Module Title:	Advanced PLC's
Language of Instruction:	English

Credits:	5

NFQ Level:	7

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	The lectures will incorporate a mixture of presentations, examples and student exercises/problem-solving, question and answer sessions, group discussions and online resources. The Institute Managed Virtual Learning Environment will be utalised in the module delivery to provide learning resources and interactively communicate with students. Extensive use will be made of "hands-on" laboratory equipment and PLC software simulation programs to promote greater student engagement with the learning process by facilitating them to apply and implement the concepts explored in the classroom.

Module Aim:	The aim of this module is to develop an in-depth understanding of advanced programming methods for Programmable Logic Controllers, Human Machine Interfaces and Variable Speed Drives, 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	Apply advanced PLC programming techniques in a range of applications.
LO2	Explain the significance of the key programming parameters for PLC systems, input and output devices including Variable Speed Drives and measurement devices.
LO3	Implement good design practice to PLC, HMI and VSD integrated systems.
LO4	Design and program a Programmable Logic Controller, Human Machine Interface and Variable Speed Drive 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

Module Content & Assessment

Indicative Content
PLC programming languages Use of different program langauges 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 different communication protocols within a PLC. Integration of device level network protocols (IO Link) into PLC programs.
Variable Speed Drive programming. Program a variable speed drive and integrate it into a PLC program. Modify the speed of the motor from a HMI.
Automation Project Design Develop and implement automation project individually and collaboratively (depending on project complexity).

Assessment Breakdown	%
Continuous Assessment	20.00%
Project	40.00%
End of Module Formal Examination	40.00%

Continuous Assessment				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Presentation	Presentation of main project reflecting on the process and learning involved.	1,2,3,4	10.00	Sem 1 End
Short Answer Questions	Class or online short answer questions	1,2,3	5.00	Week 5
Short Answer Questions	Class or online short answer questions	1,2,3	5.00	Week 10

Project				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Project showing the design, programming and testing of a PLC, HMI and VSD for an instrumentation based application using advanced methods.	1,2,3,4	40.00	End-of-Semester

No Practical

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Written Exam	1,2,3	40.00	End-of-Semester

Continuous Assessment				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Presentation	Presentation of main project reflecting on the process and learning involved.	1,2,3,4	10.00	Sem 1 End
Short Answer Questions	Class or online short answer questions	1,2,3	5.00	Week 5
Short Answer Questions	Class or online short answer questions.	1,2,3	5.00	Week 10

Project				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Project showing the design, programming and testing of a PLC, HMI and VSD for an instrumentation based application using advanced methods.	1,2,3,4	40.00	End-of-Semester

No Practical

End of Module Formal Examination				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	Written Exam	1,2,3	40.00	End-of-Semester

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

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lab/Lecture	Every Week	3.00
Independent Learning Time	Every Week	6.00
	Total Hours	9.00

Workload: Part Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lab/Lecture	Every Week	3.00
Independent Learning Time	Every Week	6.00
	Total Hours	9.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EMIMC_D	[Batchelor of Science in Industrial Measurement and Control](#)	2	Mandatory