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MODULE DESCRIPTOR

Module Title

Mechatronics and Automation

Reference	EN3551	Version	2
Created	August 2021	SCQF Level	SCQF 9
Approved	June 2021	SCQF Points	15
Amended	August 2021	ECTS Points	7.5

Aims of Module

To provide student 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	Describe a comprehensive understanding and design process of mechatronic systems and their relationship with automation applications.
2	Critically analyse various components such as electrical and mechanical sensors, actuators, and electrical motors for mechatronics and automation systems.
3	Critically analyse various electronic signal conditioning, signal conversion and signal processing tools and techniques applicable in mechatronic and automation systems.
4	Demonstrate the design and analysis of mechatronic systems and its implementation in the form of automation systems in either laboratory or software based settings.

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

This is a lecture-based course supplemented with tutorial sessions, laboratory exercises and student centered learning.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	48	N/A
Non-Contact Hours	102	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

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

Component 1

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	2, 4
Description:	Lab-based coursework exercises and a report.				

Component 2

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 3
Description:	Closed book examination.				

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 50% and C2 is worth 50%.

		Examination:						
		A	**B**	**C**	**D**	**E**	**F**	**NS**
Coursework:	**A**	A	A	B	B	E	E	
	B	A	B	B	C	E	E	
	C	B	B	C	C	E	E	
	D	B	C	C	D	E	E	
	E	E	E	E	E	E	F	
	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	EN2510 or EN1562 or similar
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.
8. DU, K.L. and SWAMY, M.N.S., 2006. Neural Networks in a Softcomputing Framework. London: Springer.