MODULE DESCRIPTOR

Module Title

Mechatronics and Automation

Reference	EN3551	Version	4
Created	May 2022	SCQF Level	SCQF 9
Approved	June 2021	SCQF Points	15
Amended	June 2022	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	Demonstrate 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	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. Modelling of mechatronic systems. Sensors & Actuators: theory and operation, types of sensors and transducers, sensor/actuator selection, technologies and applications, MEMS. Motors: Special motors; Stepper motors, types, principles, characteristics, and control; Switched reluctance motors, principles and applications; Brushless dc motors; Universal motor; Hysteresis motor; Synchronous reluctance motor; Servomotors and drives; Motor selection. PLCs: Configuration and programming.

Module Delivery

Full-time students: This module is delivered by a combination of lectures and tutorials. It will be supported by practical examples and activities including computer based laboratory exercises. Part-time students: This module is delivered by a combination of lectures and tutorials online. It will be supported by drop-in evening sessions and labs on campus. Assessments will primarily be online although exams will be held on campus with the full-time cohorts.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	48	48
Non-Contact Hours	102	102
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
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:	75%	Outcomes Assessed:	2, 3
Description:	Lab-based coursework exercises and reports.				

Component 2

Type:	Examination	Weighting:	25%	Outcomes Assessed:	1
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 75% and C2 is worth 25%.

		Examination:						
		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	EN2510 or equivalent (Electronic and Electrical Engineering students). EN1562 or equivalent (Mechanical and Electrical Engineering students).
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.