

Module specification

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Module Code	ENG432
Module Title	Programmable Logic Controllers
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100166
Cost Code	GAME
Pre-requisite module	None

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
HNC Electrical & Electronic Technology	Core

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	0 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	60 hrs
Placement hours	0 hrs
Guided independent study hours	140 hrs
Module duration (Total hours)	200 hrs

Module aims

To provide fundamental knowledge of control technology with multiple interfaces (I/Os) to connect and control multiple mechatronic devices such as sensors and actuators. To understand the concepts of PLCs and to investigate the internal architecture of PLCs.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Investigate the design and operational characteristics of PLCs
2	Investigate PLC information and communication techniques
3	Investigate and apply PLC programming techniques along with management of memory allocation and structure

Assessment

Indicative Assessment Tasks:

Assessment is 100% in-course. 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.

Assessment 1: A coursework covering the design characteristics, devices comms' links architecture and operation.

Assessment 2: Practical - develop and implement of PLC programming to fulfil requirements from industrial problem.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1	Coursework	1600 words	40%	
2	2,3	Practical	2400 words	60%	

Derogations

None

Learning and Teaching Strategies

The module will be presented to students through a specified series of lectures assisted by notes via VLE platform. Lectures will deliver key concepts, ideas, theories and examples.

Initial structured lectures followed by practical exercises and the design of applications of PLCs.

Welsh Elements

This module will be delivered through the medium of English; however, students have the option to submit their assessments in the medium of Welsh. While this module is not currently offered fully through Welsh, Welsh language support and guidance are available, and some learning materials or tutorial discussions may incorporate Welsh elements where appropriate.

Indicative Syllabus Outline

1. **Design & operational characteristics:** unitary, modular, rack-mounted. I/P & O/P devices, mechanical switches, non-mechanical digital sources, transducers, relays. Communication links, twisted pair, coaxial, fibre optic network. Internal architecture, CPU, ALU, storage devices, memory, opto-isolators, I/P and O/P units, flags shift registers. Operational characteristics, scanning, performing logic operations, continuous updating mass I/O copying.
2. **Information & communications techniques:** Forms of signal, analogue (4-20mA), digital, discrete. Resolution & relationships, 8-bit, 10-bit, 12-bit. Number systems, decimal, binary, octal, hexadecimal, BCD. Protocols, RS232, IEE488, RS422, 20 mA. Networking methods and standards, master to slave, peer to peer, ISO, IEE, MAP Logic functions, AND, OR, EXCLUSIVE OR, NAND, NOR.
3. **Programming Techniques:** Methods of programming: ladder and logic diagrams, statement lists. Advanced functions, less than, greater than, binary to BCD, calculations. PID control. Testing & debugging, forcing inputs, forcing outputs, changing data, comparing files. Associated elements, contacts, coils, timers, counters, override facilities, flip-flops, shift registers, sequences.

Indicative Bibliography

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

Essential Reads:

W.Bolton. (2015) Programmable Logic Controllers. 6th ed. Newnes

Other indicative reading:

Website: PLC Manual <http://www.plcmanual.com>

Administrative Information

For office use only	
Initial approval date	August 2016
With effect from date	September 2021
Date and details of revision	6 July 2021, revalidated. 27/05/2026 Updated to new template
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