

Module specification

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Module Code	ENG5C9
Module Title	Industrial Automation and PLCs
Level	5
Credit value	20
Faculty	FACE
HECoS Code	100188
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
FdEng Industrial Engineering (Electrical) BEng (Hons) Electrical Engineering with Manufacture BEng (Hons) Electrical Engineering	Core

Breakdown of module hours

Learning and teaching hours	18 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	18 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	36 hrs
Placement hours	0 hrs
Guided independent study hours	164 hrs
Module duration (Total hours)	200 hrs

Module aims

This module develops applied understanding through a balance of theory and practice. Learners undertake both classroom study and supervised practical activity to explore design, implementation, and evaluation processes. Collaborative work and enquiry-based learning

foster communication, teamwork, and the confidence to apply problem-solving techniques in varied contexts.

This module aims to equip students with the knowledge and practical skills required to design, implement, and evaluate industrial automation systems using programmable logic controllers (PLCs) and associated technologies, preparing them for application in real-world engineering environments.

Module Learning Outcomes

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

1	Plan and apply practical laboratory and workshop skills to investigate and analyse broadly defined problems using PLCs and industrial hardware, applying engineering principles where appropriate (AHEP-4 F12).
2	Select, utilise and integrate appropriate devices, equipment, and engineering technologies to design, implement, and evaluate automated control systems, recognising limitations and constraints (AHEP-4 F13).
3	Develop, test, and appraise PLC programmes and associated HMI/SCADA interfaces, applying systematic analysis to ensure compliance with operational requirements.

Assessment

Indicative Assessment Tasks:

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: Portfolio (100%)

Students will complete a portfolio that documents the design, programming, and implementation of an industrial automation system using PLCs. The portfolio will include system planning, hardware interfacing, control logic development, and performance evaluation. This assessment is designed to demonstrate students' practical skills, application of relevant technologies, and problem-solving capabilities.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Portfolio	3000	100%	N/A

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a pass mark 40% has been achieved, with a minimum mark of 30% in each assessment element.

Learning and Teaching Strategies

Learning integrates conceptual study with practical investigation to deepen understanding and enhance problem-solving ability. Students participate in lectures, laboratory work, and team-based projects that encourage collaboration and communication. Online materials, recordings, and discussion forums support blended engagement. Tutorials promote reflective learning and increasing autonomy in preparation for advanced study.

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. To further promote bilingual learning, all students have the opportunity to take the 20-credit *Welsh for STEM* short course, designed to develop confidence and subject-specific language skills in both English and Welsh.

Indicative Syllabus Outline

PLC Architecture and Automation Equipment: Analysis of PLC architecture, industrial controllers, and communication protocols to support the investigation and diagnosis of automation problems within laboratory and workshop settings.

Interfacing with Field Devices: Application and evaluation of integration techniques for sensors, actuators, and I/O modules, enabling practical investigation and analysis of real-world automation systems.

Automation System Integration: Utilisation and integration of industrial devices, control hardware, and communication technologies to design and implement automated systems, recognising practical limitations and system constraints.

System Implementation and Evaluation: Evaluation of system performance and functionality, considering reliability, scalability, and operational effectiveness within industrial automation environments.

PLC Programming and Testing: Development and testing of PLC control programs using ladder logic, function block diagrams, and structured text, applying systematic methods to ensure correct operation and compliance with requirements.

HMI and SCADA Systems: Design and critical evaluation of HMI and SCADA interfaces for monitoring and control, ensuring usability, functionality, and alignment with operational and system performance requirements.

Indicative Bibliography

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

Essential Reads:

AutomationDirect, *PLC Handbook: Practical Guide to Programmable Logic Controllers*, 2020. [Online]. Available: <https://cdn.automationdirect.com/static/eBooks/PLC%20Handbook.pdf>

Other indicative reading:

W. Bolton, *Instrumentation and Control Systems*, 3rd ed. Oxford, UK: Newnes, 2021.

RealPars, “*Sensors and actuators explained*,” YouTube playlist, 2025. [Online Video]. Available: <https://www.youtube.com/playlist?list=PLIn3BHg93SQ812ihcqWb9OOWbZ-09DLW6>.

OpenPLC Project, “*OpenPLC user guide and tutorials*,” 2025. [Online]. Available: <https://www.openplcproject.com>.

Plus, various others to be signposted on Moodle.

Administrative Information

For office use only	
Initial approval date	June 2026
With effect from date	September 2026
Date and details of revision	
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