SYST C4605: Advanced PLCs

Module Title:	Advanced PLCs
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	This module will be delivered through a mix of lectures, laboratory assignments and projects including a professional write up. It will employ a mixture of active/task-based learning, reflective learning and problem-based learning.

Module Aim:	The aim of this module is to develop an in-depth understanding and insight to control, analysis, and visualisation of advanced programming methods for dynamic systems using Programmable Logic Controllers (PLCs), Human Machine Interfaces (HMI/SCADA), safely and ethically as used in automated processes across a range of industrial applications.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Design, develop and, debug control (PLC) and visual (HMI/SCADA) models using a combination of IEC PLC languages and embedded scripting.
LO2	Employ good and safe practice in control system design and development.
LO3	Set up industrial networks, communication protocols and security.
LO4	Design and develop a PLC/HMI project for a given application.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
PLC programming languages Use of different program languages such as Ladder (LAD), Function Block Diagrams (FBD) and Structured Control Logic (SCL).
Advanced PLC Programming Function Blocks, Data Blocks, comparator operations, safety circuit classification and integration into projects, fail safe operation and safe shutdown of equipment. Analogue input and output modules, Digital to Analogue conversion, Analogue to Digital Conversion, resolution, step outputs, sampling frequency, and associated calculations.
HMI Programming Design and program a HMI to include multiple screens, buttons, pictures, animations, access levels, alarms and trends.
Interfacing, industrial networking and communication protocols Introduction to the integration of network protocols into PLC programs.
Automation Project Design Develop and implement automation project individually/collaboratively (depending on complexity).

Assessment Breakdown	%
Project	30.00%
Practical	20.00%
End of Module Formal Examination	50.00%

No Continuous Assessment

Project				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	A group/solo (depending on complexity) project based on real-world scenarios.	1,2,3,4	30.00	n/a

Practical				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	A set of practical exercises to complement the theory elements of the module.	1,2,3,4	20.00	n/a

End of Module Formal Examination				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	A final assessment to evaluate students' learning.	1,2,3	50.00	End-of-Semester

No Continuous Assessment

Project				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	A group/solo (depending on complexity) project based on real-world scenarios.	1,2,3,4	30.00	n/a

Practical				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	A set of practical exercises to complement the theory elements of the module.	1,2,3,4	20.00	n/a

End of Module Formal Examination				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	A final assessment to evaluate students' learning.	1,2,3	50.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	3.00
Laboratory	Every Week	2.00
Independent Learning Time	Every Week	4.00
	Total Hours	9.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEROB_B	Bachelor of Engineering (Honours) in Robotics and Automated Systems	8	Mandatory