Module Specification

Integrated Electro-Mechanical Systems

Version: 2023-24, v2.0, 12 Apr 2023

Contents

Part 1: Information

Module title: Integrated Electro-Mechanical Systems

Module code: UFMFSL-15-3

Level: Level 6

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Systems Design 2022-23

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This course teaches the design of mechatronic systems which integrate mechanical, electrical, and control systems engineering.

The approach is problem led with majority of the learning being achieved by working in small groups on design tasks that require the integration of disciplines that are required when considering mechatronic systems. To ensure active engagement in the material the module is designed to provide significant laboratory-based design

experiences and the consideration of real engineering problems.

The module provides an opportunity for students who wish to learn through laboratory based project work in a small collaborative design team and so helps students understand the role of an engineer working in such an environment.

Features: Not applicable

Educational aims: This module is designed to demonstrate the necessity to integrate different engineering and technical disciplines in the solution of a systems based problem, taking mechatronics as the vehicle for applying problem based skills to real engineering problems.

Outline syllabus: Topics covered in the course may include but not be limited to the followings:

Controls Review and Introduction to LabVIEW programming on the myRIO;

Low-level interfacing of software with hardware;

Use of high-level graphical programming tools to implement real-time computation tasks;

Digital logic;

Analog interfacing and power amplifiers;

Measurement and sensing;

Electromagnetic and optical transducers;

Control of mechatronic systems.

Part 3: Teaching and learning methods

Teaching and learning methods: The module delivery is designed for students to engage with a series of practical design tasks and demonstrate their problem solving skills.

Lectures are used to set the scene and relevance of the underlying theory and design tasks. The majority of the active learning takes place in tutorials and computer-based practical sessions.

Independent learning includes hours engaged with essential reading, software, group project preparation and completion, etc.

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

MO1 Create and evaluate an integrated design of a mechatronic system with industrial application

MO2 Model the performance characteristics of a given mechatronic system

MO3 Critically evaluate the design and operation of a mechatronic system including constraints, environmental impact and sustainability limitations, health and safety, and risk assessment considerations.

MO4 Design and Implement an electromechanical solution to satisfy a given set of requirements

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufmfsl-15-3.html

Part 4: Assessment

Assessment strategy: The assessment for this module is as follows to create a balanced assessment that covers underpinning concepts and applications of the material covered.

Report:
During the module, students are introduced to a series of practical scenarios that develop their ability to apply concepts of modelling and simulation to the design and validation of electromechanical systems. The coursework assessment is a group based activity (group size 3 or 4 students) resulting in a 24 page technical report where typically three scenarios will be considered. A template will be provided to help students develop their writing style.

Within each scenario students will be required to demonstrate their knowledge of using modelling software packages, and their ability to critically evaluate and analyse results of the structural model. Each student will submit a 250 word reflection summarising their understanding of the conclusions to be drawn from the investigations.

Presentation:

A technical oral (group) presentation to assess how students implement their understanding and knowledge of the fundamentals of electromechanical systems based on a real engineering scenario. Students will explain their experimental results and approach to combine in synergy mechanical, electrical, automation and computer science engineering.

Following the presentation, there will be individual questioning where the teaching team will ask questions to evaluate fundamental knowledge of each student in the group and their contribution to the group report.

Resit Strategy:

Resit is the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Assessment tasks:

Presentation (First Sit)
Description: Presentation and individual questioning
Weighting: 40 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4

Report (First Sit)
Description: Group report (portfolio of three scenarios) 24 pages
Weighting: 60 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4

Presentation (Resit)
Description: Presentation and individual questioning

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 40 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4

Report (Resit)
Description: Group report (portfolio of three scenarios) 24 pages

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Weighting: 60 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electro-mechanical Engineering (Nuclear) {Apprenticeship-UCW}{Top-Up}[Frenchay] BEng (Hons) 2023-24

Electro-mechanical Engineering {Apprenticeship-UCW}{Top-Up}[Frenchay] BEng (Hons) 2023-24

Mechanical Engineering (Mechatronics) [AustonSingapore] BEng (Hons) 2023-24

Mechanical Engineering (Mechatronics) [Feb][PT][BIET][16months] BEng (Hons) 2022-23

Mechanical Engineering (Mechatronics) [May][PT][BIET][16months] BEng (Hons) 2022-23

Mechanical Engineering (Mechatronics) [Sep][PT][BIET][16months] BEng (Hons) 2022-23

Mechanical Engineering (Mechatronics) [BIET] BEng (Hons) 2022-23

Aerospace Engineering {Apprenticeship-UCW} [Sep][FT][UCW][5yrs] BEng (Hons) 2021-22

Aerospace Engineering {Apprenticeship-UCW} [Sep][FT][UCW][4yrs] BEng (Hons) 2020-21

Mechanical Engineering with Manufacturing {Apprenticeship-UWE} [Sep][FT][UCW][4yrs] BEng (Hons) 2020-21

Aerospace Engineering {Apprenticeship-UWE} [Sep][FT][UCW][4yrs] BEng (Hons) 2020-21

Mechanical Engineering with Manufacturing {Apprenticeship-UWE} [Sep][FT][COBC][4yrs] BEng (Hons) 2020-21

Mechanical Engineering (Nuclear) {Apprenticeship-UCW} {Top-Up} [Sep][FT][MOD][2yrs] BEng (Hons) 2023-24

Mechanical Engineering [Sep][PT][Frenchay][2yrs] - Not Running MSc 2022-23

Mechanical Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2021-22

Aerospace Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2021-22

Aerospace Engineering [Sep][FT][Frenchay][4yrs] MEng 2021-22

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][4yrs] MEng 2021-22

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][3yrs] BEng (Hons) 2021-22

Automotive Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2021-22

Automotive Engineering [Sep][FT][Frenchay][4yrs] MEng 2021-22

Mechanical Engineering [Sep][FT][Frenchay][4yrs] MEng 2021-22

Automotive Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Mechanical Engineering [Sep][PT][Frenchay][7yrs] MEng 2020-21

Aerospace Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2020-21

Mechanical Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Mechanical Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Automotive Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Mechanical Engineering {Foundation}[Sep][FT][Frenchay][4yrs] BEng (Hons) 2020-21

Mechanical Engineering [Sep][PT][Frenchay][6yrs] BEng (Hons) 2020-21

Automotive Engineering {Foundation}[Sep][FT][Frenchay][4yrs] BEng (Hons) 2020-21