

Module Details	
Module Title:	Advanced Engineering Design
Module Code:	MAE6009-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 6
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Lectures	12
Tutorials	24
Directed Study	164

Availability	
Occurrence	Location / Period
MSA	Management Development Institute of Singapore (MDIS) / Academic Year (Sept - May)
BDA	University of Bradford / Academic Year (Sept - May)
BDB	University of Bradford / Academic Year (Sept - May)

Module Aims
The aim of this module is to develop both technical deepening and critical understanding of mechanical engineering design within a holistic sustainable product development context.

Outline Syllabus
1. Product Definition Needs and Requirements Analysis, Developing a product design specification (legislative and

sustainability, consideration of cost and cost constraints, patents and intellectual property considerations in engineering design), Product cycles.

2. Concept Design

Requirements cascade in systems thinking, Concept generation and selection (creative thinking methodologies), Design for manufacture and assembly considerations, Manufacturing process selection.

3. Details Design/Embodiment

Requirements cascade to subsystem, Engineering design analysis and synthesis, detailed consideration of bearing types, selection and life. Belts, chains and pulley types, their design and selection. Coupling selection. Clutches and brakes. Gear design and selection, shaft design, 3D solid modelling, assemblies. 2D working drawings.

4. Design Verification and Product Validation

Approaches to design verification and validation, consideration of robustness in design, Evaluation of sustainability and ethical issues in product design, Risk assessment (FMEA) and management in design.

Learning Outcomes

1	1.1 apply a holistic approach to product development. 1.2 Select specific design elements to meet a design requirement. 1.3 use selection methodologies in system design.
2	2.1 Show your ability to apply tools for concept analysis and selection. 2.2 Show your ability in designing and validating system assemblies and mechanisms.
3	3.1 Use problem solving techniques, 3.2 Present technical information in a concise written format and use CAD to communicate engineering design data

Learning, Teaching and Assessment Strategy

Theory is developed in key lectures delivered by relevant experts and practiced in tutorials through individual and team-based activities. The VLE is used to provide teaching materials and direct students towards useful websites. The ability to select design elements is assessed by an individual in-class test whilst the ability to use design methodologies to integrate design elements to solve an open-ended design problem is assessed by a group project. Oral feedback will be provided on a continuous basis through regular clinics. Written feedback will be given via assessment of group coursework. Assessment for this module will take the form of an individual class test and group coursework of 4000 words equivalent per student that will test all of the learning outcomes. The students will complete a self-assessment of individual contribution to teamwork, which is used to adjust the individual final mark based on the team report. The in-class test will assess LOs 1.2, 3.1 and the group project will assess LOS 1.1, 1.2, 2.1, 2.2, 3.1, 3.2, 3.3. Supplementary assessment: Repair deficiencies in the original submission / re-presentation of individual student's contribution to the group project.

Mode of Assessment

Type	Method	Description	Length	Weighting
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Summative	Coursework	Classroom based assignment	0 hours	30%
Summative	Coursework	Group design project portfolio (4000 words equivalent per student)	0 hours	70%

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.