MODULE DESCRIPTOR

Module Title

Mechatronics and Automation

Reference	EN4109	Version	3
Created	April 2023	SCQF Level	SCQF 10
Approved	May 2021	SCQF Points	30
Amended	August 2023	ECTS Points	15

Aims of Module

To provide students with the ability to demonstrate mechatronics and its automation systems.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Execute design process of mechatronic systems and their relationships with automation applications.
2	Argue the behavioural performance of electrical and mechanical sensors, and actuators
3	Examine behavioural performance of electrical motors for mechatronics and automation systems.
4	Critique the design and implementation of mechatronic systems in a laboratory setup and/or a software package.

Indicative Module Content

Introduction to mechatronics: examples of mechatronic systems, automation concepts, design approaches. Mechanical components of motion, hydraulic, pneumatic, and mechanical actuation systems. Modeling of mechatronic systems. Sensors & Actuators: theory and operation, types of sensors and transducers, sensor/actuator selection, technologies and applications, MEMS. Motors: stepper, reluctance, brushless, servo, control techniques (speed, torque, & braking). Closed-loop feedback systems, Introduction to digital controllers. Signals: acquisition, conditioning, processing, and data presentation, ADCs/DACs, conversion and processing of signals, indicators, recorders, displays, EMC, standards and practice (EU, UK, USA), noise impacts and mitigation (grounding, shielding, bonding). PLCs: Configuration and programming.

Module Delivery

The module is delivered in Blended Learning mode using structured online learning materials/activities and directed study, facilitated by regular online tutor support. Workplace Mentor support and work-based learning activities will allow students to contextualise this learning to their own workplace. Face-to-face engagement occurs through annual induction sessions, employer work-site visits, and modular on-campus workshops.

Module Ref:	EN4109 v3

Indicative Student Workload	Full Time	Part Time
Contact Hours	30	N/A
Non-Contact Hours	30	N/A
Placement/Work-Based Learning Experience [Notional] Hours	240	N/A
TOTAL	300	N/A
Actual Placement hours for professional, statutory or regulatory body	240	

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	20%	Outcomes Assessed:	1, 2
Description:	Logbook of solved tutorials and a case study report				

Component 2

Type:	Coursework	Weighting:	80%	Outcomes Assessed:	3, 4
Description:	Group report based on mechatronics system design accompanied by a reflective account of their contribution to and their learning from the group work. Both participation in the group report and submission of the reflective summary are required in order to pass the module.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The module has 2 components and to gain an overall pass a minimum D grade must be achieved in each component. The component weighting is as follows: C1 is worth 20% (horizontal axis) and C2 is worth 80% (vertical axis).

		Coursework:						
		A	**B**	**C**	**D**	**E**	**F**	**NS**
Coursework:	**A**	A	A	A	B	E	E	
	B	B	B	B	B	E	E	
	C	B	C	C	C	E	E	
	D	C	C	D	D	E	E	
	E	E	E	E	E	E	E	
	F	E	E	E	F	F	F	
	NS	Non-submission of work by published deadline or non-attendance for examination						

Module Requirements

Prerequisites for Module	Completion of Stage 3, SCQF Level 9, or equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1. Isermann, Rolf. Mechatronic Systems. London: Springer London, Limited, 2007. Web.
2. Regtien, Paul P. L, and Dertien, Edwin. Sensors for Mechatronics. 1st ed. San Diego: Elsevier, 2018. Elsevier Insights.
3. Crowder, Richard M. Electric Drives and Electromechanical Systems : Applications and Control / [internet Resource]. Second ed. Kidlington, Oxford; Cambridge, MA: Butterworth-Heinemann, 2020.
4. Hughes, Austin, and Drury, Bill. Electric motors and drives: fundamentals, types, and applications. 5th ed. Kidlington: Newnes, an imprint of Elsevier, 2019.
5. Bolton, W. Programmable Logic Controllers. 6th ed. Cambridge: Elsevier Science & Technology, 2015.
6. Awrejcewicz, J, et. al. Mechatronics: Ideas, Challenges, Solutions and Applications. Springer, 2015.
7. DORF, R.C. and BISHOP, R.C., 2017. Modern Control Systems. 13th ed. London: Pearson Education.