MODULE SPECIFICATION

Part 1: Information			
Module Title	Design and Electromechanical Systems		
Module Code	UFMF88-30-2	Level	Level 5
For implementation from	2020-21		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Design, Materials and Manufacturing 2020-21		
Excluded Combinations	Mechatronics 2020-21		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: The primary aim of this module is to enable the student to understand the multi-disciplinary challenges present in engineering designs that include electromechanical systems in designs and to develop an appreciation of 'TOTAL DESIGN' as a design philosophy.

Pre-requisites: students must take one out of UFMF7C-30-1 Design, Materials and Manufacturing (Work Based Learning) or UFMFN3-30-1 Design, Materials and Manufacturing.

Educational Aims: The key outcome will be the understanding of techniques for product realisation that address the optimal integration of Mechanical, Electronic and Software Engineering to produce superior products, processes or systems, with an understanding of materials selection and manufacturing aspects.

Outline Syllabus: The following is indicative; the syllabus may include but not be limited to the following:

Design and application of machine elements:
This section is concerned with the design and application of such elements as columns, shafts, bearings, gears, gear boxes, fasteners, springs, brakes, clutches and other elements relevant to the design of an electromechanical system and their functional capabilities and tolerances.

Application of electromechanical elements:
This section is concerned with batteries and other power sources, electric actuators, microcontrollers and their peripherals, basic electrical circuits, sensors and signals, interfacing, transformers and power supplies, basic closed loop control.

Materials of construction:
This section is concerned with material selection for specific applications; it reviews material properties particularly ferrous materials, material treatments, material properties including toughness, ductility, fatigue and aspects of material selection that relate to performance and failure including various types of stress, wear mechanisms and lubrication.

Manufacture of mechanical elements:
Material removal processes, forming processes, surface finishes and coatings, fabrication and welding, design for manufacture, simple cost calculations.

Design and realisation of Electromechanical Systems
This section examines areas related to the Total Design Activity, user requirements, design specification, concept design and selection, design management and product life cycle management, concurrent engineering, design of integrated electromechanical systems and software interfacing, introduction to design optimisation and use of Excel Solver, design failure mode and effect analysis.

Teaching and Learning Methods: Large group lecture supported by small group tutorial sessions. Study time outside of contact hours will be spent on going through design exercises and example problems.

Laboratory sessions (small groups) will provide experience of empirical methods and will require further non-contact time or assignment preparation.

Scheduled learning includes lectures, tutorials and lab sessions.

Independent learning includes engaging with essential reading, assignment preparation and completion, exam preparation, skill and knowledge development.

Students will be required to complete assignments in own time using CAD facilities provided by University.

Approximate hours:
Contact 72
Assimilation and skill development 78
Exam and Coursework preparation and engagement 150
Total 300

Part 3: Assessment
Assessed via an extended coursework. The Coursework will consist of lab work, Mechanical Engineering Design, Electromechanical System (Mechatronics) techniques, Materials Selection, Manufacturing Techniques and the use of CAD to ensure focus is maintained on the practical nature of engineering design and realisation processes. Lab work is essential for gaining a practical understanding of fundamentals and applications of Mechatronic systems and will be assessed via a Lab Report which is part of the Coursework. The Design Report and the Materials/Manufacturing Report will form the rest of the Coursework. A word limit is not applicable for reports on Design assignment. Specific instructions on structure of reports will be offered depending on the assignments.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component A		100 %	Coursework Report
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component A		100 %	Coursework report

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	**Reference**
Apply quantitative methods to Electromechanical (Mechatronic) systems and solve Mechatronic system problems	MO1
Identifying and Creating computer aided models for simple mechatronics systems	MO2
Selection of electromechanical components (e.g. sensors, actuators) based on an understanding of their characteristics	MO3
Investigate and define a problem and identify constrains including environmental and sustainability limitations, health and safety, cost and risk assessment issues.	MO4
Use information from dynamic model to calculate various performance metrics and use these metrics to produce mechanical design for the system	MO5
Perform optimisation studies and provide a comprehensive report of the project detailing the engineering design, control strategy and controller design and equipment for the system	MO6
Show cognitive skills with respect to modelling and simplifying real problems, and applying mathematical methods of analysis, and understanding the capabilities of computer based modelling and design	MO7

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	228
Total Independent Study Hours:	228
Scheduled Learning and Teaching Hours:	
Face-to-face learning	72
Total Scheduled Learning and Teaching Hours:	72
Hours to be allocated	300
Allocated Hours	300

Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmf88-30-2.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Mechanical Engineering [Sep][PT][COBC][6yrs] BEng 2018-19

Mechanical Engineering and Vehicle Technology [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Mechanical Engineering and Vehicle Technology [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19

Automotive Engineering {Foundation} [Sep][FT][Frenchay][5yrs] MEng 2018-19

Automotive Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19

Automotive Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Automotive Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Mechanical Engineering [Sep][PT][Frenchay][7yrs] MEng 2018-19

Mechanical Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng 2018-19

Mechanical Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng 2018-19

Mechanical Engineering {Foundation} [Sep][FT][Frenchay][5yrs] MEng 2018-19

Mechanical Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19

Mechatronics [Sep][PT][BTC][3yrs] FdSc 2018-19

Mechatronics [Sep][PT][GlosColl][3yrs] FdSc 2018-19

Mechanical Engineering {Apprenticeship} [Sep][PT][Frenchay][6yrs] BEng 2018-19

Mechanical Engineering [Sep][PT][Frenchay][6yrs] BEng 2018-19