Module Specification

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Module code	ENG6A3
Module title	Mechatronics Applications
Level	6
Credit value	20
Faculty	FAST
HECoS Code	100170
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Industrial Engineering (Mechatronics)	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	36hrs
Placement tutor support	0 hrs
Supervised learning e.g., practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**36**hrs
Placement / work-based learning	0 hrs
Guided independent study	164hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	22nd Aug 2022
With effect from date	Sept 2022
Date and details of revision	
Version number	1

Module aims

This module is aimed at developing and enhancing the students' understanding and knowledge of the concepts of mechatronics systems and their applications for real-world industrial automation. In this way, the students will be able to conceptualise and design mechatronics systems that meet given industrial specifications.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Extrapolate the knowledge and insights gained from theoretical work to address real-world mechatronics problems.
2	Demonstrate the theory and concepts of mechatronics engineering from real-world perspectives.
3	Identify and evaluate commercial off-the-shelf components, modules, and units to ascertain the most appropriate technology for a given mechatronics application.
4	Plan, design and test an application-specific mechatronics system for industrial automation, process quality control and improvement.

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: B3

Assessment

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Indicative Assessment Tasks:

The assessment is 100% in-course.

Assessment 1 - Portfolio of work relating to practical activities inclusive of logbook/diary. An appropriate technical level should be achieved and demonstrated through hardware design of a mechatronics system. (*Indicative word count:* 3,500 words +/- 10%)

Assessment 2 - Presentation: to use pre-recorded or live presentation (10 minutes) to provide a clear overview of the topic investigated including explanations and summary of results together with an analysis of their relevance, limitations and how the results relate to the objectives of the engineering design.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 3, 4	Portfolio	80%
2	2	Presentation	20%

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Learning and Teaching Strategies

The module will be delivered through practical investigation/demonstrations and Computer Simulations in support of formal lectures and tutorials. Also, there will be extensive use of VLE (Moodle) for additional support and formative work outside of timetabled contact periods, in line with university's Active Learning Framework (ALF).

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

Indicative Syllabus Outline

Modelling and simulation of dynamic processes: Different types of mathematical models for an industrial dynamic process; Mechanical/Electrical analysis-based modelling; Empirical data-based modelling; Linear time invariant models; Model structure selection; Model parameter identification and estimation.

Analysis and simulation of a range of mechanical/electrical transducers and actuators for analogue/ digital interfaces such as pressure/ heat/ chemical/ electromechanical/ optical.

Electronic interface design between the digital controller and the analogue/digital mechatronic processes to maximise the speed, efficiency, and reliability of their operation.

Mechatronic systems design implementation using High level software industry standards, such as VEE /LabView and MATLAB+Simulink, and lower-level control using embedded micro controller functions. Use of microcontrollers, dedicated industrial microprocessors and PLC interfaces.

Design mechatronics systems for industrial automation, process quality control and improvement.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

D. Shetty and K. Richard, *Mechatronics System Design*; CL Engineering, 2012.

Other indicative reading

W. C. Bolton, *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering*. Pearson UK, 2018.

D. Alciatore, *Introduction to Mechatronics and Measurement Systems*; McGraw-Hill, 2012.

V.S. Bagad, *Mechatronics*, Technical Publications Pune, 2010.

R. H. Bishop *Mechatronics handbook*, CRC Press, 2002.

Web Links http://mechatronics.colostate.edu/book/video_demos.html

Emplyabilty Skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas. Click here to read more about the Glyndwr Graduate attributes

Core Attributes
Creative
Ethical

Practical Skillsets
Digital Fluency
Critical Thinking
Communication