UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Automotive Tribology and Noise Vibration and Harshness
Module Code	MAE7031-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Laboratories	8
Lectures	24
Directed Study	168

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims

To gain systematic knowledge of the importance of tribology and noise, vibration and harshness (NVH) and their role in the design and operation of automotive systems.
To be able to analyse complex systems and the effect of both tribology and noise vibration and harshness on such systems.

Outline Syllabus

Engine Lubrication and Lubricants.
Lubrication of the Piston Assembly, Valve Train and Crankshaft Bearings.
Engine Fuel Economy/Efficiency by Tribology.
Wear and Durability of the Engine.
Engine Oil Consumption and Lubricant Derived Exhaust Emissions.
Tribology of Engine Ancillaries.
Tribology of the Drivetrain and Transmission.
Metrology: methods for non-destructive evaluation, technologies and capabilities, measurement systems analysis.
Fundamentals of acoustics and vibration.
Sources of low and high frequency noise and vibration, including transmission and response.
Vibration control.
CAE prediction and analysis techniques.
Experimental techniques for measurement and analysis.
Experimental modal analysis (EMA).

Learning Outcomes

Outcome Number	Description
01	Critically evaluate vehicle component behaviour and the influence of tribology and NVH on such systems.
02	Use CAE tools competently to design, simulate and critically analyse component behaviour.
03	Present and interpret experimental and CAE results.
04	Communicate effectively and manage your own learning.

Learning, Teaching and Assessment Strategy

The module is taught via a combination of lectures and computer laboratory sessions focussing on the two disciplines of tribology and noise, vibration and harshness (NVH). The subject matter draws upon case studies, examples and applications from the automotive industry to support the learning material, but also has direct relevance to the broader engineering disciplines and would be well suited to students wishing to gain employment in Mechanical Engineering fields.

The lecture sessions cover theories and principles and are supported with evidence and examples from real-world case studies. CAE modelling techniques for the investigation of NVH problems are covered within the computer laboratory sessions together with experimental techniques for the purposes of validation. Directed study takes the form of background reading to deepen the understanding of the material.
Formative assessment is enabled through in-class tutorials and group discussions. The module is summatively assessed by two pieces of project based coursework covering all module learning outcomes (LOs 1-4).

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Fourth Edition (AHEP4) as published by the Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify five key areas of learning which partially (C) or fully (M) meet the academic requirement for CEng registration: Science and Mathematics (1), Engineering Analysis (2-4), Design and Innovation (5-6), The Engineer and Society (7-11), and Engineering Practice (12-18). Further details of these learning outcomes can be found at https://www.engc.org.uk/ahep/

M1, M2, M3, M4, M5, M6, M7, M13, M17, M18,

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Written	Coursework relating to NVH (3000 words)	50%
Summative	Coursework - Written	Coursework relating to tribology (3000 Words)	50%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:
This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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