vibration measurement Vibration isolation • **Multi degree of freedom systems:** Free and forced vibration of multi-degree of freedom systems Vibration absorbers • **Modal analysis:** Stiffness and flexibility matrices Mode shapes and natural frequencies Modal analysis • **Continuous Systems:** Longitudinal, torsional and transverse vibration Applications of continuous vibrating systems • **Acoustics and Noise Control:** Sound power measurement Room acoustics and noise control measures • **Nosie and Vibration Measurement and Control:** Measurement hardware and calibration Signal processing for noise and random vibration analysis Measurement of modal content Noise metrics Passive/Active control measures • **Numerical Methods:** Vibrating rod and beam finite elements Commercial FEM software • **Noise and Vibration Assessment** The effects of noise and vibration on people and buildings Estimation of vibration exposure Estimation of noise exposure
Teaching and Learning Methods	This module runs for the 12 weeks of semester two (except during study/assignment week) and comprises three lectures per week plus one one-hour tutorial per week. This module lecture programme is supplemented by a detailed practical experiment which makes use of the latest noise and vibration measurement tools. The experimental work is augmented by finite element modelling using commercial and custom vibration analysis software. Students will prepare a formal report on the experimental and numerical analysis real engineering problems. The module makes use of a blended learning environment, including online discussion forums, to aid the weekly tutorials. These tutorials

	focus on common problems facing noise and vibration control engineers.

Assessment Details
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Written examination	End of semester examination	L01-L06	75%	
Assignment	Experimental & numerical analysis of an engineering system	L07-L08	25%	10

Reassessment Requirements

Written Examination

Contact Hours and Indicative Student Workload

Contact hours: 47 **Lectures 33** **Tutorials 11** **Lab 3**
Independent Study (preparation for course and review of materials): 30
Independent Study (preparation for assessment, incl. completion of assessment): 44

Recommended Reading List

Recommended Text

- Engineering Vibration, DJ Inman, Prentice Hall
- Engineering Noise Control, David A. Bies, Colin Hansen, Carl Howard, Routledge

Other Relevant Texts

- Mechanical Vibrations, SS Rao, Pearson/Prentice-Hall
- Theory of Vibration with Applications, WT Thomson, Chapman & Hall

Module Pre-requisite	NA
Module Co-requisite	NA
Module Website	NA

Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	
Approved by	
Academic Start Year	
Academic Year of Date	