

Module Details	
Module Title:	Automotive Tribology and Noise Vibration and Harshness
Module Code:	MAE7031-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Mechanical and Automotive Engineering
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Lectures	24
Laboratory	8
Directed Study	168

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2 (Feb - May)

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.

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 & vibration
 Sources of low and high frequency noise & vibration including transmission and response.
 CAE prediction & analysis techniques
 Experimental techniques for measurement and analysis

Learning Outcomes

1	Critically evaluate vehicle component behaviour and the influence of tribology and NVH on such systems.
2	Use CAE tools competently to design, simulate and critically analyse component behaviour.
3	Apply experimental techniques to analyse vibrating systems.
4	Present and interpret experimental and CAE results
5	Communicate effectively and manage your own learning.

Learning, Teaching and Assessment Strategy

The module is taught via a combination of lectures and laboratory sessions including a portfolio of case study exercises based around engine performance impacted by tribology. Technical knowledge is consolidated by hands-on project work focussing on aspects of vehicle NVH with applied dynamic modelling and computer simulations. Directed study takes the form of background reading to deepen the understanding of the material.

The module will be assessed by both project based coursework (practical & computer based LO1-5) and formal examination (LO1 & , LO3).

Supplementary assessment: repair deficiency in the original submission.

Formative assessment is enabled via an online assessment with immediate solutions enabling self- evaluation and identification of areas for support.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).

SM1m, SM4m, SM5m, EA1m, EA2, EA3m, EA4m, EA6m, D3m, D6, P2m, P3, P4, P7, G1, G2, SM7M, SM8M, SM9M, EA6M, EA7M, D9M, D11M, EL9M, EL10M, EL11M.

Further details of these learning outcomes can be found at <https://www.engc.org.uk/>.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Examination - closed book	Examination of taught material	2 hours	50%

Summative	Coursework	Programme of coursework relating to NVH and tribology	-2000 words	50%
Formative	Computer-based assessment	Test the formal knowledge with immediate solutions to facilitate self evaluation of learning		%

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.