Module Specification

Advanced Mechatronics

Version: 2023-24, v3.0, 23 Mar 2023

Contents

Part 1: Information

Module title: Advanced Mechatronics

Module code: UFMFTL-15-M

Level: Level 7

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: Integrated Electro-Mechanical Systems 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.

This is a problem based learning module that cover advanced modelling, development and implementation of solutions to mechatronic systems. It is lab-based with students working in small groups on problems that originate from an industrial application or a research problem from the robotics or mechatronics

research carried out within the Department. Potential areas of interest include biomechanics but could include a variety of advanced application of electromechanical systems.

The module builds on the work and the learning approach covered in the modules Systems Design and Integrated Electromechanical Systems and and provides an opportunity for students who wish to learn through research and practice.

Features: Not applicable

Educational aims: The aim of this module is to equip students with advanced technical knowledge and practical experiences of the design of mechatronic principles and industrial applications.

Outline syllabus: In this course, the topics covered principally systems modelling and control and may include but not be limited to the followings:

Using the myRIO with LabVIEW to implement closed-loop control

Open/Close loop control

Controllers PC and PLC and Embedded

Software for control

Languages and Platforms

Real-time Control

Analog Feedback Systems

Electronic Scale

Brushless Motor Control

Examples of mechatronic systems may include: Robots, Machine tools, Car Engine management system, etc.

Part 3: Teaching and learning methods

Teaching and learning methods: This is a problem based learning module that will be taught entirely through workshops and laboratory sessions.

The sessions are problem led. Students work in small groups on industrially related problems under the guidance of academic staff.

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

MO1 Produce a technical analysis and evaluation of a Mechatronic System.

MO2 Apply appropriate scientific, data and design principles and to develop and implement an Embedded Mechatronic controller.

MO3 Demonstrate knowledge of programming, digital electronics and microprocessors or controlled systems in the design of advanced mechatronic systems.

MO4 Develop innovative solutions to automation problems that arise in advanced manufacturing.

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/index.html

Part 4: Assessment

Assessment strategy: The module is examined through work in groups to develop their knowledge and understanding of the engineering process - i.e. analysis of problem, conceptualisation of a solution and its iteration, simulation and proof-of-concept testing - in order to test ability of students to work in teams, as well as via coursework designed to assess the students' abilities in using modelling software packages, and their competencies in critically evaluating and analysing results from modelling and simulation.

The industrial project will be assessed through a group report where they submit a portfolio of their design work. The group presentation will give them a real-engineering problem solving experience as they will be working in teams on an industrial problem provided by industrial partners and will be individually assessed through a questioning session.

A technical oral (group) presentation to assess how students implement their understanding and knowledge of the fundamentals of integrated electromechanical systems and mechatronics. They will explain their approach to simulate real systems and their experimental results to finding solutions to real-world industrial problems (PBL). Following the group presentation, there will be an individual questioning session where the teaching team will ask questions to evaluate fundamental knowledge and assess the contribution of every student in the group. The overall oral presentation (presentation and questioning session) will last for a maximum of 20 minutes.

Depending on the industrial problems plotted, the design project will include but not be limited to the followings: (i) a 3D CAD model of an engineering system, (ii) 2D component drawings, (iii) appropriate software, (iv) implementation and validation of the proposed solution through the use of relevant hardware to evaluate full comprehension of the syllabus and learning outcomes. This will be assessed using the standard group assessment strategy.

Resit Strategy: The resit strategy will be to provide the group of students with the opportunity to rework the project carried out in the first sit in order to demonstrate that they have achieved all of the learning outcomes. The resit assessments will be 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: Group presentation and individual questioning (20 minutes total, 8 presentation + 12 minutes Q&A)
Weighting: 50 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO3, MO4

Report (First Sit)
Description: Group coursework (Report) 24 pages
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO4

Presentation (Resit)
Description: Presentation and individual questioning (12 minutes total)
Weighting: 50 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO3, MO4

Report (Resit)

Description: Group coursework (Report) 24 pages

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mechanical Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

Automotive Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

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

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