



# **Higher Certificate in Engineering in Telecommunications and Data Network Engineering**

**Industry-led New Apprenticeship Programme**

**National Qualifications Framework Level 6  
Department of Electronic Engineering  
School of Engineering  
Tallaght**

**Syllabi Booklet**

**Based on validated submission  
October 2019**

## Volume II

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# Course Overview

## YEAR 1

SEM 1 Credits: 30

**Network Installation,  
Health & Safety**

NIHS H1000,  
CA:FE; 100 %CA for 2021  
Credits: 15, Online + Work  
based Learning

**Telecommunications  
Technology & Service  
Restoration**

TELE H1000,  
100% CA  
Credits: 15, Online +  
practical labs  
Work based learning

SEM 2 Credits: 30

**Electrical  
Principles**

EPRI H1000,  
CA:FE; 50:50  
Credits: 15, Classroom  
+ Work based Learning

**Customer  
Services**

CSSV H1000,  
100% CA  
Credits: 15, Online Delivery  
Work based Learning

## YEAR 2

SEM 3 Credits: 30

**Broadband &  
Wireless Skills**

BBWL H2000,  
CA:FE; 50:50  
Credits: 15, Class room +  
Work based learning

**Optic Fibre  
Installation**

OPFI H2000: 100% CA  
Credits: 15, Classroom + Work  
based learning

SEM 4 Credits: 30

**Optic Fibre Maintenance  
& Commissioning**

OPFM H2000  
CA:FE; 50:50  
Credits: 15, Class room +  
Work based learning

**Personal &  
Professional  
Development**

PRFD H2000,  
100% CA  
Credits: 15, Blended Delivery  
CA:FE; 100% CA

Ack. Telecoms Industry Consortium Steering Group (CSG)



Department of Electronic Engineering, TU Dublin – Tallaght.

## Module Details

Short Title:	Network Installation and Health and Safety <b>DRAFT</b>		
Full Title:	Network Installation and Health and Safety		
Language of Instruction:	English		
Module Code:	NIHS H1000	Duration:	1 Semester
Credits:	15		
NFQ Level:	6		
Field of Study:	Engineering & Engineering Trades		
Valid From:	Semester 1 - 2019/20 ( June 2019 )		
Module Delivered In	1 programme(s)		
Module Coordinator:	JAMES WRIGHT		
Module Author:	BRIAN KEOGH		
Module Description:	The purpose of this module is to provide fundamental knowledge and skills that will complement and enable work based learning (WBL) for the learner in respect of Data Network Installations. The module also provides preparatory mathematical studies relevant to the learner's employment as well as instruction and discussion in respect of the importance and requirements of Health and Safety in the workplace. Through this module, the learner will also gain an overview of data network installations in terms of planning, installation, operation and maintenance.		

## Learning Outcomes

*On successful completion of this module the learner will be able to:*

LO1	Describe the importance and requirements of workplace Health and Safety and be able to perform risk assessment and control evaluations (on and off-the-job).
LO2	Describe an overview of modern communications networks and the stages involved in the installation of a communications network; planning, installation, commissioning and maintenance. (off-the-job).
LO3	Explain the relative features of copper, fibre and wireless based networks, including key operational parameters (e.g. signalling, addressing) and terminology of a data network (off-the-job).
LO4	Describe the role of standards bodies and the benefits of data network installation and commissioning standards to service providers and customers (off-the-job).
LO5	Outline workflow stages involved for fibre to the home (FTTH) installations such as fibre deployment/handling, link-termination and implementation of wiring/topology diagrams (on and off-the-job).
LO6	Outline range and purpose of installation tests, (e.g. continuity, insertion loss and optical time-domain reflectometry), required to commission a data communications network (on and off-the-job).
LO7	Apply relevant numerical methods to practical communications engineering problems associated with network installation (e.g. Ohms Law, dB, power, frequency, basic trigonometry) (on and off-the-job).
LO8	Outline requirements and procedures for the recording and maintenance of accurate technical information in respect of network installation/repair, as well as network device configuration (customer and service side). (on and off-the-job)

## Pre-requisite learning

### Co-requisite Modules

No Co-requisite modules listed

## Module Content & Assessment

Indicative Content	%
<b>Health and Safety in the Workplace</b> Electrical and physical risk assessment and control evaluation method. Safe-working practices specific to fibre, copper and wireless (RF emissions). Safe use and care of tools (PPE, disposal of waste). Awareness of any environmental impacts and environmental proofing of equipment and installation parts.	15.00%
<b>Overview of Data Network Types and Installation</b> Historical overview of access networks (evolution from analogue to digital, copper, fibre and wireless, converged networks). Introduction to the electromagnetic spectrum and network signal types/form. Structure and operational overview of hierarchical network (the cloud, mobile access). Addressing in multi-access networks (MAC, IP). National broadband deployment (challenges and benefits). Block diagram of optical fibre network.	15.00%
<b>Network Installation Standards</b> Standards bodies and the importance/benefits of network installation standards. Requirements and benefits of adherence to standards in respect of fibre, copper and wireless network installation and commissioning.	10.00%
<b>Network Installation Practice</b> Introduction, demonstration and practice in respect of fibre network installation; introduction to optical fibre operation, fibre types and connectors, handling (deployment, bend-radius, crush/impact mitigation), routing (ducting and fibre-blowing) and repair (introduction to splicing and splicing tools/instruments). Maintenance and operation of field instruments and tools (e.g. fibre-blower).	15.00%
<b>Communications Network Testing and Verification</b> Discussion, demonstration and practice in post-installation and repair link testing. Introduction to OTDR, power meters, test-setup and device configuration (customer and service provider sides). Key testing parameters; continuity, insertion-loss, OTDR.	15.00%
<b>Numerical and Mathematical Skills for Network Installation</b> Use of Number Systems (decimal, binary, hexadecimal). Arithmetic (manipulation and solving of equations). Powers, Logarithms, basic Trigonometry. Signal measurements (amplitude, frequency, period, phase, bandwidth, Ohms law). Calculator Apps for data processing and recording.	15.00%
<b>Technical Data Recording and Processing</b> Compilation, verification and maintenance of data. Importance of recording, interpreting and processing data (i.e. equipment configuration, maintenance and customer).	15.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Risk assessment, evaluation and control of sample work scenario (e.g. circuit-building station) incorporating safe use of tools (e.g. soldering irons, cutters etc.) (off-the-job)	1,7	3.00	Programme Board to Provide Date
Laboratory	Operational Overview and Principles of Data Networks. Software simulation to investigate fundamental operational parameters (signals and addressing) and end-device basic configuration for copper, fibre and wireless networks (off-the-job).	2,3,4	2.00	Programme Board to Provide Date
Laboratory	Numerical methods and measurement. Use of laboratory test and measurement equipment to perform signals-based measurements and calculations such as ohm's law (voltage, current and resistance), power (dB, dBm), sinusoidal waveforms (amplitude, frequency, phase), bandwidth. (off-the-job).	7	2.00	Programme Board to Provide Date
Practical/Skills Evaluation	Basic familiarisation with key fibre-network field installation tools and terminology (fibre-splicer, fibre-blowing, link-terminations, field equipment maintenance and safe-use, fibre deployment and ducting). (off-the-job).	1,4,5,8	3.00	Programme Board to Provide Date
Laboratory	Familiarisation with key network commissioning tests (continuity, insertion-loss, OTDR). Recording, interpreting and reporting of test data and results. (off-the-job).	3,4,6,7,8	2.50	Programme Board to Provide Date
Reflective Journal	Tasks:(1) Basic risk assessment, evaluation and control. (2) Use of network field installation tools (e.g. fibre-blower). (3) Completion and recording of network commissioning tests and results. (4) Completion of a numerical-based work survey on a network installation task. (on-the-job)	1,2,3,4,5,6,7,8	30.00	Ongoing
Assignment	Report on Work based Learning; emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (on-the-job)		7.50	Programme Board to Provide Date

End of Module Formal Examination				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	Written examination.	1,2,3,4,5,6,7,8	50.00	End-of-Semester

Reassessment Requirement
<b>Repeat examination</b> <i>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.</i>

TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment

**Module Workload**

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Formal Lectures	37.50	Once per Semester	2.50
Lab	Structured Labs and Practical Assignments at TU Dublin	37.50	Once per Semester	2.50
Placement	Work based learning with Qualified Field Personnel	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00

### *Recommended Book Resources*

2017, *Engineering Mathematics*, 2 Ed. [ISBN: 978113867359]

Thiagarajan Viswanathan 2015, *Telecommunication Switching Systems and Networks*, 2 Ed., PHI Learning [ISBN: 978-812035083]

Jim Hayes 2014, *Fiber Optics Technician Manual*, 4th Ed., 17, Cengage [ISBN: 978-143549965]

*This module does not have any article/paper resources*

### *Other Resources*

**Website: Health and Safety Authority - Electricity UKWeb**

<http://www.hse.gov.uk/electricity/hse.htm>

**Website: Health and Safety Authority - Electricity IRLWeb**

<http://www.hsa.ie/eng/Topics/Electricity/>

**Website: Guide to the Safety, Health and Welfare at Work (General Application) Regulations 2007 – Part 3: ElectricityPDF**

[http://www.hsa.ie/eng/Publications\\_and\\_Forms/Publications/Retail/Gen\\_Apps\\_Electricity.pdf](http://www.hsa.ie/eng/Publications_and_Forms/Publications/Retail/Gen_Apps_Electricity.pdf)

**Website: Fibre Optic Associationn/a**

<http://www.thefoa.org/tech/ref/contents.html#jump>



## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

<b>Short Title:</b>	Telecommunications Technology and Service Restoration <b>DRAFT</b>		
<b>Full Title:</b>	Telecommunications Technology and Service Restoration		
<b>Language of Instruction:</b>	English		
<b>Module Code:</b>	TELE H1000	<b>Duration:</b>	1 Semester
<b>Credits:</b>	15		
<b>NFQ Level:</b>	6		
<b>Field of Study:</b>	Engineering & Engineering Trades		
<b>Valid From:</b>	Semester 1 - 2019/20 ( June 2019 )		
<b>Module Delivered In</b>	1 programme(s)		
<b>Module Coordinator:</b>	JAMES WRIGHT		
<b>Module Author:</b>	BRIAN KEOGH		
<b>Module Description:</b>	The purpose of this module is to provide the learner with specialized training in the installation and servicing of telecommunications networks. The module comprises on and off-the job elements.		

## Learning Outcomes

*On successful completion of this module the learner will be able to:*

LO1	List the role and functions of a telecommunications network. (on and off-the job)
LO2	Identify the characteristics of a telecommunications network to include its physical environment and common installation and maintenance techniques that facilitate its operation. (on and off-the job)
LO3	Break down the potential problems with a telecommunications network in a technically literate systematic, analytical and logical manner (off-the-job)
LO4	Resolve network operation and performance issues, applying technical and mathematical skills and reasoning (on and off-the-job)
LO5	Implement and test a set of interconnections based on a diagrammatic representation of a telecommunications network (on-the-job)
LO6	Localise telecommunications network problems through diagnostic testing and fault resolution processes (on-the-job)
LO7	Interpret test results, applying a systematic, logic and analytical approach (on and off-the-job)
LO8	Communicate a range of network performance problems to a variety of technical and non-technical individuals (on-the-job)

## Pre-requisite learning

### Co-requisite Modules

No Co-requisite modules listed

## Module Content & Assessment

Indicative Content	%
<b>Role and Functions of a Telecommunications Network</b> Brief history of telecommunications including copper, wireless and fibre channels. Current technology and challenges. Characteristics of Speech and Data. Line coding methods used in transmission of data. Basic principles of time division multiplexing. Synchronous Digital Hierarchy(SDH).	10.00%
<b>Characteristics of a Telecommunications Network</b> Overview of access network technology. Network types, Nodes & dimensioning. Cable types and methods of termination. Common installation and maintenance techniques that facilitate the operation of a telecommunications infrastructure.	10.00%
<b>Applied Mathematical Methods used in Telecommunications</b> Applying technical and mathematical skills and reasoning. Review of key mathematical methods including use of International System of Units (SI) , powers, logarithms, decibels (dB), and mathematical representation of carrier signals.	20.00%
<b>Potential problems with a Telecommunications Network</b> Availability of pairs. Availability of fibre access. Customer fault reporting systems. Telecommunications network equipment. Incident management. Use of technical terminology in reports. Resolving network operation and performance Issues. Market segmentation. Installation procedures. Distribution network.	10.00%
<b>Diagrammatic Representation of a Telecommunications Network</b> Symbols and abbreviations used in documentation. Difference between symbolic diagrams and physical (layout) diagrams. Revision control process. Main cable distribution and example diagrams. Duct route dimensioning including optic fibre Routes.	10.00%
<b>Diagnostic Test and Fault Resolution Processes for Telecommunications</b> Analysis of line conditioning (identification). Measurement and localisation. Restoration of circuit to technical standards . Basic fibre testing. Fault localisation techniques used in the access network. Precision fault localisation for a range of network problems. Analysis of test data output. Conversion of information gathered into operational fault resolution. Localization of network problems through diagnostic testing. Overview of preventive network processes. Proactive network testing. Removal of defective components.	30.00%
<b>Communication of Problems to a Technical and Non-technical Audience</b> Communicate a range of access network performance problems to a technical audience. Communicate a range of network performance problems to a non-technical audience.	10.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Multiple Choice Questions	Calculation of common signal measurements. Test and measurement equipment. This is a getting started quiz. (off-the-job)	3,4	2.50	Programme Board to Provide Date
Laboratory	Investigate the radio frequency spectrum using a spectrum analyser, attenuator, directional coupler DC block and antenna. (off-the-job)	3,4,6,7,8	5.00	Programme Board to Provide Date
Laboratory	Install and configure a simple wireless data link using a subscriber premises data access point. (off-the-job)	1,2,3,5	5.00	Programme Board to Provide Date
Multiple Choice Questions	Applied Mathematical Methods. (off-the-job)	7,8	10.00	Programme Board to Provide Date
Laboratory	Signal measurements; dBm, frequency, bandwidth using a high speed sampling oscilloscope. (off-the-job)	3,4,5,7	5.00	Programme Board to Provide Date
Laboratory	Outdoor field testing and fault finding using industry standard telecommunications test and measurement equipment. (off-the-job)	6,7	5.00	Programme Board to Provide Date
Laboratory	Signal and interference identification using industry standards receivers and directional antennas. Identification of signal sources. Interfacing with Test and Measurement Equipment. (off-the-job)	6,7	10.00	Programme Board to Provide Date
Short Answer Questions	Test 1, multiple choice (1 hour). Test 2, theory questions (2 hours) (off-the-job)	1,2,3,4,5,6,7,8	20.00	Programme Board to Provide Date
Reflective Journal	Tasks summary (indicative): (1) - Restoration of a circuit to Technical Standards; specification, schematic, problem solving process, test results, conclusion and reflection. (2) - Installation and configuration of subscribers premises equipment; flowchart of process, wiring details, handover procedures, simplified user guide. (3) - Problem Solving Record; example of field problem encountered. (4) - Single fibre termination; street cabinet example. (5) - Copper Pair cable management; IDC, cable forming. (on-the-job)	1,2,4,5,6,7,8	30.00	Ongoing
Assignment	Report on Work based Learning; emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (on-the-job)	4,5,6,7,8	7.50	Programme Board to Provide Date

No End of Module Formal Examination

#### Reassessment Requirement

##### Coursework Only

*This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.*

**TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment**

**Module Workload**

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Formal Lectures (off-the-job)	37.50	Once per Semester	2.50
Lab	Structured labs (off-the-job)	37.50	Once per Semester	2.50
Placement	Work based learning (on-the-job)	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00

### *Recommended Book Resources*

***A Guide to the Wireless Engineering Body of Knowledge* [ISBN: 978-111834357]**

**Louis E. Frenzel, Jr. 2017, *Electronics Explained*, Newnes [ISBN: 9780128116418]**

**Samuel Brüning Larsen 2019, *Doing Projects and Reports in Engineering*, Red Globe Press [ISBN: 9781352005639]**

**Annabel Z. Dodd 2012, *The Essential Guide to Telecommunications*, Prentice Hall [ISBN: 9780137058914]**

*This module does not have any article/paper resources*

### *Other Resources*

**e-book, ASIN: B01E9D1COG: Eric Coll 2017, *Telecom 101: CTA Study Guide and High-Quality Reference Book Covering All Major Telecommunications Topics... in Plain English. Kindle Edition*, Teracom Training Institute, Amazon Digital Services LLC**

## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

Short Title:	Electrical principles <b>DRAFT</b>		
Full Title:	Electrical principles		
Language of Instruction:	English		
Module Code:	EPRI H1000	Duration:	1 Semester
Credits:	15		
NFQ Level:	6		
Field of Study:	Engineering & Engineering Trades		
Valid From:	Semester 1 - 2019/20 ( June 2019 )		
Module Delivered In	1 programme(s)		
Module Coordinator:	JAMES WRIGHT		
Module Author:	BRIAN KEOGH		
Module Description:	The purpose of this module is to equip the learner with the knowledge, skill and competence in the principles underpinning the functioning of electrical circuits to understand and work safely with electrical circuits.		

Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Identify the units and characteristics of conductors, insulators and electrical circuits including laws that govern their relationship to each other. (off-the-job)
LO2	Test the behaviour of electrical components including resistors, capacitors, inductors and transformers and the laws that govern their behaviour. (off-the-job)
LO3	Outline the functioning of electrical circuits under direct current and alternating current conditions. (off-the-job)
LO4	Calculate the consumption of power in electrical circuits, and list the factors that affect power efficiency. (off-the-job)
LO5	Construct basic circuits to an acceptable work standard using schematic and industry standard tools. (off-the-job)
LO6	Trouble-shoot circuits and terminations using test and measurement equipment including electrical field-test meters. (on-the-job)
LO7	Resolve circuit malfunctions, applying a systematic, logical and analytical problem solving approach. (on-the-job)
LO8	Write a test report with reference to an electrical test specification and interpret the test results. (on-the-job)
Pre-requisite learning	
Co-requisite Modules	
No Co-requisite modules listed	



**Module Content & Assessment**

Indicative Content	%
<b>Electrical Fundamentals</b> Characteristics of metal and how it conducts current. Review of energy (Joules), Coulomb, Charge, Current, Voltage. Resistivity. Conductor and insulator characteristics. Review of SI units, particularly those relating to electricity such as electric charge, energy, potential, current, resistance, conductance, capacitance and inductance. Common prefixes. Ohm's law; application to resistive circuit calculations. Calculation of power, energy and unknown voltages, current and resistances in series- parallel networks.	20.00%
<b>Practical Calculations (Resistance, Capacitance and Inductance)</b> Factors on which the electrical resistance of a component depends including resistivity and temperature coefficient. Resistor colour codes or letter and digit codes. Capacitance; its unit and calculations involving capacitors in series and parallel. Energy stored in a capacitor. Charge and discharge equations. Inductance and behaviour of inductors including back-emf. Basic concept of a pulse transformer. Transformer as an isolation barrier. Insulation testing. Review of required mathematical tools to solve equations. Calculation of unknown values in a DC resistive circuits, AC resistive, reactive circuits. Power calculations for a range of power supply circuits.	15.00%
<b>Schematics and circuit construction</b> Importance of schematics and revision control. Review of circuit diagram symbols including grounds, voltage rails, polarity, resistors, capacitors, inductors, transformers, switches, diodes, LEDs, photo diodes, zener diodes, voltage clamping devices and surge protectors. Read and draw block diagram of an electrical system and explain its functioning. Bill of materials. Component layout and wiring configuration based on a variety of circuit diagrams. Techniques to assemble components and wiring: through hole and surface mount components.	15.00%
<b>AC Circuits and Power Calculations</b> Differences in operations of DC and AC circuits. Definition of the frequency of an AC signal; peak to peak, r.m.s (sine wave examples). Introduction to reactance. Impedance; polar and rectangular formats. Plotting impedance versus frequency. Example of a simple RC or LC network and where it is used. Review of power sources and their characteristics. Practical usage of DC power supplies. Generators, Inverters/Rectifiers. Battery characteristics. Power rating of components. Calculation of power in a resistor. Heating effects in equipment.	15.00%
<b>Test &amp; Measurement and Fault Finding Techniques</b> Operation of multimeters, ohm meters, bridges and power meters. Operation of an oscilloscope; volts/div, time/div and trigger. Grounding and earthing considerations. Oscilloscope probes. Differential mode. Impact of errors and accuracy in the use of meters. Identification of normal and abnormal readings. The need for a systematic approach to fault finding within an overall quality system. Root cause analysis; symptoms and determination of full extent of malfunction. Determination of tests required to identify a faulty circuit. Review of existing fault resolution processes and comparison of their effectiveness.	20.00%
<b>Interpretation and analysis of test results</b> Comparison of test results to expected normal outcome. Identification of parts of the circuit which may be contributing to an abnormal test results. Technical report writing and reviewing conclusions to inform the method of resolving a circuit malfunction. Referencing to standards bodies such as IEC, CENELEC or NSAI.	15.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Laboratory	Safe use of power supplies. Isolated supplies, negative rails, series and parallel configuration, current limiting, over voltage protection. (off-the-job)	4,5,6	2.50	Programme Board to Provide Date
Laboratory	Construction and analysis of simple resistor networks such as potential divider, attenuator, wheatstone bridge. (off-the-job)	1,3,6	2.50	Programme Board to Provide Date
Laboratory	Use of Oscilloscope to measure amplitude, frequency and phase relationships using RC and RL circuits. (off-the-job)	2,3,4,5,6	2.50	Programme Board to Provide Date
Laboratory	Fault Finding Techniques; Root cause analysis, defining the problem, process of elimination, resolving and documenting the fault. (off-the-job)	7,8	2.50	Programme Board to Provide Date
Multiple Choice Questions	SI Units, Calculations based on Ohm's Law. (DC ) AC Calculations; Impedance, Reactance. Power dissipation calculations. Recognition of circuit symbols. (off-the-job)	1,2,3,4	2.50	n/a
Reflective Journal	Indicative Tasks: (1) Health and Safety – Safety awareness and hazard identification. (2) Health and Safety – Demonstrate an understanding of earthing and why is it done (3) Describe the characteristics of conductors and insulators and describe how it could affect telecommunications cables. (4) Explain the difference in operation between AC and DC circuits (5) Fault find techniques – demonstrates ability to problem solve and resolve fault to root cause using test meters and equipment. (on-the-job)	3,4,5,6,7,8	30.00	Ongoing
Assignment	Report on Work based Learning; Emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (on-the-job)	3,5,6,7,8	7.50	Programme Board to Provide Date

End of Module Formal Examination				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	Theory based Exam	1,2,3,4,5,8	50.00	End-of-Semester

Reassessment Requirement
<b>Repeat examination</b> <i>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.</i>

TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment

Module Workload

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Formal Lectures	37.50	Once per Semester	2.50
Lab	Structured labs in TU Dublin	37.50	Once per Semester	2.50
Placement	Work based learning with Qualified Field Personnel	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00

### *Recommended Book Resources*

Mitchel E Schultz 2015, *Grob's Basic Electronics (Engineering Technologies & the Trades)*, 12 Ed., McGraw-Hill Education [ISBN: 978-007337387]

*A Guide to the Wireless Engineering Body of Knowledge* [ISBN: 978-111834357]

*This module does not have any article/paper resources*

### *Other Resources*

Website: CENELEC 2019, *European Committee for Electrotechnical Standardization (CENELEC)*

<https://www.cenelec.eu/about-us/our-services/Training/Pages/default.aspx>

Website: NSAI 2019, *What are Standards?*

<https://www.nsai.ie/standards/about-standards/>

## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

Short Title:	Customer Service <b>DRAFT</b>		
Full Title:	Customer Service		
Language of Instruction:	English		
Module Code:	CSSV H1000	Duration:	1 Semester
Credits:	15		
NFQ Level:	6		
Field of Study:	Engineering & Engineering Trades		
Valid From:	Semester 2 - 2018/19 ( February 2019 )		
Module Delivered In	1 programme(s)		
Module Coordinator:	JAMES WRIGHT		
Module Author:	BRIAN KEOGH		
Module Description:	The purpose of this module is to equip the learner with the relevant knowledge, skill and competence to direct quality customer service within a work environment, independently and or in a supervisory capacity. Online delivery.		

Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Explain the principles underpinning customer service in a range of organisations, to include domestic and global organisations, those dealing with internal, external, corporate and individual customers, organisations providing products, and those providing services (off-the-job).
LO2	Evaluate how organisational policies and industry-specific quality assurance systems can enhance customer service, to include customer charters, policies on handling complaints, relevant quality rating systems (off and on-the-job).
LO3	Summarise key elements of consumer legislation for an industry specific area in Ireland. Describe the formal processes and associated organizations or bodies available to customers seeking protection, representation and redress (off-the-job).
LO4	Construct an organisational chart for two different types of organisations, to include identification of personnel with responsibility for customer service. Describe the benefits of effective teamwork in a customer service department and how the principles of customer service influence strategic planning in an organisation (off-the-job).
LO5	Explain how market research can assist development of customer service strategies, to include use of primary and secondary data, different data collection methods, use of market segmentation and observation of customer reaction and behaviour (off and on-the-job).
LO6	Use a range of communication skills and technologies to meet the needs of diverse customers, to include a variety of listening methods and strategies to respond to complaints and to resolve any difficulties arising (off and on-the-job).
LO7	Manage the needs of customers within a specialised industry or vocational area, to include identification of diverse needs of people with a disability and strategies to meet those needs and to build customer loyalty (off and on-the-job).
LO8	Design a customer service programme for staff, to include operational standards for frontline personnel and delivery of an appropriate oral presentation summarising the programme (off and on-the-job).

Pre-requisite learning
<b>Co-requisite Modules</b>
No Co-requisite modules listed

## Module Content & Assessment

Indicative Content	%
<b>Principle and Practice of Customer Service</b> Define customer Service. Identify elements of good customer practice and the impact of poor customer service on the business. Give examples of organisations which practise good customer service including public, private and voluntary.	10.00%
<b>Principles underpinning customer service</b> Explain principles underpinning customer service such as a mission statement/customer charter. Explore the three main components that affect consumer behaviour, demographics, values/attitudes and lifestyle. Describe different customer types (internal, external, corporate and individual customers) and their needs. Differentiate between product and service-oriented business.	10.00%
<b>Organisational policies and industry-specific quality assurance system</b> What is Company X typical code of practice and complaints Process? Examine codes of practice and independent advisory bodies. How do quality assurance policies enhance customer service?	10.00%
<b>Consumer legislation for telecoms industry</b> What is legislation? State the main provisions of the Sale of Goods and Supply of Service Act 1980. Outline the main provisions of consumer protection legislation. Evaluate the role of the Advertising Standards Authority. Investigate the existence of comparable legislation or regulations in at least one other country (look at EU).	15.00%
<b>Processes available to customers seeking protection</b> Explore the Non legislative processes for example negotiation. Evaluate the legal protection available to customers in the event of disputes. Outline the procedures in making a complaint to a Small Claims Court. Evaluate the role of the Director of Consumer Affairs. Outline the functions of the Consumers Association of Ireland.	8.00%
<b>Organisational structures and customer service</b> Examine personnel with responsibility for customer service and outline competencies for each role.	2.00%
<b>Effect of Customer service principles on strategic planning</b> Review principles of customer service. Show how a customer satisfaction measurement tool can influence strategic planning in an organisation. Examine how customer satisfaction results can affect organisation structure/restructure and policies at all levels.	10.00%
<b>Marketing research</b> Define Market research. Identify market research data collection methods that support the concept of branding. Explore the importance of the visual message and how branding techniques apply to customer service.	5.00%
<b>Communication skills required to meet customer needs</b> Identify communication skills essential for a customer service representative. Examine different customer service channels. Identify listening methods, identify barriers & evaluate the benefit of listening to customers. Explain the differences between verbal and non-verbal communication. Discuss the differences between assertiveness, aggressiveness and passiveness behaviours. Outline how to respond to customer complaints in accordance with the policy of the organisation. Identify strategies for handling complaints and dealing with difficult customers. Discuss the requirements of customers with diverse needs (not diversity).	10.00%
<b>Measuring customer satisfaction</b> Why measure customer satisfaction? Examine the tools used in Company XYZ to measure customer satisfaction.	5.00%
<b>Diversity &amp; Customer Loyalty</b> What is diversity? What is diversity management? Explore strategies to meet diverse needs in telecoms industry and the Importance of building customer loyalty.	5.00%
<b>Effective teamwork in customer service</b> What is a team? Examine team formation. Identify the role of teamwork in the provision of quality service. Evaluate the importance of performance and success of a team.	5.00%
<b>Design a customer service programme for staff</b> Guidelines for designing a customer service training programme and understanding presentation skills.	5.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Assignment	Construct an organisational chart for two different types of organisations to include the identification of personnel with responsibility for customer service. (off-the-job)	1,4	12.50	Programme Board to Provide Date
Assignment	Explain how market research can assist development of customer service strategies. (off-the-job)	5	10.00	Programme Board to Provide Date
Assignment	Report on work based learning; emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (on-the-job)	2,4	7.50	Programme Board to Provide Date
Reflective Journal	Tasks: (1) Gain experience with your company interacting with customers on new installations or faults. Try and take a lead role with the more experience you build up. (2) Rate the apprentice interacting with a customer from task one. (3) Define a tool to measure customer satisfaction within your industry. What are the benefits to a company to measure customer satisfaction. (4) Give an example of a company (not your own) that has outstanding customer service. (5) Reflect on a time you worked on a team. What was the team's goal and was it achieved. (on-the-job)	1,2,6,7,8	30.00	Programme Board to Provide Date
Presentation	Design and develop a half day customer service programme that will be used at induction for new staff joining the customer service team. (off-the-job)	1,2,3,7,8	30.00	Programme Board to Provide Date
Presentation	Demonstrate how to handle a call complaint ensuring that you address the complaint appropriately and ensure customer satisfaction is maintained. (off-the-job)	6	10.00	Programme Board to Provide Date

No End of Module Formal Examination

Reassessment Requirement
<b>Repeat the module</b> <i>The assessment of this module is inextricably linked to the delivery. The student must reattend the module in its entirety in order to be reassessed.</i>
<b>Reassessment Description</b> Repeat module

TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment



## Module Workload

This module has no Full Time workload.

### Workload: Part Time

<i>WorkLoad Type</i>	<i>WorkLoad Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Directed Learning	Online guided lectures including seminars, forums and quizzes.	37.50	Once per Semester	2.50
Lab	Online Lab activities	37.50	Once per Semester	2.50
Placement	Work based learning with Qualified Field Personnel	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00

## Module Resources

### *Required Book Resources*

**Martin Newman, Malcolm McDonald 2018, *100 Practical Ways to Improve Customer Experience*, Kogan Page [ISBN: 9780749482671]**

**Chris Daffy 2019, *Creating Customer Loyalty*, Kogan Page [ISBN: 9780749484309]**

*This module does not have any article/paper resources*

*This module does not have any other resources*

<b>Programme Code</b>	<i>Programme Title</i>
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

Short Title:	Broadband & Wireless Skills <b>DRAFT</b>		
Full Title:	Broadband & Wireless Skills		
Language of Instruction:	English		
Module Code:	BBWL H2000	Duration:	1 Semester
Credits:	15		
NFQ Level:	6		
Field of Study:	Engineering & Engineering Trades		
Valid From:	Semester 1 - 2019/20 ( June 2019 )		
Module Delivered In	1 programme(s)		
Module Coordinator:	JAMES WRIGHT		
Module Author:	BRIAN KEOGH		
Module Description:	This module equips the student with the knowledge skills needed for installation and field services in wireless and broadband networks.		

## Learning Outcomes

*On successful completion of this module the learner will be able to:*

LO1	Define the technical requirements of broadband and wireless network services to include transmissions speeds, bandwidth and latency including future growth trends. (off-the-job)
LO2	Describe the technical characteristics of physical layer networks over which broadband services can be provided including installation and maintenance requirements. (off-the-job)
LO3	Apply a range of technical skills to an access network and end user equipment to include installation, commissioning and fault-finding processes. (on and off-the-job)
LO4	Identify and analyze signal interference sources using test and measurement techniques based on industry standard equipment. (off-the-job)
LO5	Provide solutions to a range of network, wireless access and end user problems using an analytical approach and technical reasoning. (on-the-job)
LO6	Interpret and implement technical instructions relevant to installation of broadband and wireless networks. (on-the-job)
LO7	Explain the organization, its procedures, good operational practice and technology in a work based learning environment using written records and presentations. (on-the-job)
LO8	Demonstrate industry specific verbal and written communications skills to provide “start –up” and “problem solving” assistance to end users. (on-the-job)

## Pre-requisite learning

### Co-requisite Modules

No Co-requisite modules listed

## Module Content & Assessment

Indicative Content	%
<b>Range and Nature of Service</b> - Brief history of broadband and wireless. - Broadband growth trends. - DSL services. - DSL equipment and properties. - Quality of Service; Issues and solutions. - Internet Services. - Introduction to broadband; Broadband technologies, Fixed line technologies, Wireless technologies, Comparisons and conclusions. - Radio frequency spectrum. Spectrum analyser. Classification of radio bands. Where 4G, 5G and Wi-Fi fit in the spectrum. - Overview of International Standards and regulation; ITU-T, ETSI, ComReg. - Internet Protocol; IPv4 addressing, DHCP, subnetting, private IP address ranges. IPv6 addresses. Debug tools; Ping, ipconfig utility, protocol analyzer example. Physical layer security. - Network Characteristics; ADSL, xDSL, Coaxial based broadband, Fibre optic broadband, Wi-Fi, mobile broadband.	15.00%
<b>Application of mathematical tools to signals</b> - Practical examples of number systems. Binary to Decimal, Decimal to Binary, Byte format, Hexadecimal. Boolean logic; AND, OR, EX-OR, 2's Complement. - Trigonometric functions to represent a carrier. Trigonometric identities; product to sum. - Applying rules of indices. - Conversion between degrees and radians. - Plotting graphs; rectangular and polar formats. - Why use Log scales? - Using calculator apps. - Representation of a signal; magnitude, frequency, phase. - Calculation of wavelength and electrical length	10.00%
<b>Wireless Systems</b> - How a radio works. Simplified block diagram of a wireless system including reasons for filters, power amplifiers, low noise amplifiers, matching networks, directional couplers and attenuators. - EU EMC directive. Radiated Emissions and Immunity. Practical techniques for reduction of emissions; Screening, grounding, filtering, cabling. - Recognition of signal impairment; harmonic distortion, transients. - Wireless safety considerations; Interlock Systems. , Reflectometers. Power - up procedures, Over voltage protection, Isolation standards, Creepage and Clearance, Induced lightning, Electro Static Discharge and Telecoms Earths. - Coexistence of wireless standards. Identification of interferer signal sources. Interference hunting using an antenna and spectrum analyser.	15.00%
<b>Understanding the Frequency Domain</b> - Signal fundamentals review; Wavelength and frequency, Calculating wavelength and electrical length. - Antenna overview; isotropic reference, Isotropically Radiated Power, half-wave dipole antenna example, effective radiated power, Signal polarization, Doppler Effect, Near field and far field. Digital communications; How information is transmitted. Modulation and demodulation, Frequency-Shift Keying, Phase-Shift Keying, Examples of current modulation standards. - Radio Jamming, Radio propagation ; link budget calculation. Signal Fading, Multi-path reception, Signal congestion, Co-channel interference.	10.00%
<b>Test and Measurement Practice</b> - Signal to Noise Ratio (SNR) - Channel Capacity Defined (Shannon). - Noise floor, Bandwidth and displayed noise level, - Signal Bandwidth, Thermal noise, Measuring thermal noise, Noise per bandwidth, Receiver reception, Carrier to Interference Ratio, Adjacent channel interference, How to measure Electric Field Strength, - Digital communication system, Frequency-Shift-Keying, Bit error rate (BER), Signal to Noise, Occupied bandwidth, Channel bandwidth.	10.00%
<b>Interpret and Implement Technical Instructions</b> Procedures to Install, configure, trouble-shoot ADSL - Connect to router using WIFI - Installation on Fibre - Installation on Coax - Installation Processes: ADSL Wi-Fi Broadband Fibre broadband Coax Installation Mobile broadband installation.	10.00%
<b>Communication Skills</b> - Verbal and Non verbal. - Questioning and Listening. - Technical Instruction in lay terms. - Resolving issues. - Present Technical Information in an end-user friendly format. - Walk and talk customer though setup and inter connectivity. - Synopsis the maintenance and repair of broadband service.	10.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Laboratory	Differential mode time-domain signal measurements using data acquisition devices such as oscilloscopes and advanced meters; calibration and care of of probes, menu system, data extraction to Excel, Graphing. (off-the-job)	3,4	2.50	Programme Board to Provide Date
Laboratory	Fault finding; Typical scenario: In this practical, the following should be set up for the student: A working 3Mb ADSL line on two pair cable, terminated on a master socket. A plug in splitter fitted and RJ11 cables connected to a handset and router are connected. The router is on the ground against the wall and right beside a metal filing cabinet. A fully configured PC but with an incorrect WEP key is on the other side of the cabinet. (off-the-job)	5,6	2.50	Programme Board to Provide Date
Laboratory	Investigation of EMC Emissions using an RF spectrum analyser; (1) an outdoor site and (2) an Anechoic Chamber (off-the-job)	2,3,8	2.50	Programme Board to Provide Date
Multiple Choice Questions	Boolean Logic, Signal Representation using A Cos(wt) format, rectangular to polar conversion, log scales, dBm, waveform recognition, modulation types. (off-the-job)	3,5,8	2.50	Programme Board to Provide Date
Laboratory	Field Testing: Signal Hunting Investigations using specialized equipment and antenna. The student is expected to track down a spurious source in an open air site. This is a team based activity and can include walk and drive testing. (off-the-job)	4,5,6	2.50	Programme Board to Provide Date
Reflective Journal	Tasks (1) Broadband Installation: wireless router using public and private IP addresses. (2) Fault finding; typical scenario is ADSL line on two pair cable, terminated on a master socket. A plug in splitter fitted and RJ11 cables connected to a handset and router are connected. The router is on the ground against the wall and against a metal filing cabinet. A fully configured PC but with an incorrect WEP key is on the other side of the cabinet. (3) Analysis of Wireless Spectrum; Noise Floor, Environmental Noise, Identification of licenced bands. (4) Reliable installation of multiple terminations. (5) Walk and talk "customer" though setup and inter connectivity. (on-the-job)	6,7,8	30.00	Ongoing
Assignment	Report on Work based Learning; Emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (on-the-job)	3,7	7.50	Programme Board to Provide Date

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Part 1 : 1 hour multi choice (1 hour) Part 2: Theory (2 hours)	2,3,5,6,8	50.00	End-of-Semester

Reassessment Requirement				
<b>Repeat examination</b> 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.				

TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment

**Module Workload**

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Formal Lectures (off-the-job)	37.50	Once per Semester	2.50
Lab	Structured labs in TU Dublin (off-the-job)	37.50	Once per Semester	2.50
Placement	Work based learning during on-the-job training.	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00

### Recommended Book Resources

**A Guide to the Wireless Engineering Body of Knowledge** [ISBN: 978-111834357]

John Bird 2017, *Engineering Mathematics Paperback*, 8 Ed., Routledge [ISBN: 978113867359]

Gorshe 2014, *Broadband Access*, 1 Ed., Wiley [ISBN: 978-047074180]

Louis E. Frenzel, Jr. 2017, *Electronics Explained*, Newnes [ISBN: 9780128116418]

*This module does not have any article/paper resources*

### Other Resources

website: IEEE MTTSMicrowaves 101, IEEE MTTs

<https://www.microwaves101.com/>

Website: IET 2019, *Information and Communication*, IET, UK

<https://www.theiet.org/publishing/iet-standards/information-and-communication/>



## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

Short Title:	Optic Fibre Installation <b>DRAFT</b>		
Full Title:	Optic Fibre Installation		
Language of Instruction:	English		
Module Code:	OPFI H2000	Duration:	1 Semester
Credits:	15		
NFQ Level:	6		
Field of Study:	Engineering & Engineering Trades		
Valid From:	Semester 1 - 2019/20 ( June 2019 )		
Module Delivered In	1 programme(s)		
Module Coordinator:	JAMES WRIGHT		
Module Author:	BRIAN KEOGH		
Module Description:	The purpose of this Module is to equip the learner with the knowledge, skill and competence to confidently install fibre optic telecommunications infrastructure.		

Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Describe the electromagnetic spectrum, the transmission of optical waves and explain the principles of light transmission in optical fibres. (Off-the-Job)
LO2	Describe the structure of optical fibre, fibre cables and the range of services provided via fibre networks. (Off-the-job)]
LO3	Recognise the hazards associated with fibre optic systems and demonstrate the range of skills and procedures required to install, identify and record the identity of fibre cables. (On-and-off-the-job)
LO4	Perform a range of fibre splicing techniques including mechanical fusion and connectorised joints. (On-and-off-the-job)
LO5	Use standardised techniques for the management of fibres and cables in enclosures. (On-and-off-the-job)
LO6	Perform and record a range of network measurements employing standardized procedures. (On-and-off-the-job)
LO7	Apply fibre installation techniques in a range of network contexts. (On-and-off-the-job)
LO8	Interpret and implement technical instructions and exercise substantial personal autonomy in a variety of service provision environments. (On-the-job)

Pre-requisite learning
<b>Co-requisite Modules</b>
No Co-requisite modules listed

## Module Content & Assessment

Indicative Content	%
<b>Principles of Optical transmission</b> Infrared – to ultraviolet, Xrays Speed of light, in vacuum / different Substances, different Frequencies Calculation of wavelength. Common wavelengths for short haul and long haul. Attenuation in cables. Laser characteristics. Principles of light transmission – attenuation and dispersion, Wavelengths, Refraction and reflection. Comparison of mono and multi-mode fibre. Fibre design	10.00%
<b>Fibre optical cable</b> Cable design and Layout. Range of fibre cables. Connectors and Connection methods. Services delivered over fibre networks. Protection of the eye, protection of the skin and safe handling of optic fibre.	10.00%
<b>Ducting</b> Installation of Sub Duct, Coupling Sub Duct, Pressure testing Sub Duct, Cleaning and testing Sub Duct. Fitting Coupling Closures.	10.00%
<b>Fibre Blowing Processes</b> Blowing in Optic Fibre Cables. Using a Fleet Machine. Identify Cable Markings. Recognise colour codes of fibre tubes. Recognise colour of fibres.	10.00%
<b>Fibre Splicing</b> Fitting Cable marking labels. Preparation of splice closure. Preparation of cable ends. Setting up fusion splicing machine. Fusion splicing techniques. Cleaning and inspection of Patch Cords. Installation and connection of patch cords.	10.00%
<b>Slack Management</b> Slack management in splice closures. Slack management in Fibre Distribution Hub (Cabinet). Slack management on Optic Distribution Frame.	10.00%
<b>Optical Time Domain Reflectometry (OTDR)</b> Principles of OTDR. Reflections. Calculation of time delay and distance to fault. Set up of Optical Time Domain Reflector. Use of the iOLM.	25.00%
<b>Fibre Installation techniques</b> Deployment of fibre to the cabinet, to the home and fibre distribution to the home of business network. Compares the current Irish fibre network to the global fibre network.	10.00%
<b>Technical Instructions and Personal autonomy</b> Communication skills in a work environment, interacting with customers and resolving issues, what is personal autonomy, writing an action plan and a work plan template	5.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Assignment	Report on Work based Learning: Emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (On-the-job)	3,4,5,6,7,8	7.50	Programme Board to Provide Date
Reflective Journal	Tasks (1) Demonstrate the hazards associated with fibre optic systems and that safe working practices are adhered to. (2) Describe the electromagnetic spectrum and the transmission of optical waves. (3) Draw and explain the structure of a fibre optic cable. List the different types of fibre optic cable used in the network you are working on. 12F/24F/36F. (4) 2 weeks experience working on a build team on fibre installation. (5) Brief report on your 2 week experience and provide a drawing of the FTTH network. Rural or urban. (On- the - job)	1,2,3,4,5,6,7,8	30.00	Ongoing
Multiple Choice Questions	Operating frequencies and wavelengths, power levels, optic operating wavelengths, classifications of fibres, classification of optic fibre cable identification of optic connectors. (Off-the-job)	1,2	2.50	Programme Board to Provide Date
Laboratory	Handling light sources, use of solvents for cleaning optical fibres, safety when using Isopropyl alcohol, handling and disposal of fibre waste in a Cin Bin. (Off-the-job)	3	5.00	Ongoing
Practical/Skills Evaluation	Student will demo how to install sub duct, couple subduct. pressure test the duct, clean and test duct, fit the coupling closures and blowing in the optic fibre cable. (Off-the-job)	3	5.00	Ongoing
Laboratory	This will entail preparation of the splice closure and cable ends. Setup the fusion splicer and demonstrate splicing techniques. Clean, inspect, install and connect patchcords. (Off-the-job)	4	15.00	Ongoing
Laboratory	Demonstrate and identify techniques of slack management in transition and aggregation joints. Storage of micro modules and tubes. knowledge of slack management in both Optic distribution hub and frame. Installation of various patchcords and adapters. (Off-the-job)	5	10.00	Ongoing
Laboratory	Gaining experience of using the OTDR and iOLM. Prepare fibre ends and physically setup launch lead. Using the user interface setup the resolution, measure, save files and interpret test results. Download results from splicer. (Off-the-job)	6	15.00	Ongoing
Short Answer Questions	Exam/Test is split into 2 sessions. Test 1 - Multiple choice - Time allocated: 1 hour test: Test 2 Exam Theory Questions - Time allocated: 2 hours	1,2,3,4,5,6,7,8	10.00	Programme Board to Provide Date

No End of Module Formal Examination

#### Reassessment Requirement

##### Coursework Only

*This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.*

##### Reassessment Description

Coursework Only

**TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment**

**Module Workload**

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Formal Lectures	37.50	Once per Semester	2.50
Lab	Structured labs in TU Dublin	37.50	Once per Semester	2.50
Placement	Work based learning with Mentor	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00

## Module Resources

### *Recommended Book Resources*

***A Guide to the Wireless Engineering Body of Knowledge*** [ISBN: 978-111834357]

Eric R. Pearson 2015, *Fiber Optic Communications for Beginners*, Createspace Independent Publishing Platform [ISBN: 1517789028]

Jim Hayes 2011, *Fiber Optics Technician's Manual*, Delmar Pub [ISBN: 1435499654]

*This module does not have any article/paper resources*

### *Other Resources*

**Website: Fiber Optic Association 2019, *The Fiber Optic Association Inc***  
<http://www.thefoa.org>

## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

<b>Short Title:</b>	Optic Fibre Maintenance & Commissioning <b>DRAFT</b>		
<b>Full Title:</b>	Optic Fibre Maintenance & Commissioning		
<b>Language of Instruction:</b>	English		
<b>Module Code:</b>	OPFM H2000	<b>Duration:</b>	1 Semester
<b>Credits:</b>	15		
<b>NFQ Level:</b>	6		
<b>Field of Study:</b>	Engineering & Engineering Trades		
<b>Valid From:</b>	Semester 1 - 2019/20 ( June 2019 )		
<b>Module Delivered In</b>	1 programme(s)		
<b>Module Coordinator:</b>	JAMES WRIGHT		
<b>Module Author:</b>	BRIAN KEOGH		
<b>Module Description:</b>	This module evaluates the characteristics of fibre channels and networks. The learner evaluates the operational effects of lost network performance. Advanced training on test and measurement equipment using optical time-domain reflectometer (OTDR) meters to identify, and categorize events and measure and localise their effects. The final exam assesses the learner's knowledge of optical principles.		

## Learning Outcomes

*On successful completion of this module the learner will be able to:*

LO1	Examine the functions and specifications of optic fibre network components, topology and analyse the operational effects of lost network performance. (On - and - off - the - job)
LO2	Explain the typical causes of service degradation, their effects on network performance and identify the factors affecting power budgets for network circuits. (Off - the - job)
LO3	Outline the hazards associated with fibre optic systems and demonstrate correct fibre handling, cleaning and inspection techniques. (On - and - off - the - job)
LO4	Perform end to end measurements using light sources and power meters. (On - and - off - the - job)
LO5	Use optical time-domain reflectometer (OTDR) meters to identify, and categorize events and measure and localise their effects. (On - and - off - the - job)
LO6	Analyse, format, name and save test results accurately. (On - and - off - the - job)
LO7	Employ fibre maintenance, commissioning techniques, skills in a range of network contexts and analyse and interpret test results. (On - and - off - the - job)
LO8	Exercise substantial personal autonomy in the maintenance of a variety of service environments. (On - the - job)

## Pre-requisite learning

### Co-requisite Modules

No Co-requisite modules listed



## Module Content & Assessment

Indicative Content	%
<b>Fibre Optic Technology</b> Fibre Optic Characteristics, Fibre Cable construction, Optical spectrum, attenuation windows, Fibre System operation and light propagation, fibre optic anomalies, connectors, colour codes, network topologies and fibre route calculations	10.00%
<b>Optical Safety</b> Legislation, standards, laser safety, labelling for laser safety, safety summary	10.00%
<b>Fibre Optic Inspection &amp; Cleaning</b> Optical cleaning and its importance, inspection process and tools.	10.00%
<b>Insertion Loss Testing</b> The insertion loss testing process, Optical Return Loss testing (ORL), OTDR versus ORL meter	10.00%
<b>Understanding Optical Time Domain Reflectometry</b> OTDR system basics, OTDR theory, analysis using the OTDR, settings and key points of the OTDR, applications using the OTDR, distance accuracy. What is Intelligent Optical link Manager (iOLM), iOLM features, iOLM applications	40.00%
<b>Next Generation Access (NGA) Fibre Optic Network Typologies</b> NGA- Fibre Access Network Types, PON standards, PON Characteristics, Next Generation Network Topologies, Key NGA Components, Impact of age on network components, Trouble shooting the NGA	20.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Assignment	Report on Work based Learning; emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (On-the-job)	3,4,5,6,7,8	7.50	Programme Board to Provide Date
Reflective Journal	Tasks: (1) Health and Safety – Outline the hazards associated with fibre optic systems Explain and demonstrate correct fibre handling to as to ensure safe working practices adhered to. (2) Examine the functions and specifications of optic network components and topology. (3) Perform end to end tests on the fibre network using the relative test equipment. i.e. test FTTH fault with no power. Analyse and interpret test result. (4) 2 weeks experience working on fibre faults.i.e. – Low light DP etc. (5) Explain the typical causes of loss of service and their effects on network performance. (On-the-job)	3,4,5,6,7,8	30.00	Ongoing
Laboratory	Lab 1 - Safety issues working with lasers, operation of the laser and light sources. (Off-the-job)	3	2.50	n/a
Laboratory	Lab 2 - Student will clean the bare fibre and clean the fibre connectors using both alcohol and dry cleaning tools: They will inspect the connectors using handheld microscopes and a LCD visual inspection probe, while understanding the pass/fail criteria. (Off-the-job)	3	2.50	n/a
Laboratory	Lab 3 - Student will carry out a Insertion loss test using a Power meter and light source: recording the power loss from AB and BA and the average power loss result. (Off-the-job)	3,4	2.50	n/a
Laboratory	Lab 4 - Student will use both an OTDR and iOLM: prepare the launch cord and fibre connectors: measure the overall optical distance, distance to your splice, identify the transition joint, locate a splice loss and record the loss should there be one, identify any Macro/Micro bends, output a soft copy of your trace. (Off-the-job)	5,6,7	5.00	n/a

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Theory based exam	1,2,3,4,5,6,7	50.00	End-of-Semester

Reassessment Requirement
<b>Repeat examination</b> 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.
<b>Reassessment Description</b> Repeat examination

**Module Workload**

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Formal Lectures	37.50	Once per Semester	2.50
Lab	Structured labs in TU Dublin	37.50	Once per Semester	2.50
Placement	Work based learning with Qualified Field Personnel	300.00	Once per Semester	20.00
Total Weekly Learner Workload				25.00
Total Weekly Contact Hours				5.00

## Module Resources

### *Recommended Book Resources*

Jim Hayes 2011, *Fiber Optics Technician's Manual*, Delmar Pub [ISBN: 1435499654]

Jim Hayes 2009, *FOA Reference Guide to Fiber Optics*, CreateSpace [ISBN: 1-4392-5387-0]

Bill Woodward, Emile B. Husson 2005, *Fiber Optics Installer and Technician Guide*, Sybex [ISBN: 0782143903]

*This module does not have any article/paper resources*

*This module does not have any other resources*

## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

## Module Details

Short Title:	Personal and Professional development <b>DRAFT</b>		
Full Title:	Personal and Professional development		
Language of Instruction:	English		
Module Code:	PRFD H2000	Duration:	1 Semester
Credits:	15		
NFQ Level:	6		
Field of Study:	Engineering & Engineering Trades		
Valid From:	Semester 1 - 2019/20 ( June 2019 )		
Module Delivered In	1 programme(s)		
Module Coordinator:	JAMES WRIGHT		
Module Author:	BRIAN KEOGH		
Module Description:	The purpose of this module is to equip the learner with the knowledge, skill and competence to utilise a range of advanced personal and interpersonal skills in variety of personal, civic and specific vocational contexts, operating autonomously and or in a supervisory capacity.		

## Learning Outcomes

*On successful completion of this module the learner will be able to:*

LO1	Evaluate the principles and practice of personal development. Identify the personal qualities and skills needed for effective participation in a chosen job or organisation, to include opportunities for further personal development and associated action plans.
LO2	Assess the role and practice of time-management to include; strategies for time-management; the impact of poor time-management; personal time-management. Research the processes of problem-solving and decision-making to include; different approaches; strategies to handle difficult problems; planning for contingency; and methods of implementing and evaluating a solution.
LO3	Analyse the use of goals or objectives to include; their characteristics; the role of planning and prioritisation; a range of tools and strategies; the role of review and evaluation. Link goals or objectives to available budgets and financial plans to include periodic review and adaptation of resources to plans.
LO4	Evaluate how organisations manage change to include; information; communication; analysis of the forces behind change; motivating staff; handling reactions to change. Determine strategies to resolve conflict to include; an understanding of different personalities and how they react to conflict; common causes of conflict; the role of assertiveness and co-operation.
LO5	Delegate tasks to others to include; appropriate planning; identification of skills and strengths in others; review and management of any issues arising.
LO6	Respond appropriately to feedback and constructive criticism about personal performance.
LO7	Use strategies to recognise and cope with; stress, setback and workplace pressure.
LO8	Reflect on personal and professional development to include; goal or objective-setting; action planning; implementation; ongoing review and personal initiative.

## Pre-requisite learning

### Co-requisite Modules

No Co-requisite modules listed

## Module Content & Assessment

Indicative Content	%
<b>Reflection</b> • Introduction & Overview of topics to be covered • What Is Reflection? • Why Reflection? • Different Types of Reflection • HANDOUT- Self Evaluation on Reflective Practice_1 • The Value of Personal Reflection • Putting it into practice • End of Module Summary	5.00%
<b>Personal Development</b> • Introduction & Overview of topics to be covered • What Is Personal Development? • Principles of Personal Development • How do you apply the Personal Development Principles to yourself? • End of Module Summary	5.00%
<b>Personal &amp; Professional Development</b> • Introduction & Overview of topics to be covered • Self Awareness • Job & Skill Evaluation • Identifying your personal qualities and skills • Creating your own personal Development Plan • End of Module Summary	5.00%
<b>Decision Making &amp; Problem Solving</b> • Introduction & Overview of topics to be covered • What is Decision Making? • What is problem solving? • Approaches and Techniques for Decision Making & Problem Solving • Strategy for Managing a Complex Scenario • Evaluating Decisions • End of Module Summary	10.00%
<b>Goal and Objective Setting</b> • Introduction & Overview of topics to be covered • What are Goals and Objectives? • Goal and Objective Setting - A Management Perspective • Using Goals and Objectives for Personal Development • End of Module Summary	10.00%
<b>Change Management</b> • What is Change Management? • Forces and Factors that Contribute to Change • How Organisations Manage Change • Informing and Communicating Change • Motivating Staff during Periods of Change • Reactions to Change and How to Manage Them • End of Module Summary	10.00%
<b>Conflict</b> • Introduction & Overview of topics to be covered • What is Conflict? • Causes of Conflict • Personality Types and How they deal with Conflict • How to Resolve Conflict • End of Module Summary	10.00%
<b>Financial Planning</b> • Introduction & Overview of topics to be covered • What Is Personal Financial Planning? • The Importance of Personal Financial Planning • Preparing a Personal Financial Plan • Financial Planning in Business • Overview of Financial Information and Assistance Available • End of Module Summary	10.00%
<b>Delegating</b> • Introduction & Overview of topics to be covered • What is Delegating? & Benefits of Delegating • Factors influencing Delegating • Delegating as a Process • Addressing Gaps and Issues • End of Module Summary	10.00%
<b>Feedback</b> • Introduction & Overview of topics to be covered • What is Feedback? • Types of Feedback • How do we respond to Feedback? • Reflection and Internalisation of Feedback • End of Module Summary	10.00%
<b>Stress</b> • Introduction & Overview of topics to be covered • What Is Stress? • Understanding Stress • Symptoms of Stress • Causes of Stress - Stress Triggers or Stressors • Coping with Stress • End of Module Summary	7.50%
<b>Time Management</b> • Introduction & Overview of topics to be covered • What is Time Management? • Effective Time Management • Developing a personal Time Management Strategy • Impact of Time Management • How do you Manage Your Time? • Where to now? • End of Module Summary	7.50%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Reflective Journal	Tasks: (1) Show the personal qualities and skills needed for effective participation within your organisation. (2) Demonstrate effective time management skills. (3) Analyse good time management and the impact of poor time management. Explain how either could affect your performance within your company. (4) Describe how changing business needs within the organisation required personal adaptation. (5) Reflect on your own personal performance for the duration of the apprenticeship, outlining how the apprenticeship has benefited your personal and professional development. (on-the-job)	1,2,3,4	30.00	Programme Board to Provide Date
Assignment	Report on work based learning; Emphasis should be placed on the skills relevant to the learner's employer including quality assurance, safety and information technology aspects. A report template will be provided to the learner. (on-the-job)	3	7.50	Programme Board to Provide Date
Assignment	Describe priority setting, delegation, planning and organising. Highlight how crucial they are to effective time- management. Apply the seven-step model to a work or personal scenario, and describe how you would use it to evaluate a problem or decision and take the most appropriate action. Provide details of financial information you required to make this decision. (off-the-job)	1,3,5,8	12.50	Programme Board to Provide Date
Assignment	Describe how changing a new process or system can be implemented within a large company. How would you communicate this change to employees? How might they react and what strategies you can recommend to manage this reaction to change. Discuss how delegating tasks to a/your team would help with this process. (off-the-job)	2,5	10.00	Programme Board to Provide Date
Presentation	Prepare and deliver a power-point presentation on the following scenario: you have been asked to assist in the roll-out of a project to recruit new representatives to handle complaints for a Telecoms company. To include; a detailed person specification; recruitment avenues; a briefing document for the interviewer (a draft set of questions). (off-the-job)	2,5	20.00	Programme Board to Provide Date
Presentation	Deliver a ten minute presentation (audience to be defined) to include the role of planning and organising; the power of feedback on personal performance; how to deal with conflict and understanding stress. (off-the-job)	3,6,7,8	20.00	Programme Board to Provide Date
No End of Module Formal Examination				

**TU Dublin – Tallaght Campus reserves the right to alter the nature and timings of assessment**

**Module Workload**

This module has no Full Time workload.

Workload: Part Time				
WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Directed Learning	Blended learning including Online Lectures, forums, quizzes.	37.50	Once per Semester	2.50
Practical	Online labs	37.50	Once per Semester	2.50
Placement	Work based learning with Qualified Field Personnel	200.00	Once per Semester	13.33
Total Weekly Learner Workload				18.33
Total Weekly Contact Hours				5.00



## Module Resources

### *Recommended Book Resources*

**Stella Cottrell 2015, *Skills for Success*, Macmillan International Higher Education [ISBN: 9781137426536]**

**M. D. Ferrari, Robert J. Sternberg 1998, *Self-awareness*, Guilford Press [ISBN: 1572303174]**

*This module does not have any article/paper resources*

### *Other Resources*

**Website: *Personal Development Plan***

[https://www.mindtools.com/courses/lnV924 x0/PersonalDevelopmentPlanning.pdf](https://www.mindtools.com/courses/lnV924%20/PersonalDevelopmentPlanning.pdf)

**Website: *Self-Awareness Part 1: Definition, Measures, Effects, Functions, and Antecedents***

<https://philarchive.org/archive/MORSP-2>

## Module Delivered In

Programme Code	Programme Title
TA_ETELE_C	Higher Certificate in Engineering in Telecommunications and Data Networks (Apprenticeship Programme) (Draft)

PO6. Competence - Role:

(a) exercise substantial personal autonomy and often take responsibility for the work of others and/or for the allocation of resources.

(b) 11757

(c) 2

(d) an understanding of the respective functions of technicians, technologists, engineers and ICT specialists and how they together constitute a team.

Supporting Modules	
NIHS H1000 - Network Installation and Health and Safety	<p>LO 1: Evaluate the principles and practice of personal development. Identify the personal qualities and skills needed for effective participation in a chosen job or organisation, to include opportunities for further personal development and associated action plans.</p> <hr/> <p>LO 5: Outline workflow stages involved for fibre to the home (FTTH) installations such as fibre deployment/handling, link-termination and implementation of wiring/topology diagrams (on and off-the-job).</p> <hr/> <p>LO 6: Outline range and purpose of installation tests, (e.g. continuity, insertion loss and optical time-domain reflectometry), required to commission a data communications network (on and off-the-job).</p> <hr/>
TELE H1000 - Telecommunications Technology and Service Restoration	<p>LO 4: Resolve network operation and performance issues, applying technical and mathematical skills and reasoning (on and off-the-job)</p> <hr/> <p>LO 6: Localise telecommunications network problems through diagnostic testing and fault resolution processes (on-the-job)</p> <hr/> <p>LO 7: Interpret test results, applying a systematic, logic and analytical approach (on and off-the-job)</p> <hr/> <p>LO 8: Communicate a range of network performance problems to a variety of technical and non-technical individuals (on-the-job)</p> <hr/>
EPRI H1000 - Electrical principles	<p>LO 2: Identify the characteristics of a telecommunications network to include its physical environment and common installation and maintenance techniques that facilitate its operation. (on and off-the job)</p> <hr/> <p>LO 5: Construct basic circuits to an acceptable work standard using schematic and industry standard tools. (off-the-job)</p> <hr/> <p>LO 6: Trouble-shoot circuits and terminations using test and measurement equipment including electrical field-test meters. (on-the-job)</p> <hr/> <p>LO 7: Resolve circuit malfunctions, applying a systematic, logical and analytical problem solving approach. (on-the-job)</p> <hr/> <p>LO 8: Write a test report with reference to an electrical test specification and interpret the test results. (on-the-job)</p> <hr/>

Supporting Modules	
<b>CSSV H1000 - Customer Service</b>	<p>LO 3: Break down the potential problems with a telecommunications network in a technically literate systematic, analytical and logical manner (off-the-job)</p>
<b>BBWL H2000 - Broadband &amp; Wireless Skills</b>	<p>LO 3: Apply a range of technical skills to an access network and end user equipment to include installation, commissioning and fault-finding processes. (on and off-the-job)</p> <p>LO 5: Provide solutions to a range of network, wireless access and end user problems using an analytical approach and technical reasoning. (on-the-job)</p> <p>LO 6: Interpret and implement technical instructions relevant to installation of broadband and wireless networks. (on-the-job)</p> <p>LO 7: Explain the organization, its procedures, good operational practice and technology in a work based learning environment using written records and presentations. (on-the-job)</p>
<b>OPFI H2000 - Optic Fibre Installation</b>	<p>LO 2: Identify the characteristics of a telecommunications network to include its physical environment and common installation and maintenance techniques that facilitate its operation. (on and off-the job)</p> <p>LO 4: Resolve network operation and performance issues, applying technical and mathematical skills and reasoning (on and off-the-job)</p> <p>LO 5: Use standardised techniques for the management of fibres and cables in enclosures. (On-and-off-the-job)</p> <p>LO 6: Perform and record a range of network measurements employing standardized procedures. (On-and-off-the-job)</p> <p>LO 7: Apply fibre installation techniques in a range of network contexts. (On-and-off-the-job)</p>

Supporting Modules	
<b>OPFM H2000 - Optic Fibre Maintenance &amp; Commissioning</b>	<p>LO 3: Outline the hazards associated with fibre optic systems and demonstrate correct fibre handling, cleaning and inspection techniques. (On - and - off - the - job)</p> <hr/> <p>LO 5: Use optical time-domain reflectometer (OTDR) meters to identify, and categorize events and measure and localise their effects. (On - and - off - the - job)</p> <hr/> <p>LO 6: Analyse, format, name and save test results accurately. (On - and - off - the - job)</p> <hr/> <p>LO 7: Employ fibre maintenance, commissioning techniques, skills in a range of network contexts and analyse and interpret test results. (On - and - off - the - job)</p> <hr/> <p>LO 8: Exercise substantial personal autonomy in the maintenance of a variety of service environments. (On - the - job)</p> <hr/>
<b>PRFD H2000 - Personal and Professional development</b>	<p>LO 3: Analyse the use of goals or objectives to include; their characteristics; the role of planning and prioritisation; a range of tools and strategies; the role of review and evaluation. Link goals or objectives to available budgets and financial plans to include periodic review and adaptation of resources to plans.</p> <hr/> <p>LO 7: Use strategies to recognise and cope with; stress, setback and workplace pressure.</p> <hr/> <p>LO 8: Reflect on personal and professional development to include; goal or objective-setting; action planning; implementation; ongoing review and personal initiative.</p> <hr/>

PO7. Competence - Learning to Learn:

(a) take initiative to identify and address learning needs and interact effectively in a learning group.

(b) 11746

(c) 2

Supporting Modules	
NIHS H1000 - Network Installation and Health and Safety	<p>LO 1: Evaluate the principles and practice of personal development. Identify the personal qualities and skills needed for effective participation in a chosen job or organisation, to include opportunities for further personal development and associated action plans.</p> <hr/> <p>LO 3: Break down the potential problems with a telecommunications network in a technically literate systematic, analytical and logical manner (off-the-job)</p> <hr/>
TELE H1000 - Telecommunications Technology and Service Restoration	<p>LO 2: Identify the characteristics of a telecommunications network to include its physical environment and common installation and maintenance techniques that facilitate its operation. (on and off-the job)</p> <hr/> <p>LO 3: Break down the potential problems with a telecommunications network in a technically literate systematic, analytical and logical manner (off-the-job)</p> <hr/> <p>LO 4: Resolve network operation and performance issues, applying technical and mathematical skills and reasoning (on and off-the-job)</p> <hr/> <p>LO 5: Implement and test a set of interconnections based on a diagrammatic representation of a telecommunications network (on-the-job)</p> <hr/>
EPRI H1000 - Electrical principles	<p>LO 5: Construct basic circuits to an acceptable work standard using schematic and industry standard tools. (off-the-job)</p> <hr/> <p>LO 8: Write a test report with reference to an electrical test specification and interpret the test results. (on-the-job)</p> <hr/>
CSSV H1000 - Customer Service	<p>LO 6: Use a range of communication skills and technologies to meet the needs of diverse customers, to include a variety of listening methods and strategies to respond to complaints and to resolve any difficulties arising (off and on-the-job).</p> <hr/> <p>LO 8: Design a customer service programme for staff, to include operational standards for frontline personnel and delivery of an appropriate oral presentation summarising the programme (off and on-the-job).</p> <hr/>

Supporting Modules	
<b>BBWL H2000 - Broadband &amp; Wireless Skills</b>	<p>LO 3: Apply a range of technical skills to an access network and end user equipment to include installation, commissioning and fault-finding processes. (on and off-the-job)</p> <hr/> <p>LO 4: Identify and analyze signal interference sources using test and measurement techniques based on industry standard equipment. (off-the-job)</p> <hr/> <p>LO 5: Provide solutions to a range of network, wireless access and end user problems using an analytical approach and technical reasoning. (on-the-job)</p> <hr/> <p>LO 6: Interpret and implement technical instructions relevant to installation of broadband and wireless networks. (on-the-job)</p> <hr/> <p>LO 7: Explain the organization, its procedures, good operational practice and technology in a work based learning environment using written records and presentations. (on-the-job)</p> <hr/>
<b>OPFI H2000 - Optic Fibre Installation</b>	<p>LO 3: Recognise the hazards associated with fibre optic systems and demonstrate the range of skills and procedures required to install, identify and record the identity of fibre cables. (On-and-off-the-job)</p> <hr/> <p>LO 5: Use standardised techniques for the management of fibres and cables in enclosures. (On-and-off-the-job)</p> <hr/>
<b>OPFM H2000 - Optic Fibre Maintenance &amp; Commissioning</b>	<p>LO 3: Outline the hazards associated with fibre optic systems and demonstrate correct fibre handling, cleaning and inspection techniques. (On - and - off - the - job)</p> <hr/> <p>LO 5: Use optical time-domain reflectometer (OTDR) meters to identify, and categorize events and measure and localise their effects. (On - and - off - the - job)</p> <hr/> <p>LO 6: Analyse, format, name and save test results accurately. (On - and - off - the - job)</p> <hr/> <p>LO 8: Exercise substantial personal autonomy in the maintenance of a variety of service environments. (On - the - job)</p> <hr/>
<b>PRFD H2000 - Personal and Professional development</b>	<p>LO 3: Analyse the use of goals or objectives to include; their characteristics; the role of planning and prioritisation; a range of tools and strategies; the role of review and evaluation. Link goals or objectives to available budgets and financial plans to include periodic review and adaptation of resources to plans.</p> <hr/> <p>LO 7: Use strategies to recognise and cope with; stress, setback and workplace pressure.</p> <hr/> <p>LO 8: Reflect on personal and professional development to include; goal or objective-setting; action planning; implementation; ongoing review and personal initiative.</p> <hr/>

PO8. Competence Insight:

(a) assume responsibility for consistency of self- understanding and behavior

(b) 11761

(c) 2

Supporting Modules	
NIHS H1000 - Network Installation and Health and Safety	<p>LO 1: Evaluate the principles and practice of personal development. Identify the personal qualities and skills needed for effective participation in a chosen job or organisation, to include opportunities for further personal development and associated action plans.</p> <hr/> <p>LO 7: Apply relevant numerical methods to practical communications engineering problems associated with network installation (e.g. Ohms Law, dB, power, frequency, basic trigonometry) (on and off-the-job).</p> <hr/> <p>LO 8: Outline requirements and procedures for the recording and maintenance of accurate technical information in respect of network installation/repair, as well as network device configuration (customer and service side). (on and off-the-job)</p> <hr/>
TELE H1000 - Telecommunications Technology and Service Restoration	<p>LO 4: Resolve network operation and performance issues, applying technical and mathematical skills and reasoning (on and off-the-job)</p> <hr/> <p>LO 7: Interpret test results, applying a systematic, logic and analytical approach (on and off-the-job)</p> <hr/> <p>LO 8: Communicate a range of network performance problems to a variety of technical and non-technical individuals (on-the-job)</p> <hr/>
EPRI H1000 - Electrical principles	<p>LO 5: Construct basic circuits to an acceptable work standard using schematic and industry standard tools. (off-the-job)</p> <hr/> <p>LO 6: Trouble-shoot circuits and terminations using test and measurement equipment including electrical field-test meters. (on-the-job)</p> <hr/> <p>LO 8: Write a test report with reference to an electrical test specification and interpret the test results. (on-the-job)</p> <hr/>



Supporting Modules	
<b>CSSV H1000 - Customer Service</b>	<p>LO 5: Explain how market research can assist development of customer service strategies, to include use of primary and secondary data, different data collection methods, use of market segmentation and observation of customer reaction and behaviour (off and on-the-job).</p> <hr/> <p>LO 6: Use a range of communication skills and technologies to meet the needs of diverse customers, to include a variety of listening methods and strategies to respond to complaints and to resolve any difficulties arising (off and on-the-job).</p> <hr/> <p>LO 8: Design a customer service programme for staff, to include operational standards for frontline personnel and delivery of an appropriate oral presentation summarising the programme (off and on-the-job).</p> <hr/>
<b>BBWL H2000 - Broadband &amp; Wireless Skills</b>	<p>LO 2: Identify the characteristics of a telecommunications network to include its physical environment and common installation and maintenance techniques that facilitate its operation. (on and off-the-job)</p> <hr/> <p>LO 3: Apply a range of technical skills to an access network and end user equipment to include installation, commissioning and fault-finding processes. (on and off-the-job)</p> <hr/> <p>LO 5: Provide solutions to a range of network, wireless access and end user problems using an analytical approach and technical reasoning. (on-the-job)</p> <hr/> <p>LO 7: Explain the organization, its procedures, good operational practice and technology in a work based learning environment using written records and presentations. (on-the-job)</p> <hr/> <p>LO 8: Demonstrate industry specific verbal and written communications skills to provide “start –up” and “problem solving” assistance to end users. (on-the-job)</p> <hr/>
<b>OPFI H2000 - Optic Fibre Installation</b>	<p>LO 3: Recognise the hazards associated with fibre optic systems and demonstrate the range of skills and procedures required to install, identify and record the identity of fibre cables. (On-and-off-the-job)</p> <hr/> <p>LO 4: Resolve network operation and performance issues, applying technical and mathematical skills and reasoning (on and off-the-job)</p> <hr/> <p>LO 8: Interpret and implement technical instructions and exercise substantial personal autonomy in a variety of service provision environments. (On-the-job)</p> <hr/>

Supporting Modules	
<b>OPFM H2000 - Optic Fibre Maintenance &amp; Commissioning</b>	<p>LO 3: Outline the hazards associated with fibre optic systems and demonstrate correct fibre handling, cleaning and inspection techniques. (On - and - off - the - job)</p> <hr/> <p>LO 4: Perform end to end measurements using light sources and power meters. (On - and - off - the - job)</p> <hr/> <p>LO 5: Use optical time-domain reflectometer (OTDR) meters to identify, and categorize events and measure and localise their effects. (On - and - off - the - job)</p> <hr/> <p>LO 6: Analyse, format, name and save test results accurately. (On - and - off - the - job)</p> <hr/> <p>LO 7: Employ fibre maintenance, commissioning techniques, skills in a range of network contexts and analyse and interpret test results. (On - and - off - the - job)</p> <hr/> <p>LO 8: Exercise substantial personal autonomy in the maintenance of a variety of service environments. (On - the - job)</p> <hr/>
<b>PRFD H2000 - Personal and Professional development</b>	<p>LO 3: Analyse the use of goals or objectives to include; their characteristics; the role of planning and prioritisation; a range of tools and strategies; the role of review and evaluation. Link goals or objectives to available budgets and financial plans to include periodic review and adaptation of resources to plans.</p> <hr/> <p>LO 5: Delegate tasks to others to include; appropriate planning; identification of skills and strengths in others; review and management of any issues arising.</p> <hr/> <p>LO 6: Respond appropriately to feedback and constructive criticism about personal performance.</p> <hr/> <p>LO 7: Use strategies to recognise and cope with; stress, setback and workplace pressure.</p> <hr/> <p>LO 8: Reflect on personal and professional development to include; goal or objective-setting; action planning; implementation; ongoing review and personal initiative.</p> <hr/>