

Title:	Plant Automation	APPROVED
Long Title:	Plant Automation	
Module Code:	ELEC7025	
Credits:	5	
NFQ Level:	Intermediate	
Field of Study:	Electrical Engineering	
Valid From:	Semester 1 - 2014/15 (September 2014)	
Module Delivered in	2 programme(s)	
Module Coordinator:	JOSEPH CONNELL	
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Module Description:	This module will provide the student with the skills, knowledge, and competence necessary for a career in the industry dealing with automation solutions. An essential skill is the ability to write PLC control solutions to be implemented in automation systems and having an acute awareness of the peripheral nature of devices and the totality of equipment surrounding the programs.	
Learning Outcomes		
On successful completion of this module the learner will be able to:		
LO1	Develop the safety circuits required for routine automation systems.	
LO2	Configure PLC hardware to take account of common I/O devices and standard networks that may be connected.	
LO3	Develop and configure program blocks used in the structure of PLC programs and the common programming languages used within them.	
LO4	Utilise selected numbering and coding systems used within routine PLC programs.	
LO5	Complete a mini-project to develop, implement and debug a solution to a common automation problem.	
Pre-requisite learning		
Module Recommendations		
This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).		
No recommendations listed		
Incompatible Modules		
These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.		
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. You may not enrol on this module if you have not acquired the learning specified in this section.		
No requirements listed		
Co-requisites		
No Co Requisites listed		

Module Content & Assessment

Indicative Content

Safety in automation systems

Machinery directives for safety systems, principle of risk assessment, emergency stop equipment, prevention of unexpected startup, two-hand control systems, zero speed detection relays, light curtain and zonal safety systems, safety guards, redundancy and monitoring in safety systems.

PLC Hardware

Selection and configuration of: power supply module, CPU, digital input and a output modules, analog input and output modules.

Sensors and Actuators

Sensors for analog measurement of: temperature, weighing, pressure, flow rate, angular and linear position, vibration, etc. Actuators operating from digital and analog outputs.

Programming Languages

IEC 1131-3 PLC programming languages including: LAD (ladder), IL (instruction list), FBD (function block diagram, ST (structured text) and SFC (sequential flow chart)

Complex Instructions

Complex PLC instructions and their application in math and other functions.

Data Handling

Conversion of data formats, e.g. Integer to Double Integer, Double Integer to Real, Round, Truncate, Integer to BCD, BCD to Integer, etc. Data manipulation, e.g. Shift Left, Shift Right, Rotate Left, Rotate Right, and Logic operators on various data widths

PLC Programming and Testing

Writing programs, downloading and testing for: real time clock applications, scaling of linear analog input data, linear interpolation of non-linear analog input data. Writing functions for measurement of volume in horizontally oriented cylindrical vessels and spherical shaped vessels.

High-speed Counters

Principle of high-speed counter (HSC) inputs, modes of operation, interrupt programming, use of HSC functions.

Assessment Breakdown	%
Course Work	50.00%
End of Module Formal Examination	50.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Automation project	2,3,4,5	50.0	Sem End

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-Semester Final Examination	1,2,3,4	50.0	End-of-Semester

Reassessment Requirement

Repeat examination

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lab	Practical application and associated theory, definitions etc. in the same lab.	4.0	Every Week	4.00
Independent Learning	Self Study	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

This module has no Part Time workload.

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> • Eric D. Knapp,, <i>Industrial Network Security</i> [ISBN: 978-1597496452] • Werner R.Kriesel/Otto W. Mandelung 1999, <i>AS-Interface, The Actuator-Sensor-Interface for Automation , Second revised and expanded Ed</i> [ISBN: ISBN 3-446-21065-2]
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> • Hans Berger 2005, <i>Automating with STEP7 in STL and SCL</i>, Third revised Ed., 34, Siemens Germany [ISBN: 3-89578-243-2]
<i>This module does not have any article/paper resources</i>
<i>This module does not have any other resources</i>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<u>Bachelor of Engineering (Honours) in Electrical Engineering</u>	6	Mandatory
CR_EELEC_7	<u>Bachelor of Engineering in Electrical Engineering</u>	6	Mandatory