INDL C4F01: Industrial Networks

Module Title:	Industrial Networks
Language of Instruction:	English

Credits:	5

NFQ Level:	7

Module Delivered In	2 programme(s)

Teaching & Learning Strategies:	A mix of traditional lectures, laboratory work and take-home projects will enable the learner to fully understand and practice the various networking concepts presented.

Module Aim:	To provide learners with a broad and solid knowledge of network concepts, techniques and protocols related to Industrial Networks.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Select and apply appropriate techniques, models as well as networking tools and devices to broadly-defined networking problems within an Industrial networking environment.
LO2	Describe and demonstrate serial as well as switched and routed communication paths over wired or wireless media between elements in an Industrial network.
LO3	Catogorise and contrast the particular protocols used for communication within Industrial Networks.
LO4	Evaluate, and consider mitigation measures for, security concerns that exist for Industrial networks

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
Local Area Networks (LAN) Switching: Ethernet, Bridging and Switching Concepts, Local Area Networks (LAN), Virtual LAN (VLAN).
Internet Protocol: Internet Protocol version 4 (IPv4), subnetting, Classless Inter-Domain Routing (CIDR), Variable Length Subnet Masks (VLSM), Internet Protocol version 6 (IPv6) overview.
Routing: Route types, Static routing, Dynamic routing protocol types (e.g. distance vector and link state), Investigation of dynamic routing protocols (e.g. Routing Information Protocol (RIP), Intermediate System to Intermediate System (IS-IS), Open Shortest Path First (OSPF)), Analysing routing tables.
Wireless: Wireless networks, Wireless LAN concepts, configuration and security (e.g. WiFi).
Industrial Control System protocols: Examine serial and network technologies used in Industrial Control Systems (e.g. Distributed Network Protocol 3 (DNP3), BACnet, Modbus, Modbus TCP, Profibus, DeviceNet, CANbus, Zigbee, Profinet).
Industrial Security Insecurity by Inheritance, Defence in Depth, Perdue model, IEC62443, Computer and Application Security.

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

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Multiple Choice Questions	MCQ style online tests to consolidate class material.	1,2,3,4	20.00	Every Second Week

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Laboratory based examination. The learner will be presented with a practical networking problem to solve in a 2 hour period.	1,2,3,4	30.00	End-of-Semester

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	Examination of the complete range of material. This examination will take the form of an MCQ; however, it will take place at the Institute under supervision.	1,2,3,4	50.00	End-of-Semester

Continuous Assessment

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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*
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	Every Week	6.00
	Total Hours	9.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EFARG_B	Bachelor of Engineering (Honours) in Agricultural Systems Engineering	7	Mandatory
CW_EMIMC_D	Batchelor of Science in Industrial Measurement and Control	2	Mandatory