22499VIC

Certificate II in Electrotechnology (Pre-vocational)

Version 2 – September 2022

This course has been accredited under Part 4.4 of the Education and Training Reform Act 2006.

Accredited for the period: 1 July 2019 to 30 June 2024

THE EDUCATION STATE

VICTORIA State Government | Education and Training

Course modification history:

Version 2 **September 2022**	Course structure updated to reflect current first aid unit *HLTAID011 Provide first aid*, which replaces the non-equivalent unit *HLTAID003 Provide first aid.* This supports the decision of national and state VET Regulators to ensure delivery of current first aid units within Victorian Crown Copyright courses. Please refer to the ASQA website. Updated Copyright and Course Classification Information
Version 1	Initial accreditation

Contents

Section A: Copyright and Course Classification Information

1. Copyright owner of the course

Copyright of this course is held by the Department of Education and Training, Victoria

2. Address

Executive Director
Higher Education and Workforce Division
Higher Education and Skills
Department of Education and Training (DET)
GPO Box 4367
Melbourne Vic 3001

Organisational Contact:

Manager, Training and Learning Products Unit
Portfolio Alignment Branch
Higher Education and Workforce Division
Higher Education and Skills
Department of Education and Training (DET)
Telephone: 131823
Email: course.enquiry@education.vic.gov.au

Day-to-day contact:

Curriculum Maintenance Manager - Engineering Industries,
Box Hill Institute
Private Bag 2014
Box Hill, Victoria 3128
Telephone: (03) 9286 9934
Email: steven.bryant@boxhill.edu.au

3. Type of submission

Reaccreditation

4. Copyright acknowledgement

The following units of competency:

- UEENEEE101A Apply occupational health and safety regulations, codes and practices in the workplace
- UEENEEE102A Fabricate, assemble and dismantle utilities industry components
- UEENEEE103A Solve problems in ELV single path circuits
- UEENEEE105A Fix and secure electrotechnology equipment
- UEENEEE141A Use of routine equipment plant technologies in an energy sector environment
- UEENEEJ102A Prepare refrigeration tubing and fittings
- UEENEEJ103A Establish the basic operating conditions of vapour compression systems
- UEENEEJ104A Establish the basic operating conditions of air conditioning systems
- UEENEEK112A Provide basic sustainable energy solutions for energy reduction in domestic premises
- UEENEEP024A Attach cords and plugs to electrical equipment for connection to a single phase 230 volt supply
- UEENEEP026A Conduct in-service safety testing of electrical cord and connected equipment and cord assemblies

are from the UEE11 Electrotechnology Training Package

© Commonwealth of Australia

The following unit of competency:

- CPCCWHS1001 Prepare to work safely in the construction industry

is from the CPC Construction, Plumbing and Services Training Package

© Commonwealth of Australia

The following unit of competency:

- HLTAID011 Provide First Aid

is from the HLT Health Training Package

© Commonwealth of Australia

The following units of competency:

- VU22330 Select and interpret drawings and prepare three dimensional (3D) sketched and drawings
- VU22333 Perform intermediate engineering computations
- VU22338 Configure and program a basic robotic
- VU22340 Use 3D printing to create products
- VU22341 Apply basic computer networking concepts and practices

are from 22470VIC Certificate II in Engineering Studies:
© State of Victoria (Department of Education and Training).

The following unit of competency:

- VU21544 Install a sustainable extra low voltage energy power system

is from 22289VIC Certificate II in Integrated Technologies:
© State of Victoria (Department of Education and Training).

5. Licensing and franchise

6. Course accrediting body

Victorian Registration and Qualifications Authority (VRQA)

7. AVETMISS information

ANZSCO code: 899914	Electrical or Telecommunications Trades Assistant
ASCED code: 0313	Electrical and Electronic Engineering and Technology
National course code:	22499VIC

8. Accreditation period

1 July 2019 to 30 June 2024

Section B: Course Information

1. Nomenclature	***Standard 1 AQTF Standards for Accredited Courses***
1.1 Name of the qualification	Certificate II in Electrotechnology (Pre-vocational)
1.2 Nominal duration of the course	394 - 474 hours
2. Vocational or educational outcomes	***Standard 1 AQTF Standards for Accredited Courses***
2. Purpose of the course	This pre-vocational course is primarily for school leavers and other new entrants wishing to prepare themselves to gain a traineeship, apprenticeship or other employment in the electrotechnology industry The course provides an overview of the industry, employment opportunities and the training pathways available. It also includes training in the basic fundamentals of electrical, telecommunication, refrigeration and air conditioning systems as well as workshop experience in fabrication and assembly techniques, wiring, cabling, basic installation skills and use of test equipment. Workplace safety and first aid training are also included.
3. Development of the course ***Courses***	***Standards 1 and 2 AQTF Standards for Accredited***
3.1 Industry /enterprise/ community needs	The electrotechnology industry is a fast developing and highly technical industry. It is changing and growing at a rapid rate as technology advances in fields such as data communication, home automation, intelligent systems for industrial and facilities management and renewable/sustainable energy systems. There are many sub sectors which make up the electrotechnology industry. These include: • electrical (residential, commercial and industrial) • electricity supply (generation, transmission and distribution) • electronics • communications • computer systems • information/data technology • instrumentation • lifts • air-conditioning and refrigeration • renewable energy • fire and security • photovoltaic systems

- gaming
- rail and rail signals
- switchboard manufacturing

The Certificate II in Electrotechnology Studies (Pre-vocational) has been available for a number of years and is the preferred course for RTOs preparing students for a career in the electrotechnology industry. The course provides a broad approach to the electrotechnology industry enabling students to explore a range of career options within the various industry sectors and to gain practical skills that enhanced their employment opportunities particularly for entering a traineeship or trade apprenticeships. The course is recognised by a number of key Victorian industry organisations (see representation on the Project Steering Committee), as the preferred pathway of preparatory training for school leavers and young adults planning a career in the electrotechnology industry.

In summary, the course aims to provide graduates with:

- a broad-based underpinning competencies in a range of electrotechnology skills such as electrical and data communication cabling and wiring, basic equipment installation use of test equipment and other practical workshop experience which will prepare them for entry-level employment in the industry through an traineeship or apprenticeship
- knowledge of a range of electrotechnology occupations at trade level enabling graduates to make informed choices in the selection of vocational career paths
- knowledge of the application of advanced technologies in the electrotechnology industry
- social and interpersonal skills relevant to participation in the electrotechnology industry through project work and integrating general competencies as part of the course curriculum
- a recognised credential with credits for further training including an apprenticeship or traineeship.

In 2017 there were one thousand seven hundred and twenty six (1726) enrolments in the current 22261VIC Certificate II in Electrotechnology Studies (Pre-vocational). This figure includes both VET in School/VCE programs and individual Government funded places. It is expected the annual enrolments for this course for 2018 and beyond will be similar to the 2017 figure.

The course review for reaccreditation was guided by a Project Steering Committee (PSC) consisting of the following persons:

Name:	Organisation:
Alex Newman (Chairperson)	Future Energy Skills
Sue Sizer	Energy Safe Victoria (ESV)
Maurice Graham	Electrical Trades Union (ETU)

	Laura Steedman — Air Conditioning and Mechanical Contractors' Association (AMCA) Peter Collins — VET Electrical Senate Brendan Harris — Melbourne Polytechnic Michael Cullen/Ian Theobold — Holmesglen Institute In attendance: George Adda (project manager) — CMM- Box Hill Institute Trevor Lange (writer) — CMM-Box Hill Institute Jacinta Bradford (minutes) — Future Energy Skills This course: • does not duplicate by title or coverage, the outcomes of an endorsed training package qualification • is not a subset of a single training package qualification that could be recognised through one or more statements of attainment or a skill set • does not include units of competency additional to those in a training package qualification that could be recognized through statements of attainment in addition to the qualification • does not comprise units that duplicate units of competency of a training package qualification
3.2 Review for re-accreditation	Currently, thirteen (13) RTOs consisting of ten (10) tafe institutes and three (3) secondary colleges have 22261VIC Certificate II in Electrotechnology Studies (Pre-vocational) course on their scope of registration. Enrolment figures for the past four (4) years including both VET in School/VCE programs and individual Government funded places are: • 2014 – 218 (enrolment overlap with the superseded qualification) • 2015 - 1586 • 2016 - 1707 • 2017 – 1726 The Australian Government Department of Education and Training Myskills website indicates that 84.2% of course graduates have either gained employment or are undertaking further study. The Curriculum Maintenance Manager – Engineering Industries has been monitoring the existing 22261VIC – Certificate II in Electrotechnology Studies (Pre-vocational) with key industry stakeholders and RTOs during the accreditation period. In summary, the feedback received over a period of time indicated the current course structure and unit selection needs a significant review. An examination of the enrolment figures for all the units in the current course also indicates many of the elective units are not being used.

	The Project Steering Committee reviewed and updated the knowledge and skills profile and recommended a number of changes to the course structure and units to: • increase participants awareness of the wide coverage of the electrotechnolgy industry • provide a higher level of practical experience to further enhance graduates employment opportunities • ensure new technological developments and practices in the industry are being covered As a consequence, there has been a significant adjustment to the unit content in both the core and elective component of the course. A number of the now dated UEE11 Electrotechnology Training Package units have been deleted or replaced by more recently developed existing course units or new units. Additionally, the elective streams in the current course have been replaced by a single cluster to encourage a broader selection of elective units. Finally, the PSC recommended a small change to the wording of the course title to promote the pre-vocational emphasis of the revised course content. Due to the changes to the core units and the streamlining of the elective units of the current course, the revised course: *Certificate II in Electrotechnology (Pre-vocational)* is deemed to be ***not equivalent*** to the current course: *22261VIC Certificate II in Electrotechnology Studies (Pre-vocational).* Transition arrangements between the current and revised course is provided in **Table 1**

Table 1: Transition Arrangements:

22261VIC Certificate II in Electrotechnology Studies (Pre-vocational)		**22499VIC Certificate II in Electrotechnology (Pre-vocational)**		**Comments**
Unit code	**Unit Title**	**Unit code**	**Unit Title**	
UEENEEE101A	Apply occupational health and safety regulations, codes and practices in the workplace	UEENEEE101A	Apply occupational health and safety regulations, codes and practices in the workplace	Equivalent
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	Equivalent
UEENEEE103A	Solve problems in ELV single path circuits	UEENEEE103A	Solve problems in ELV single path circuits	Equivalent
UEENEEE105A	Fix and secure electrotechnology equipment	UEENEEE105A	Fix and secure electrotechnology equipment	Equivalent
UEENEEE179A	Identify and select components, accessories and materials for energy sector work activities			Deleted
UEENEEE142A	Produce products for carrying			Delet

22261VIC Certificate II in Electrotechnology Studies (Pre-vocational)		22499VIC Certificate II in Electrotechnology (Pre-vocational)		Comments
Unit code	**Unit Title**	**Unit code**	**Unit Title**	
	out energy sector work activities			ed
UEENEEK112A	Provide basic sustainable energy solutions for energy reduction in domestic premises	UEENEEK112A	Provide basic sustainable energy solutions for energy reduction in domestic premises	Equivalent
UEENEEP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 volt supply	UEENEEP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 volt supply	Equivalent
		UEENEEP026A	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies	New unit
UEENEED102A	Assemble, set-up and test computing devices			Deleted
UEENEEE122A	Carry out preparatory energy sector work activities			Deleted
UEENEEE141A	Use of routine equipment/plant/technologies in an energy sector environment	UEENEEE141A	Use of routine equipment/plant/technologies in an energy sector environment	Equivalent
UEENEEH101A	Repair basic computer equipment faults by replacement of modules/sub-assemblies			Deleted
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components			Deleted
UEENEEH104A	Set up and test residential video/audio equipment			Deleted
UEENEEJ102A	Prepare refrigeration tubing and fittings	UEENEEJ102A	Prepare refrigeration tubing and fittings	Equivalent
UEENEEJ103A	Establish the basic operating conditions of vapour compression systems	UEENEEJ103A	Establish the basic operating conditions of vapour compression systems	Equivalent
UEENEEJ104A	Establish the basic operating conditions of air conditioning systems	UEENEEJ104A	Establish the basic operating conditions of air conditioning systems	Equivalent
UETTDREL11A	Apply sustainable energy and environmental procedures			Deleted
CPCCOHS1001A	Work safely in the construction industry	CPCCWHS1001	Prepare to work safely in the construction industry	Equivalent
HLTAID002	Provide basic emergency life support	HLTAID011	Provide first aid	Not equivalent
VU21533	Perform energy sector installations of extra low voltage (ELV) single path circuits	VU22669	Perform energy sector installations of extra low voltage (ELV) single path circuits	Equivalent
VU20915	Perform basic welding and			Delet

22261VIC Certificate II in Electrotechnology Studies (Pre-vocational)		22499VIC Certificate II in Electrotechnology (Pre-vocational)		Comments
Unit code	**Unit Title**	**Unit code**	**Unit Title**	
	thermal cutting processes to fabricate engineering structures			ed
VU20912	Perform basic machining processes			Deleted
VU20913	Apply basic fabrication techniques			Deleted
VU20903	Produce basic engineering components and products using fabrication or machining			Deleted
VU21554	Perform basic network and computer assembly			Deleted
VU21555	Perform basic network and computer maintenance			Deleted
VU21556	Install and configure basic network and computer operating systems			Deleted
VU21565	Install and test a home entertainment system			Deleted
VPAU645	Install and configure a home or small office network			Deleted
VPAU646	Install and configure a small to medium business network			Deleted
VU21552	Operate a small power supply system			Deleted
VU21553	Assemble and connect an extra low voltage battery power source			Deleted
VU21541	Maintain rechargeable battery systems			Deleted
VU21542	Identify and locate building blocks of a centralised power generation system			Deleted
VU21543	Set up an extra low voltage emergency power supply system (Not exceeding 32V)			Deleted
VBP141	Install a sustainable extra low voltage energy supply system	VU21544	Install a sustainable extra low voltage energy supply system	Equivalent
VU21388	Install, set up and test an embedded control system			Deleted
VU21387	Test and verify correct operation of a by-wire control system			Deleted
VU21352	Implement a digital circuit using a programmable logic device (PLD)			Deleted
VBP131	Construct and configure a basic			Delet

22261VIC Certificate II in Electrotechnology Studies (Pre-vocational)		22499VIC Certificate II in Electrotechnology (Pre-vocational)		Comments
Unit code	**Unit Title**	**Unit code**	**Unit Title**	
	robotic system			ed
VBP132	Program a basic robotic system			Deleted
		VU22330	Select and interpret drawings and prepare three dimensional (3D) sketches and drawing	New unit
		VU22338	Configure and program a basic robotic system	New unit
		VU22340	Use 3D printing to create products	New unit
		VU22341	Apply basic computer networking concepts and practices	New unit
		VU22333	Perform intermediate engineering computations	New unit
		VU22670	Provide an overview of the electrotechnology industry	New unit
		VU22671	Use test instruments in the electrotechnology industry	New unit
		VU22672	Carry out basic electrotechnology project	New unit
		VU22673	Carry out basic network cabling for extra low voltage (ELV) equipment and devices	New unit
		VU22674	Explore applications and operation of the Internet of Things (IoT)	New unit

4. Course outcomes	*Standards 1, 2, 3 and 4 AQTF Standards for Accredited Courses*
4.1 Qualification level	*Standards 1, 2 and 3 AQTF Standards for Accredited Courses* This course is consistent with the Australian Qualifications Framework (AQF) for a Certificate II level qualification in that graduates will have the following learning attributes. **Knowledge:** Graduates of the Certificate II in Electrotechnology (Pre-vocational) will have basic factual, technical and procedural knowledge within the area of electrotechnology. For example, in the application of basic electrical principles and workshop practices to enhance their entry-level employment prospects in the electrotechnology industry. **Skills:** Graduates of the Certificate II will have: • cognitive skills to access, record and act on a defined range of information from a range of sources. For example, compiling information on the range of occupations at electrotechnology trade level, in order to make a more informed choice in the selection of a vocational career path. • cognitive and communication skills to apply and communicate known solutions to a limited range of predictable problems. For example, solving problems in extra-low voltage single path circuits. • technical skills to use a limited range of equipment to complete tasks involving known routines and procedures with a limited range of options. For example, testing, repairing and securing electrical equipment. **Application of knowledge and skills:** Graduates of the Certificate II in Electrotechnology (Pre-vocational) will be able to demonstrate the application of knowledge and skills: • with some accountability for the quality of own outcomes and some responsibility for own outputs in work and learning. For example, identifying potential learning pathways. • with limited autonomy and judgement in the completion of own defined and routine tasks in known and stable contexts. For example, completing assigned electrical tasks in a workplace environment. • with limited autonomy and judgement to complete routine but variable tasks in collaboration with others in a team environment. For example, contributing to the outcomes of a basic electrotechnology project as a member of a team. **Volume of learning:** The volume of learning for this qualification is typically between 0.5 to 1 year and incorporates structured training and self-directed learning activities such as researching and gathering information for assignments and completing project work.
4.2 Employability skills	*Standard 4 AQTF Standards for Accredited Courses* The Employability Skills for the Certificate II in Electrotechnology (Prevocational) are summarised in **Table 2**.

Table 2: Summary of the Employability Skills	
Employability Skills	**Industry/enterprise requirements for this qualification include the following facets. On successful completion of the course a graduate should be able to:**
Communication	• complete work related documents e.g. logs, reports • access and interpret information on electrotechnology practices or processes • receive and follow routine instructions • provide written and oral reports • listen and carry out instructions • speak clearly and directly with other team members • share information within groups activities
Teamwork	• work as part of a team • identify and describe own role and the role of others • receive feedback and evaluate own contribution • work with diverse range of individuals/groups
Problem solving	• recognise routine faults that occur during a process or operation • identify and take action on causes of simple faults • respond to routine electrical related problems • use numeracy skills to solve basic electrotechnology tasks
Initiative and enterprise	• determine issues or problems needing action in an electrotechnology workshop environment • raise questions regarding an electrotechnology work task requirements and fulfil expectations • distinguish between causes of simple faults • safely shut down equipment in abnormal circumstances
Planning and organising	• plan and organise work tasks • recognise hazards and follow appropriate hazard control methods • organise competing priorities to fulfil work task requirements
Self-management	• operate within appropriate time constraints and work standards • select and use appropriate equipment, materials, processes and procedures • identify task outcomes and work role • monitor and evaluate own performance

Learning	• ask questions to gain information • seek clarification to confirm own understanding or expectation • participate in improvement procedures • learn in a range of settings • learn new electrotechnology skills
Technology	• carry out pre-operational checks • monitor equipment operation • apply WHS/OHS requirements when using technology • use workplace tools, test equipment and IT technologies relevant to electrotechnology industry
4.3 Recognition given to the course	*Standard 5 AQTF Standards for Accredited Courses* Not applicable
4.4 Licensing/ regulatory requirements	*Standard 5 AQTF Standards for Accredited Courses* No licensing, legislative, regulatory or certification requirements apply to this course at the time of publication.

5. Course rules Standards 2, 6,7 and 9 AQTF Standards for Accredited Courses

5.1 Course structure

To achieve the award of a Certificate II in Electrotechnology (Pre-vocational) participants must successfully complete a minimum of fifteen (15) units consisting of:

- all thirteen (13) core units *plus*
- minimum of two (2) elective units.

Participants who do not complete the full course will be awarded a Statement of Attainment indicating those units, which they have successfully completed.

Refer to **Table 3** for details:

Table 3: Course structure

Unit of competency/ module code	Field of Education code (6-digit)	Unit of competency/ module title	Pre-requisite	Nomi hour
Core units:				
CPCCWHS1001	061301	Prepare to work safely in the construction industry	None	6
HLTAID011	069907	Provide first aid	None	18
UEENEEE101A	061301	Apply occupational health and safety regulations, codes and practices in the workplace	None	20
UEENEEE102A	031313	Fabricate, assemble and dismantle utilities industry components	*E101A	40
UEENEEE103A	031313	Solve problems in ELV single path circuits	*E101A	40
UEENEEE105A	031317	Fix and secure electrotechnology equipment	*E101A	20
UEENEEJ104A	031315	Establish the basic operating conditions of air conditioning systems	*E101A	20
VU22333	030199	Perform intermediate engineering computations	None	40
VU21544	031301	Install a sustainable extra low voltage energy power system	None	30
VU22670	031399	Provide an overview of the electrotechnology industry	None	30
VU22671	031399	Use test instruments in the electrotechnology industry	None	20
VU22672	031399	Carry out basic electrotechnology project	None	40
VU22673	031399	Carry out basic network cabling for extra low voltage (ELV) equipment and devices	None	30
		Total nominal hours for core units		**354**
Elective units:				
UEENEEE141A	030717	Use of routine equipment plant technologies in an energy sector environment	*E101A	60

UEENEEJ102A	031315	Prepare and connect refrigeration tubing and fittings	*E101A	40	
UEENEEJ103A	031315	Establish the basic operating conditions of vapour compression systems	*E101A	60	
UEENEEK112A	031301	Provide basic sustainable energy solutions for energy reduction in residential premises	None	40	
UEENEEP024A	031313	Attach cords and plugs to electrical equipment for connection to a single phase 230 volt supply	*E101A	20	
UEENEEP026A	031313	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies	*E101A	20	
VU22330	030199	Select and interpret drawings and prepare three dimensional (3D) sketches and drawing	None	20	
VU22338	030199	Configure and program a basic robotic system	None	60	
VU22340	030199	Use 3D printing to create products	None	40	
VU22341	020113	Apply basic computer networking concepts and practices	None	40	
VU22669	031399	Perform energy sector installations of extra low voltage (ELV) single path circuits	None	40	
VU22674	020113	Explore applications and operation of the Internet of Things (IoT)	None	20	
Total nominal hours range for elective units =				40 - 120	
Overall nominal hours range [thirteen (13) core and two (2) elective units] =				394 - 474	
*Add UEENEE to the code provided					

5.2 Entry requirements	*Standard 9 AQTF Standards for Accredited Courses* There are no entry requirements for this course. However, learners who have as a minimum; language, literacy and numeracy skills that are equivalent to Level 2 of the Australian Core Skill Framework (ACSF) are best equipped to achieve the outcomes of this course. Full details, descriptors and tests of the ACSF can be found on website here. Learners who have lower levels of language and literacy may require additional support to complete the course.
6. Assessment Courses	**Standards 10 and 12 AQTF Standards for Accredited**
6.1 Assessment strategy	All assessment, including Recognition of Prior Learning (RPL) must be compliant with the requirements of: • Standard 1 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 4.1 and 4.2 of the VRQA Guidelines for VET Providers or • the Standards for Registered Training Organisations 2015 (SRTOs)

	or • the relevant standards and guidelines for Registered Training Organisations in effect at the time of assessment Assessment strategies must therefore ensure that: • all assessments are valid, reliable, flexible and fair • learners are informed of the context and purpose of the assessment and the assessment process • feedback is provided to learners about the outcomes of the assessment process and guidance given for future options • time allowance to complete a task is reasonable and reflect the industry expectations of a junior operator Assessment strategies should be designed to: • cover a range of skills and knowledge required to demonstrate achievement of the course aim • collect evidence on a number of occasions to suit a variety of contexts and situations • be appropriate to the knowledge, skills, methods of delivery and needs and characteristics of learners • assist assessors to interpret evidence consistently • be equitable to all groups of learners Assessment methods are included in each unit and include: • oral and/or written questioning • inspection of final process/product outcomes • portfolio of documented evidence • demonstration of required physical tasks A holistic approach to assessment is encouraged. This may be achieved by combining the assessment of more than one unit where it better replicates working practice. Assessment of the imported units must reflect the requirements of the Assessment Guidelines in the relevant training package and/or accredited course.
6.2 Assessor competencies	*Standard 12 AQTF Standards for Accredited Courses* Assessment must be undertaken by a person or persons with competencies compliant with: • Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers or • the Standards for Registered Training Organisations 2015 (SRTOs), or

	• the relevant standards and guidelines for Registered Training Organisations in effect at the time of assessment Assessors of the imported units must meet the requirements for assessors specified in the relevant training package and/or accredited course.
7. Delivery Courses	**Standards 11 and 12 AQTF Standards for Accredited**
7.1 Delivery modes	*Standard 11 AQTF Standards for Accredited Courses* This course can be delivered either full time, part-time or a combination of both. Providers should endeavour to be flexible in the way the training is delivered to ensure they meet the needs of the learner cohort. This course will be primarily delivered in a dedicated training environment rather than on-the-job. Therefore, it is important the facilities within the training environment reflect as close as possible, realistic workplace conditions for the benefit of the students Teaching and learning strategies must be selected to reflect the varying learning requirements, educational backgrounds and preferred learning styles of the individual students and the specific requirements of each unit. Some areas of content may be common to more than one unit and therefore integration may be appropriate. For core unit VU22672 - Carry out basic electrotechnology project; it is suggested students are grouped into small teams of two to four persons with an elected team leader. This arrangement will promote teamwork, communication as well as planning and organisational skills as part of the learning experience. Project suggestions are listed in the Range Statement of the unit.
7.2 Resources	*Standard 12 AQTF Standards for Accredited Courses* The resources that should be available for this course relate to normal work practice using procedures, information and resources typical of an electrotechnology environment. This should include access to: • WHS/OHS policy and work procedures and instructions; • relevant electrical and telecommunication safety acts, service installation rules, regulations, standards and codes of practice; • a simulated electrotechnology workshop with relevant equipment, tools, materials and consumables; • relevant plans, drawings and instructions. • the internet and library resource centre • relevant computing hardware and software • first aid and workplace safety resources Training must be undertaken by a person or persons with competencies compliant with:

	• Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers, or • the Standards for Registered Training Organisations 2015 (SRTOs), or • the relevant standards and guidelines for Registered Training Organisations in effect at the time of assessment. For imported units the teachers/trainers requirements specified in the endorsed training package and/or accredited course must be complied with.
8. Pathways and articulation	*Standard 8 AQTF Standards for Accredited Courses* There are no formal articulation arrangements in place for the Certificate II in Electrotechnology (Pre-vocational). However, graduates will gain credits for successfully completed endorsed units of competency in the apprenticeship qualifications listed below from the UEE11 – Electrotechnology and UET12– Transmission, Distribution and Rail Sector Training Packages. These qualifications are: • UEE30111 Certificate III in Business Equipment • UEE30211 Certificate III in Computer Systems Equipment • UEE30311 Certificate III in Custom Electronics Installations • UEE30411 Certificate III in Data and Voice Communications • UEE30611 Certificate III in Electrical Machine Repair • UEE30711 Certificate III in Switchgear and Control Gear • UEE30811 Certificate III in Electrotechnology Electrician • UEE30911 Certificate III in Electronics and Communications • UEE31011 Certificate III in Fire Protection Control • UEE31111 Certificate III in Gaming Electronics • UEE31211 Certificate III in Instrumentation and Control • UEE31411 Certificate III in Security Equipment • UEE31511 Certificate III in Rail - Communications and Networks • UEE32111 Certificate III in Appliance Service • UEE32211 Certificate III in Air-Conditioning and Refrigeration • UEE33011 Certificate III in Electrical Fitting • UET30512 Certificate III in ESI – Transmission Overhead • UET30612 Certificate III in ESI – Power Systems – Distribution Overhead • UET30712 Certificate III in ESI – Power Systems – Rail Traction

	• UET30812 Certificate III in ESI – Power Systems – Distribution Cable Jointing Graduates will also gain credits through the national recognition process for any of the other endorsed or accredited units of competency, if they are included in further qualifications. Likewise, participants entering this course will be given credit for any endorsed training package and/or accredited course unit/s they have successfully completed. When arranging articulation providers should refer to the: *AQF 2nd Edition, 2013 Pathways Policy*
9. Ongoing monitoring and evaluation	*Standard 13 AQTF Standards for Accredited Courses* Ongoing monitoring and maintenance of this course is the responsibility of the Curriculum Maintenance Manager (CMM) - Engineering Industries. A formal review will take place at the mid-point of the accreditation period. The review will be informed by feedback and consultation with key stakeholders and will include RTO's delivering the course, course graduates and relevant industry organisations. The review will consider: • course implementation, delivery and assessment processes • course structure and currency of units • course's ability to address emerging technologies and development in the electrotechnology industry • continuing need for the course should an appropriate endorsed training package qualification become available. Any significant changes to the course resulting from course monitoring and evaluation process will be reported to the VRQA.

Appendix 1 - Summary of knowledge and skills for electrotechnology pre-vocational program

Required knowledge:

- Scope and sub sectors of the electrotechnology industry
- Employment opportunities in the electrotechnology industry
- Organisations and bodies representing the electrotechnology industry and those employed in the industry
- Apprentice supervision guidelines
- Relevant WHS/OHS processes and procedures
- Relevant electrical standards, regulations and codes of practice
- Electrical drawing standards, conventions and specifications
- Technology advances in areas such as data communication, home automation, intelligent systems
- Basic mathematical computations e.g. calculations, Pythagoras theorem

Required skills:

- Apply safe work practices in a electrotechnology environment
- Recognise hazard and implement control measures
- Carry out first aid
- Identification of safety signs and symbols
- Work in a team environment
- Follow oral and written work instructions
- Interpret sketches and drawings
- Use a range hand tools and hand held power tools regularly used in the electrotechnology industry
- Solve problems in ELV single path circuits
- Fix and secure electrotechnology equipment
- Attach cords and plugs to electrical equipment
- Run cabling for the connection of extra low voltage (ELV) networking equipment and devices.
- Conduct safety testing of electrical cord connected equipment
- Plan and carry out a basic electrotechnology project
- Build a small network using an integrated router
- Adjust mechanical operation of air conditioning system
- Set up and operate a sustainable ELV energy power system

Section C: Units of competency

New units for this course:

VU22669	Perform energy sector installations of extra low voltage (ELV) single path circuits
VU22670	Provide an overview of the electrotechnology industry
VU22671	Use test instruments in the electrotechnology industry
VU22672	Carry out basic electrotechnology project
VU22673	Carry out basic network cabling for extra low voltage (ELV) equipment and devices
VU22674	Explore applications and operation of the Internet of Things (IoT)

Imported units from National Training Packages (copy available from the national register here.)

CPCCWHS1001	Work safely in the construction industry
HLTAID011	Provide first aid
UEENEEE101A	Apply occupational health and safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE103A	Solve problems in ELV single path circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEJ102A	Prepare and connect refrigeration tubing and fittings
UEENEEJ103A	Establish the basic operating conditions of vapour compression systems
UEENEEJ104A	Establish the basic operating conditions of air conditioning systems
UEENEEK112A	Provide basic sustainable energy solutions for energy reduction in residential premises
UEENEEP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 volt supply
UEENEEP026A	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Imported units from accredited course 22470VIC Certificate II in Engineering Studies

(copy available here.)

VU22330	Select and interpret drawings and prepare three dimensional (3D) sketches and drawing
VU22333	Perform intermediate engineering computations
VU22338	Configure and program a basic robotic system
VU22340	Use 3D printing to create products
VU22341	Apply basic computer networking concepts and practices

Imported unit from accredited course 22289VIC Certificate II in Integrated Technologies

(copy available here.)

VU21544	Install a sustainable extra low voltage energy power system

VU22333 - Perform intermediate engineering computations

Unit Descriptor

This unit of competency describes the skills and knowledge required to prepare and apply intermediate level engineering computations.

It includes the use of trigonometry, the application of sine and cosine rules, formulae and geometric principles relevant to the engineering and the calculation of areas and volumes of common engineering shapes.

No licensing or certification requirements apply to this unit at the time of accreditation.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit would be applied by entry level engineering students/workers required to undertake a range of intermediate level engineering computations.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Determine job computation requirements	1.1 ***Job requirements*** are identified from specifications, drawings, job sheets or work instructions. 1.2 ***Required calculations*** are determined from job instructions.
2. Determine and apply required formulae and establish estimate	2.1 ***Relevant formulae*** to suit the job requirement is determined. 2.2 An estimation of the expected results, including rounding off is undertaken
3. Perform computation and comfirm estimate	3.1 ***Standard Operating Procedures (SOPs)*** are followed at all times. 3.2 ***Calculation method*** is made to obtain accurate answer. 3.3 Answer is checked against estimation.

REQUIRED SKILLS AND KNOWLEDGE

Required Skills:

- following work instructions, standard operating procedures
- obtaining and interpreting data from specifications, drawings, job sheets or work instructions to establish required outcomes
- determining the appropriate calculation method to suit the application
- performing calculations using:
  - trigonometric ratios
  - sine and cosine rules
  - pythagoras theorem
  - geometric formulae

- manipulating of formulae to change the subject
- checking answers using estimations

Required Knowledge:

- formulae applicable to the determination of perimeter, area and volume of simple geometric shapes
- the reasons for ensuring calculations are carried out using the same units of measurement
- nomenclature used in trigonometry, pythagoras' theorem and geometry
- mathematical principles and order of operations
- techniques and procedures for rounding off figures when estimating approximate answers
- applications of geometric calculations in manufacturing and engineering situations

RANGE STATEMENT

This describes the essential skills and knowledge and their level, required for this unit. Bold italicised wording in the Performance Criteria is detailed below.

Job requirements may include but not limited to:	• timeframe for task • tools and equipment • working with others • materials, parts and other resources • specifications • procedures • special reporting requirements • quality measures
Required calculation may include but not limited to:	• angles • lengths • areas • perimeters • volumes
Relevant formulae may include but not limited to:	• trigonometry: o basic functions eg trigonometry ratios o sine rule o cosine rule • pythagoras theorem • geometric formulae
Standard operating procedures (SOPs) may include but not limited to:	• the use of tools and equipment • instructions, including job sheets, cutting lists, plans, drawings and designs

- reporting and communication
- manufacturers' specifications and operational procedures

Calculation method may include but not limited to:

- subtraction
- addition
- multiplication
- division
- manipulation of formulae

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

To be considered competent in this unit assessors must be satisfied the candidate can demonstrate the achievement of all of the elements of the competency to the level defined by the associated performance criteria

Specifically they must be able to:

- perform calculations using:
  - trigonometric ratios
  - sine and cosine rules
  - pythagoras theorem
  - geometric formulae
- select the correct formulae for a given task and complete the required calculation/s on a number of occasions

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of conditions. The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Methods of assessment

Evidence can be gathered through a variety of ways including:

- observation of processes and procedures
- oral and/or written questioning
- testimony from supervisors, colleagues, clients and/or other appropriate persons
- inspection of the final outcome
- portfolio of documented evidence

Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU21544 - Install a sustainable extra low voltage energy supply system

Unit Descriptor

This unit of competency sets out the knowledge and skills required to plan to install, install and commission a sustainable energy power system.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication. However, practice in this unit is subject to regulations directly related to occupational health and safety

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit of competency applies in domestic, industrial or commercial environments, where appropriate sustainable energy systems are employed.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Plan to install a sustainable energy system	1.1 Plan to install a sustainable energy system
	1.2 Established OH&S requirements and risk control measures and procedures are followed in the preparation of the work area.
	1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with ***appropriate personnel***.
	1.4 ***Sustainable energy system*** requirements are determined and discussed with appropriate personnel.
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site.
2. Install a sustainable energy system	2.1 Install a sustainable energy system
	2.2 Equipment/machines/plant are checked as being isolated, where necessary, in strict accordance with OH&S requirements.
3. Commission a sustainable energy system and complete work task	3.1 Commission a sustainable energy system and complete work task
	3.2 Work site is made safe in accordance with enterprise procedures.
	3.3 Final inspections are undertaken to ensure the sustainable energy system installation conforms to requirements and enterprise procedures.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge, and their level, required for this unit.

Required knowledge:

- Causes and consequences of the greenhouse effect
- Energy usage in Australia including types and methods; contribution to the greenhouse effect; greenhouse gases other than CO2
- Opportunities for reducing greenhouse emissions including domestic,; commercial and industrial strategies; trade related technologies and methods
- Overview of sustainable energy technologies including photovoltaic; solar; micro-hydro; wind energy conversion
- Economic benefits of sustainable energy initiatives
- Major categories of energy storage methods (eg. chemical conversions; gravitational, potential, kinetic, heat)
- Basic characteristics of energy storage methods including energy density and commercial availability
- Operating low voltage DC appliances including low voltage tapping from a battery of cells; separate cells; sealed nickel-cadmium cells; low voltage adapter; DC to DC converters
- Power inverters including types, output waveforms and efficiency
- Controllers including blocking diode; low voltage disconnect; charge regulators; over-voltage shunt; connections
- Photovoltaic terminology; units/conversions, symbols
- Photovoltaic modules including types, efficiency and applications
- Photovoltaic fundamentals including IV curves; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams and configurations; specifications
- Solar radiation fundamentals including terminology; units/conversions; symbols; sun position; sun path diagrams; solar radiation on fixed and tracking collectors; specifications
- Micro-hydro fundamentals including terminology; units/conversions; symbols; flow rates, heads and assessment; turbines; operating characteristic; control requirements; specifications
- Wind energy conversion fundamentals including terminology; units/conversions; symbols; wind patterns; local terrain, wind speed, direction, turbulence and wind power; maps, data sheets and measuring instruments; characteristics; applications; specifications

Required skills

- Use tools and equipment correctly
- Follow enterprise relevant OHS procedures
- Read and interpret equipment manuals
- Complete workplace documentation relating to the work
- Make decisions within a limited range of options
- Use diagnostic tools to problem solve
- Plan a process for installing the sustainable energy power source
- Use assembling and dismantling techniques
- Test for functionality of the sustainable energy power source
- Troubleshoot installation
- Work as a member of a team

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

OH&S requirements may include	• legislation • protective equipment • material safety management systems • hazardous substances and dangerous goods code • local safe operation procedures • Awards provisions
Environmental requirements may include	• liquid waste • solid waste • gas, fume, vapour, smoke emissions, including fugitive emissions • excessive energy and water use • excessive noise
Appropriate personnel may include	• supervisor • leading hand • foreman • manager • site engineer • trainer • mentor • teacher • team member
Sustainable energy systems may include	• photovoltaic • solar radiation • micro-hydro • wind energy conversion • storage devices
Resources and equipment may include	• cables and connectors • meters • test equipment • tools • personal computer/laptop • calculator • primary and/or secondary cells • consumables

- inverters
- rectifiers
- voltage regulators
- controllers

Enterprise procedures may include

- the use of tools and equipment
- instructions, including job sheets, plans, drawings and designs
- reporting and communication
- manufacturers' specifications and operational procedures

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

• Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

• Candidates must be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.

• Assessment should also reinforce the integration of the Employability Skills.

• In particular this will incorporate evidence that shows a candidate is able to:

(i) implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures;

(ii) demonstrate the planning, installation, testing and commissioning of one(1) only of the four sustainable energy systems indicated in the Range Statement on more than one occasion and in different contexts.

Context of and specific resources for assessment

- Assessment should be conducted in a real or simulated work environment under a variety of conditions.
- Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

- The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.
- The assessment environment should not disadvantage the candidate.

Method of assessment

- Assessment must include the demonstration of practical skills and may also include:
  - observation of processes and procedures;
  - oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final product or outcome;
  - a portfolio of documentary evidence.
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.
- Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.

VU22330 - Select and interpret drawings and prepare three dimensional (3D) sketches and drawings

Unit Descriptor

This unit of competency describes the knowledge and skills required to select and interpret drawings to plan and complete an engineering task.

The unit also includes the knowledge and skills required to prepare three dimensional (3D) sketches and drawings of simple engineering components for communication requirements.

No licensing, legislative, regulatory or certification requirements apply to this unit of competency at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit would be applied by entry level engineering workers required to undertake a range of basic engineering sketches and drawings using traditional drawing and drafting skills.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Identify and select correct sketches or drawings to plan and complete engineering tasks.	1.1 Required sketches or drawings are obtained from documentation, files systems or local sources in accordance with ***enterprise procedures***. 1.2 ***Sketches and drawings*** are checked for containing all necessary information related to job requirements. 1.3 Notes, drawing versions and dates for sketches or drawings are assessed as current and appropriate. 1.4 Communications with others involved in the work is maintained to ensure efficient progress and completion of tasks and that safety is maintained at all times.
2. Interpret sketch or drawing details to plan and complete engineering tasks.	2.1 Components are identified from sketches and drawings. 2.2 Views and projections are interpreted to reconstruct a three dimensional (3D) image of components, assemblies and structures. 2.3 ***Drawing symbols***, dimensions and tolerances are interpreted and applied to the work task. 2.4 Materials requirements for work tasks are obtained from sketches and drawings. 2.5 Insufficient sketch/drawing details are identified and reported to the ***appropriate personnel*** in accordance with enterprise procedures.

3. Prepare sketches or drawings to plan and complete engineering tasks.	3.1 Objects are sketched and/or drawn for clear communications of requirements and in accordance with Australian drawing standards. 3.2 Sketches and drawings are prepared to present the required information with minimal complexity. 3.3 Dimension and notes are added to fully describe requirements in accordance with enterprise procedures. 3.4 Completed sketches and drawings are checked for compliance with requirements and reviewed with the appropriate personnel.

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- reading, interpreting and communicating information from engineering drawings and sketches
- applying sketching skills to produce detail drawing in 3rd angle orthogonal and isometric projection

Required knowledge:

- types and functions of technical drawings
- engineering drawing conventions and symbols
- drafting methods for preparing original drawings
- drawing standards and conventions (eg AS1100)

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold/italicised wording in the Performance Criteria is detailed below.

Enterprise procedures may include but not limited to:	• the use of tools and equipment • instructions, including job sheets, cutting lists, plans, drawings and designs • reporting and communication • manufacturers' specifications and operational procedures
Sketches and drawings may include but not limited to:	• free hand • manual drafting in one, two or three projections • to scale or not-to-scale • for selecting, preparing, or assembling components or products
Drawing symbols may include but not limited to:	• lines types – outlines (visible/hidden) – dimensioning lines – centre lines • electrical • engineering: – mechanical – fabrication

Appropriate personnel may include but not limited to:	• supervisor • leading hand • foreman • trainer/coach • teacher

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Elements, Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the Accreditation Submission.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	To be considered competent in this unit assessors must be satisfied the candidate can demonstrate the achievement of all of the elements of the competency to the level defined by the associated performance criteria Specifically they must be able to demonstrate the ability to: • read and interpret views and projections of an engineering component drawing to recontruct a three dimensional image • prepare a scaled three dimensional sketch or drawing of a simple engineering component.
Context of and specific resources for assessment	Evidence should show competency working in a realistic environment and a variety of conditions. The candidate will have access to all drawings, drawing equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Methods of assessment	Evidence can be gathered through a variety of ways including: • observation of processes and procedures • oral and/or written questioning on required knowledge and skills • inspection of the final product or outcome • portfolio of documented evidence. Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU22338 - Configure and program a basic robotic system

Unit Descriptor

This unit of competency describes the knowledge and skills required to configure and program a basic robotic system. Typical tasks for basic robotic system operation include pick and place, motion and navigation. Code development will include testing code and producing code to control robotic systems.

No licensing or certification requirements apply to this unit at the time of accreditation.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit would be applied by entry level engineering workers required to undertake basic operations with robotic systems for a range of repetitive and routine tasks.

This unit does not include large, complex industrial robotic systems used in manufacturing operations.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Plan the configuration and programming of a basic robotic system	1.1 ***Workplace Health and Safety/Occupational, health and safety (WHS/OHS) requirements*** and ***environmental requirements*** for a given work area are obtained and understood.
	1.2 Established WHS/OHS requirements and risk control measures and procedures in preparation for the work area are followed.
	1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with ***appropriate personnel.***
	1.4 Routine tasks that may be performed by a robotic system are analysed, documented and discussed with appropriate personnel.
	1.5 ***Robotic system*** configuration and programming requirements are determined from documentation, construction briefs and discussions with appropriate personnel.
	1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site.
	1.7 ***Resources and equipment*** needed for the task are obtained in accordance with enterprise procedures and checked for correct operation and safety.
2. Configure and program a robotic system	2.1 WHS/OHS requirements for carrying out the work are followed.
	2.2 Equipment/machines/plant is checked as being isolated where necessary in strict accordance with WHS/OHS requirements.
	2.3 Robotic system is constructed and programmed in accordance with requirements, manufacturers' specifications and ***enterprise procedures***.

	2.4 Robotic system is programmed and configured for the intended task according to manufacturers' specifications and enterprise procedures.
	2.5 Robotic system is tested for correct operation and, if required, incorrect hardware and software functions are identified and rectified.
	2.6 Decisions for dealing with unexpected situations are made from discussions with appropriate personnel, job specifications and enterprise procedures.
	2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3. Verify and document robotic system	3.1 WHS/OHS requirements for completing the work are followed.
	3.2 Work site is made safe in accordance with established safety procedures.
	3.3 Hardware and software tools used in configuration and programming tasks are maintained and stored according to enterprise procedures.
	3.4 Robotic system overall function and requirements are verified, documented and information stored according to enterprise procedures.
	3.5 Appropriate personnel are informed of the completion of work and, if required, provided with a demonstration of the operation of hardware and software aspects of the robotic system.

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- using tools and equipment configure and program a robotic system
- following enterprise and WHS/OHS procedures
- reading and interpreting robotics equipment manuals
- completing workplace documentation
- making decisions within a limited range of options
- installing and configuring integrated programming environments (IPE)
- saving, editing, documenting and compiling code
- defining and documenting a basic robotic task including requirement list; task steps; input requirements; output requirement; logic states
- testing code including systematic fault finding and documentation; debuggers and simulation; fault isolation; input checking; output checking; diagnostic code
- troubleshooting robotic system operation

Required knowledge:

- types of robotic devices including mobile robots; autonomous robots; robotic arms
- robot axis and degrees of movement
- robot power requirements and movement e.g. stationary robots with mains derived power; mobile robots with batteries; battery duration and recharging
- DC motor types including permanent magnet DC motors; brushed motors; brushless motors; stepping motor

- DC motor controls including speed control (pulse width modulation); forward and reverse control; 'H' drive
- positional feedback and servo systems including potentiometers; encodes (incremental and absolute)
- solenoid actuators
- input basic transducers including switches; potentiometers; IR infra-red sensors; ultra-sonic sensors
- robot electronics fundamentals including CPU/controller; input interfaces, analogue, digital; output interfaces, analogue, digital, drive capabilities protection
- drive mechanisms including gearboxes; belts; chains
- robot construction materials including metal; wood; plastics; composites
- download interfaces such as RS232; USB; IEEE1394 or similar
- flowchart symbols
- flowchart decisions and logic
- program code including input statements; output statements; logical operators (AND, OR, NOT, XOR, SHiFT); mathematical operators; flow control (IF THEN, FOR, WHILE); program modules (CALL, RETURN)
- code download including programming interfaces; isolation; programming mode; operational mode. eg Programming Raspberry Pi with Python and Open Computer Vision (CV)
- WHS/OHS considerations applicable to robotic systems

RANGE STATEMENT

This describes the essential skills and knowledge and their level, required for this unit. Bold italicised wording in the Performance Criteria is detailed below.

Workplace Health and Safety/Occupational, health and safety (WHS/OHS) requirements may include but not limited to:	• legislation • protective equipment • material safety management systems • hazardous substances and dangerous goods code • local safe operation procedures
Environmental requirements may include but not limited to:	• liquid waste • solid waste • gas, fume, vapour, smoke emissions, including fugitive emissions • excessive energy and water use • excessive noise
Appropriate personnel may include but not limited to:	• supervisor • leading hand • foreman • manager • site engineer • trainer • mentor

- teacher
- team member

Robotic system may include but not limited to:

- mobile robots
- autonomous robots
- robotic arms

Resources and equipment may include but not limited to:

- appropriate tools
- test equipment
- consumables
- appropriate software licences
- manufacturers' specifications and manuals
- diagnostics software
- personal computer
- programming tools

Enterprise procedures may include but not limited to:

- the use of tools and equipment
- instructions, including job sheets, cutting lists, plans, drawings and designs
- reporting and communication
- manufacturers' specifications and operational procedures

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

To be considered competent in this unit assessors must be satisfied the candidate can demonstrate the achievement of all of the elements of the competency to the level defined by the associated performance criteria

Specifically they must be able to:

- plan, and construct a robotic system for a routine task using handware and software tools
- configure, program, test and rectify robotic system to achieve optimium performance of routine task
- apply relevant WHS/OHS procedures and safe work practices during construction, programming and testing of a robotic system

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of conditions. The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Methods of assessment	Evidence can be gathered through a variety of ways including: • observation of processes and procedures • oral and/or written questioning • testimony from supervisors, colleagues, clients and/or other appropriate persons • inspection of the final product or outcome • portfolio of documented evidence Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU22340 - Use 3D printing to create products

Unit Descriptor

This unit describes the skills and knowledge to utilise a three dimensional (3D) printer to produce basic products.

It encompasses the use of current 3D printing software applications, manipulation of hardware and software features, managing files and directories, file storage requirements and relevant safety procedures.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit applies to persons preparing to enter the manufacturing and engineering industry and may be used in school based programs under appropriate supervision.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide
1. Determine the job requirements	1.1 ***Requirements*** and ***purpose*** for 3D printing are clarified by referring to the job specifications. 1.2 Relevant ***Workplace Health and Safety/Occupational Health and Safety (WHS/OHS)*** procedures are accessed and followed. 1.3 ***Relevant personnel*** are consulted to organise work flow sequences. 1.4 Computer software that suits the type of 3D printing product being created is selected. 1.5 ***3D printer*** suitable for the product being created and the material being used is selected. 1.6 Relevant ***reference materials*** to help with the visualisation of the 3D product are accessed and analysed.
2. Create the 3D printing product	2.1 Models are blocked out using software features to determine correct proportions in relation to the reference materials. 2.2 Lighting and shading software features are manipulated as required. 2.3 ***Integrity*** of the product design is ***refined*** and checked against the job requirements and specifications. 2.4 Product design is rendered and output is downloaded in the required ***format***.
3. Produce and evaluate the 3D printed product	3.1 Product design is tested to identify any faults and modified as required.

3.2 Product design is submitted to relevant personnel for approval and final adjustments to the 3D printing program are made.

3.3 Sample 3D product is produced and checked for faults.

3.4 Computer files are saved and back-up copies are made in accordance with enterprise procedures.

3.5 Complete workplace documentation is completed in accordance to enterprise procedures.

REQUIRED SKILLS AND KNOWLEDGE

Required skills:

- manipulating industry-current 3D digitial printing hardware and software application to create and produce a product
- managing 3D digitial printing files and directories by applying standard naming conventions and version control protocols
- ma
- king back-up copies of files and storing them appropriately
- interpreting and clarifying written or verbal instructions for the production of a 3D digitial printed product
- seeking expert assistance to address problems and responding constructively to feedback
- using relevant materials/resources to assist with the development and visualisation of a 3D digital printed product

Required knowledge:

- 3D digital printing techniques
- functions and features of a range of delivery platforms
- stages in the production process from initial design through to finished product
- issues and challenges in the context of creating 3D digital printed products
- WHS/OHS standards and procedures relevant to 3D digital printing operations
- resources useful for the development and creation of 3D digitial printed products
- quality assurance considerations relevant to creation of 3D digitial printed products

RANGE STATEMENT

This describes the essential skills and knowledge and their level, required for this unit. Bold italicised wording in the Performance Criteria is detailed below.

Requirements may include but not limited to::	• assets for integration • collaboration with others • creative expectations • design specifications • output format • technical specifications
Purpose may include but	• architectural models • rapid prototyping

not limited to:	• rapid manufacturing • small batch custom manufacturing
Workplace Health and Safety/Occupational Health and Safety (WHS/OHS) may include but not limited to***:***	• legislation • safety management systems • enterprise safe work procedures • protective equipment • hazardous substances and dangerous goods code
Relevant personnel may include but not limited to::	• supervisor • trainer/teacher • project Manager
3D printer may include but not limited to:	• RepRap • Ultimaker • Airwolf • RoBo • Solidoodle
Reference materials may include but not limited to:	• concept drawings and sketches • real object on which the product is to be based • photo images • video images
Integrity may include but not limited to:	• double faces • isolated vertices • pivot points • resetting transforms • scale of product relative to other components
Refined may include but not limited to:	• required shape • required topology • required functionality
Format may include but not limited to:	• Standard Tessellation Language (STL) • Audio Video Interleave (AVI) • Interchange File Format (IFF) • Joint Photographic Experts Group (JPEG) • Tagged Image File Format (TIFF) • Quicktime • Moving Pictures Experts Group (MPEG) • Portable Network Graphics

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate	To be considered competent in this unit assessors must be satisfied the candidate can demonstrate the achievement of all of the elements of the competency to the level defined by

competency in this unit	the associated performance criteria Specifically they must be able to: • use and manipulate 3D digitial printing technology to develop and produce at least one (1) simple product to specification • manage 3D digitial printing files and directories by applying standard naming conventions and version control protocols • apply relevant WHS/OHS procedures and work practices while using 3D digitial printing technology.
Context of and specific resources for assessment	Evidence should show competency working in a realistic environment and a variety of conditions. The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials
Methods of assessment	Evidence can be gathered through a variety of ways including: • observation of processes and procedures • oral and/or written questioning • testimony from supervisors, colleagues, clients and/or other appropriate persons • inspection of the final product or outcome • portfolio of documented evidence. Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU22341 - Apply basic computer networking concepts and practices

Unit Descriptor

This unit describes the knowledge and skills required to apply basic computer networking concepts and practices to a new or existing computer network.

The unit includes the knowledge and skills to build a basic Local Area Network (LAN) including wireless access.

No licensing or certification requirements apply to this unit at the time of accreditation.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit would be applied by entry level engineering students required to apply basic computer networking concepts and practices under supervision.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1. Establish how end-user devices interact with a computer network	1.1 Role of ***network devices*** enabling an end user to access internet services are indentified. 1.2 Configuring Internet Protocol (IP) addresses on an end device are confirmed. 1.3 ***Basic network*** components are identified.
2. Investigate the basic operation of key network services	2.1 Feature of an IP address is indentified. 2.2 ***Different types of IPv4 addresses*** are compared. 2.3 IPv6 address structures is indentified. 2.4 Function and role of a Dynamic Host Control Protocol (DHCP) server are confirmed. 2.5 Function and role of the four layers of the TCP/IP stack are identified. 2.6 Function and operation of static Network Address Translation (NAT) is indentified.
3. Build and configure a basic computer network and test for connectivity	3.1 Basic function and operation of a network switch and business router are determined. 3.2 Network is cabled according to a provided network diagram. 3.3 Structure of an Internetworking Operating System (IOS) for a switch and router is clarified. 3.4 ***Common IOS show and test commands*** are utilised. 3.5 Network switches and routers are configured and tested for connectivity. 3.6 Configure IP addresses on a workstation or laptop. 3.7 ***Troubleshooting methodologies and tools*** are used as required.

4. Configure wireless clients for a network	4.1	***Different types of wireless network connections*** are determined.
	4.2	Current Wi-Fi standards and functionality are explained.
	4.3	Functionality of a Wireless LAN router is described.
	4.4	Wireless clients are added to the network.
	4.5	Wireless security vulnerabilities and Wireless LAN router security features are recognised and implemented.
	4.6	Mobile devices for the Wireless LAN network are configured.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit

Required skills:

- articulating issues arising from the operation of a network
- base level problem solving to implement provided scripts for a switch and a router
- reading and accurately interpreting documents and reports
- operating a personal computer
- cabling network at a basic level
- identifying and using networking devices
- configuring IP addresses on a workstation or laptop
- building and testing a network
- configuring Wireless LAN routers
- adding users to a wirelss network

Required knowledge:

- function and operation of transport layer protocols
- IPV4 addressing structure
- IPV6 addressing fundamentals
- DHCP concepts
- basic operation of static NAT
- routers, switches, firewall fundamentals
- IOS commands
- end to end network test commands eg Ping, Traceroute
- Wireless LANs operation and vulnerabilities
- basic firewall operation
- malware attacks mechanisms and detection tools
- basic network security concepts and practices
- configuring Wireless LAN routers

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Basic network may include but not limited to***:***	• workstations • switch • hub
Different types of IPv4 addresses may include but not limited to:	• Class A Addresses • Class B Addresses • Class C Addresses • Class D Addresses
Network devices may include but not limited to:	• workstation • laptop • switch • tablet • hub • router
Common IOS show and test commands may include but not limited to:	• show running-configuration (or equivalent) • show interface (or equivalent)
Troubleshooting methodologies and tools may include but not limited to:	• top down bottow up testing • ping • traceroute
Different types of wireless network connections may include but not limited to:	• ad hoc • multihop

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

To be considered competent in this unit assessors must be satisfied the candidate can demonstrate the achievement of all of the elements of the competency to the level defined by the associated performance criteria

Specifically they must be able to:

- explain the function and operation of networking devices and how they interact with the internet
- explain the structure and operation of IP addresses and key protocols of the Transmit Control Protocol/Internet Protocol (TCP/IP) suite
- build a small network using an integrated router including security considerations
- configure an integrated wireless router and wireless clients including security considerations.
- add users to a wireless network.

Context of and specific resources for assessment

Evidence should show competency working in a realistic environment and a variety of conditions. The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Methods of assessment

Evidence can be gathered through a variety of ways including:

- observation of processes and procedures
- oral and/or written questioning
- testimony from supervisors, colleagues, clients and/or other appropriate persons
- inspection of the final product or outcome
- portfolio of documented evidence.

Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU22669 - Perform energy sector installations of extra low voltage (ELV) single path circuits

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to wire extra low voltage (ELV) single path circuits and terminate associated accessories.

This includes ELV powered devices such as security controls, integrated systems and audio/visual systems. It encompasses safe working practices and following work processes that satisfy electrical principles for safety and functionality.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit of competency is intended for use in an entry level qualification and applies to a person who is seeking employment such as an apprenticeship in the electrotechnology industry.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Determine the requirements for specific extra low voltage (ELV) jobs	1.1 Nature and location of the ELV work to be undertaken is clarified with the ***appropriate person***
	1.2 Licensing requirements of AS/NZS3000 are clarified with the appropriate person
	1.3 ***Risks or hazards*** associated with the work are identified and established risk control measures are followed
	1.4 ***Resources*** required to undertake the ELV work are identified and accessed
	1.5 Tools, equipment and testing devices are checked for correct operation
	1.6 Relevant occupational health and safety/workplace health and safety (OHS/WHS) requirements for the specific tasks are identified and accommodated
2 Wire ELV circuits and connect accessories	2.1 In accordance with workplace procedures relevant circuits/machines/plant are confirmed to be isolated
	2.2 Wiring/cabling and accessories are installed in accordance with job requirements

	2.3	Appropriate cable support and protection methods are applied in accordance with workplace requirements
	2.4	Any unexpected circumstances are referred to the appropriate person for advice
	2.5	Accessories are installed in the required locations
	2.6	Cables and conductors are terminated at accessories in accordance with manufacturer's specifications and regulatory requirements
	2.7	Installed cables are marked for identification for future service in accordance with the cable identification scheme and regulatory requirements
	2.8	Sustainable work practices are employed to minimise waste and damage to the environment
3 Finalise ELV job activities	3.1	Relevant ***testing devices*** are used to confirm compliance and correct operation of the circuit/s
	3.2	Worksite is cleaned and unused materials, tools and equipment are collected and stored in accordance with workplace requirements
	3.3	Appropriate person is notified of completion of the work in accordance to workplace procedures

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- installing cables in single path ELV circuits in a simulated workplace training environment
- terminating cables and accessories to manufacturer's specifications and requirements
- applying cable support and protection methods
- following safe work practices
- applying sustainability principles and practices in the workplace
- cleaning up the workplace after job completion

Required knowledge:

- relevant OHS/WHS regulations
- risk control measures
- safe working practices for wiring/cabling and terminating accessories for single path extra-low voltage circuits
- cable protection and support methods and accessories
- types of cables used in the electrotechnology industry and their application
- basic cable and conductor terminations
- relevant electrical standards, regulations and codes related to extra-low voltage work
- sustainability principles and practices related to electrotechnology work.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Appropriate person may include:	– instructor – electrician – supervisor – trainer
Risks and hazards may include	– contact with live parts causing shock and/or burns – faults which could cause fires – fire or explosion where electricity could be the source of ignition in a potentially flammable atmosphere
Resources may include:	– tools – equipment – testing devices – wires – cables – protection and support devices
Testing devices may include:	– continuity meter – IR (infrared receiver) meter – multimeter

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- apply OHS/WHS workplace procedures and practices including the use of risk control measures as specified in the performance criteria
- select and use appropriate tools, test equipment and other relevant resources to install wiring and/or cabling and terminate accessories for extra low voltage single path circuits in accordance with job instructions on at least three occasions in different contexts

Context of and specific resources for assessment	Skills will be demonstrated in a safe simulated environment that reflects workplace conditions using suitable facilities, equipment and resource. Assessment must ensure access to: – OHS/WHS policy, electrical standards and work procedures and job instructions – relevant tools, test equipment materials and consumables – relevant plans, drawings and instructions and manufacturer's specifications/manuals.
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: – demonstration of practical cable/wiring laying skills and installation of accessories – oral and/or written questioning on relevant background electrical principles and practices knowledge – inspection of the final product or outcome – portfolio of documented evidence.

VU22670 - Provide an overview of the electrotechnology industry

Unit Descriptor

This unit describes the skills and knowledge required to gain an overview of the electrotechnology industry including the various streams of the industry, services and products provided, employment opportunities and the training pathways for entry into the industry.

The unit also examines the role and training requirements to become an electrotechnology tradesperson, preparing a personal resume and participating in a face to face job interview

No licensing, legislative, regulatory or certification requirements apply to this unit of competency at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit of competency is intended for use in an entry level qualification and applies to a person who is exploring their options for a career in the electrotechnology industry.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Define the scope of the electrotechnology industry	1.1 ***Information sources*** on the electrotechnology industry are identified and utilised
	1.2 ***Major streams/sectors*** of the electrotechnolgy industry are identified and their focus is explained
	1.3 Services and/or products of each major stream/sector are defined
	1.4 Applications of ***advanced technology*** in one or more of the streams/sectors is identified and the principles are explained
2 Identify occupations/job roles of technical staff in the various industry streams/sectors	2.1 ***Roles and responsibilities of technical staff*** employed in each major stream/sector are identified and explained
	2.2 ***Qualifications*** for entry into the various occupations and roles and their link to the Australian Qualifications Framework (AQF) are identified
	2.3 The focus of vocational education and training (VET) is clarified and different providers that offer VET qualifications are identified

3	Define the role and training pathway for a electrotechnology tradesperson	3.1 Industry streams/sectors which employ electrotechnology tradespersons and their key tasks and responsibilities are identified
		3.2 ***Training pathway*** to become a electrotechnology tradesperson is outlined
		3.3 The purpose and requirements of ***licensing for tradespersons*** and apprentice supervision guidelines are clarified
		3.4 ***Further training options*** for electrotechnology tradespersons are identified
		3.5 Industry award classifications for a electrotechnology tradespersons are explained
		3.6 ***Electrotechnology industry organisations*** which represent the electrical industry workers are identified and their role explained
4	Make an application for an apprenticeship in the electrotechnology industry	4.1 The type of apprenticeship and the relevant electrotechnology industries which engage this type of apprenticeship are researched
		4.2 Prospective enterprises/companies/businesses are identified and contact details are confirmed
		4.3 A ***personal resume*** with a covering letter is prepared and emailed/posted/delivered to the prospective employers
5	Undergo face to face interview for an apprenticeship position	5.1 ***Preparation for the interview*** is planned and carried out
		5.2 Date, time and location of the interview are confirmed
		5.3 Personal presentation requirements for the interview are addressed
		5.4 Face to face interview is accomplished
		5.5 ***Interview process is reviewed*** and areas for improvements are identified

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- locate and interpret information on the scope and coverage of the electrotechnology industry
- recognise the application of advanced technologies in the electrotechnology industry
- define the streams/sectors of electrotechnology industry including the services/products offered and the employment opportunities in each sector
- recognise the qualification levels in the AQF including those general offered by VET providers and those general offered by universities

- map out a typical training pathway for person preparing to be a electrotechnology tradesperson
- prepare a personal resume for employment in the electrotechnology industry
- participate in a face to face job interview

Required knowledge:

- information gathering techniques
- diversity of the electrotechnology industry
- range of employment opportunities within the electrotechnology industry
- training pathway for the electrotechnology industry
- training focus of vocational education and training (VET) providers
- apprentice supervision guidelines
- electrical licensing (i.e. Energy Safe Victoria - ESV)
- refrigerant licensing (i.e. Australian Refrigeration Council - ARC)
- communication and media cabler register (i.e. Australian Communications and Media Authority - ACMA)
- job application and interviewing techniques

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Information sources may include:

- internet websites e.g. National Electrical and Communications Association (NECA), Electrical Trades Union (ETU), Australian Apprenticeship Pathway (electrotechnology)
- trade exhibitions and displays
- enterprise/company visits
- library
- direct contact with industry personnel, industry associations and trade unions

Major streams/sectors includes:

- electrician (residential, commercial and industrial)
- communications
- computer systems
- electronics
- information/data technology
- instrumentation
- refrigeration and air conditioning
- lifts
- renewable energy systems
- electricity supply (generation, transmission and distribution)

	– rail and rail signalling – mining – manufacturing – fire services – switch board manufacturing
Advanced technology may include:	– robotics – 3D printing (rapid prototyping) – industry 4.0/5.0 – automated control system – virtual/augmented reality
Roles and responsibilities of technical staff may include:	– non-technical (e.g. technical officer) – trainees/apprentices – tradespersons (e.g. electrician) – technicians (e.g. rail signalling) – para-professional/professionals (e.g. electrical engineers)
Qualifications include:	– certificates (e.g. Certificate II, III or IV) – diploma – advanced diploma – undergraduate degrees – graduate qualifications (Graduate Certificate/Diploma

Training pathway includes:	– pre-apprenticeship/vocational course (e.g. Cert II in Electrotechnology Pre-vocational) – optional
	– signed contract of training with an employer
	– apprenticeship (on/off the job training general over a 4 year period with a Certificate III qualification outcome such as Certificate III in:
	  – Electrotechnology Electrician
	  – Air-conditioning and Refrigeration
	  – Rail – Communications and Networks
	– licensing assessment/exam such as electrician licence (A), refrigerant handling licence

Licensing for tradespersons include:	– electrical:
	  – electrician's licence (A)
	  – registered electrical contractors (REC)
	  – restricted electrical worker's licence (REL)
	  – supervised worker's licence (L)
	  – licensed electrical inspectors (LEIs)
	  – switchgear worker's licence (SW)

- refrigerant:
  - refrigerant handling licences (RAC01, AAC02, RSS03, RDR04)
- communications:
  - registered cabler (various categories)

Further training options may include:

- post trade course at Certificate IV level e.g. Certificate IV in Electrical Contracting, Certificate IV in Air-conditioning and Refrigeration
- diploma/advanced diploma e.g. Diploma of Electrical Engineering, Diploma of Air-conditioning and Refrigeration

Electrotechnology industry organisations may include:

- Air Conditioning & Mechanical Contractors' Association (AMCA)
- Australian Communications and Media Authority (ACMA)
- Australian Refrigeration Council (ARC)
- Energy Safe Victoria (ESV)
- Electrical Trades Union (ETU)
- National Electrical and communications Association (NECA)
- Master Electricians Australia (MEA)

Personal resume includes:

- full name/address and contact details
- highest level of secondary education
- pre apprenticeship qualifications (if any)
- any personal achievements or awards
- any part time work history
- hobbies/interests
- statement of employment goal (optional)

Preparation for the interview includes:

- background information on the enterprise/business/company and the products and/or services it provides
- reasons for seeking the designated apprenticeship
- knowledge of the role and responsibilities of an apprentice
- clarification of own employment goals
- identification of personal achievements
- questions to ask the interviewer/s
- trial interview

Interview process is reviewed may include:

- seeking feedback from the interviewer/s

- reviewing a video of the interview (if a simulated interview)
- reflecting on own performance
- seeking advice from a more experience person in area/s of difficulty

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- locate and interpret information about the electrotechnology industry that illustrates the:
  - diverse coverage of the industry
  - applications of advanced technology
  - job role/occupations of technical staff and their required qualifications in the various industry streams /sectors
- map the typical training pathway for an electrotechnology tradesperson
- prepare an employment application for an apprenticeship
- participate in a face to face (real or simulated) employment interview

Context of and specific resources for assessment

To meet the skills and knowledge required for this unit, students must have access to the internet, library as well as a range of printed or electronic resources that demonstrate the scope and coverage of the electrotechnology industry.

Method of assessment

Different assessment methods can be used to assess the student's knowledge and skills required. They include:

- presentation
- simulated interview
- written and oral questioning
- review of portfolio of gathered printed material and/or notes

VU22671 - Use test instruments in the electrotechnology industry

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to identify, safely connect and use analog and digital test instruments to test a range of extra low voltage (ELV) components and circuits.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit of competency is intended for use in an entry level qualification and applies to a person who is seeking employment such as an apprenticeship in the electrotechnology industry.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare test instrument to perform basic electrical test	1.1 Testing requirement is determined and the appropriate ***test instrument*** is selected for the task
	1.2 Handling and operating procedures for the test equipment are confirmed before use
	1.3 Test instrument is tested for serviceability according to manufacturer requirements
	1.4 ***Safety requirements*** and safe operating procedures for the use of the test instrument are accessed and followed
2 Conduct electrical testing task	2.1 Test instrument is connected to the ***ELV component or circuit*** in accordance with manufacturer requirements
	2.2 Testing task is conducted in accordance to workplace and safety requirements
	2.3 Test result/reading is interpreted to determine the condition or serviceability of the electrical component or circuit being tested
3 Complete electrical testing task	3.1 Test results are recorded in accordance with workplace procedure
	3.2 Test equipment is disconnected, cleaned, checked for damage and stored in accordance workplace procedure
	3.3 Damaged, faulty or inaccurate electrical test equipment is tagged and isolated for repair or replacement in accordance with workplace procedure

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- set up and use a range of analog and digital test instruments commonly applied in the electrotechnology industry to test ELV components and circuits
- demonstrate safe working habits when testing ELV components and circuits
- read and interpret operating instructions for electrical testing instruments
- read and interpret test results to determine serviceability of ELV components and circuits

Required knowledge:

- test instruments commonly used to test ELV components and circuits
- WHS/OHS requirements applicable when working with electrical components and circuits
- interpretation of analog and digital scales and dials of test instruments

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Test instrument may include:	– voltmeter – ampmeter – ohmmeter – multimeter – insulation resistance tester – test lights and probes – circuit continuity tester

Safety requirements: may include	– Work health and safety (WHS) occupational health and safety (OHS) requirements including procedures for:
	  – selecting and using personal protective equipment (PPE)
	  – identifying hazards and controlling risks while working around electrical wiring systems

ELV component or circuit may include	– resistors – capacitors – cables – globes – diodes – batteries – fuses – motor control device – wiring circuit – coils

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- select, set-up and use a test instrument to test the ELV component/s and/or circuits on at least five occasions using a different test instrument on each occasion
- comply with all relevant WHS/OHS procedures and requirements for each test

Context of and specific resources for assessment

Skills will be demonstrated in a safe simulated environment that reflects workplace conditions using suitable facilities, equipment and resource. Assessment must ensure access to:

- range of test instruments commonly found in the electrotechnology industry to test ELV components and circuits
- relevant WHS/OHS procedures and requirements
- test instruments operating instructions/manuals

Method of assessment

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:

- direct observation of the candidate performing test procedures using a range of test instruments on difference electrical components and circuits in a simulated environment
- written and oral questioning to test underpinning knowledge of electrical test instruments, test procedures and interpreting the results

VU22672 - Carry out basic electrotechnology project

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to plan, carry out and finalise a basic electrotechnology project.

The unit includes defining the scope of the project, developing a project action plan with timelines, preparing design sketches and working drawings, determining and accessing the required resources, carrying out the build process, demonstrating the working model and evaluating the process.

It is intended this unit of competency will be achieved through participation in a small project team consisting of three to four persons

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit of competency is intended for use in an entry level qualification and applies to a person who is seeking employment such as an apprenticeship in the electrotechnology industry.

ELEMENT	**PERFORMANCE CRITERIA**
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Define the project	1.1 Project team is selected and a team leader is appointed
	1.2 ***Ideas for the project*** are shared by team members and a short list is prepared
	1.3 Project short list is reviewed by team members and a project concept is decided
	1.4 A broad project proposal is prepared and shared with supervisor for approval
2 Develop project action plan	2.1 Project outcome is confirmed and a draft ***action plan*** with agreed timelines is developed
	2.2 ***Safety risks and hazards*** are identified and control measures determined
	2.3 ***Working sketches and drawing*** are prepared to confirm the end product and guide the build process
	2.3 Electrical components and parts required for the project are identified
	2.4 Tools, equipment and other resources required for the project are determined
	2.5 Budget for the project is calculated and approved by supervisor

		2.6	Project action plan is confirmed and work tasks are allocated by team leader for each team member
3	Conduct the project	3.1	Components, resources, tools and equipment are sourced in line with the action plan
		3.2	Project construction stage is implemented by team members in accordance with the project action plan
		3.3	***Safe work practices*** are followed at all times by each member of the team
		3.4	Project progress is monitored by team leader against agreed timelines in conjunction with team members
		3.5	Decisions for dealing with unexpected situations are discussed with all team members and confirmed with supervisor
		3.6	Individual components are trialled and tested before final assembly
4	Finalise and review the project	4.1	Final project is assembled and trialled and where necessary, adjustments and/or modifications are made to improve performance
		4.2	Final project is demonstrated by team to peers and submitted to supervisor for sign off
		4.3	Tools and equipment used for the project are checked for damage and returned to storage
		4.4	Project team in conjunction with the supervisor, reviews the project outcomes against the project action plan and area/s for possible improvement are identified

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- work cooperatively with other team members to achieve a project outcome
- develop a project action plan with timelines and budget
- plan and organise project materials and resources
- build a electrotechnology project in line project plan
- apply safe work practices in an electrotechnology environment
- evaluate project outcomes and identify areas for improvement

Required knowledge:

- basic electrotechnology principles and practices
- basic drawing and sketching skills
- safe work practices in an electrotechnology environment
- elements for good project planning and monitoring
- principles for working effectively with other to achieve a defined outcome

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Ideas for the project may include:	– basic robotic prototype – small renewable generation system – automated ELV lighting system – alarmed ELV warning system – ELV security system
Action plan should include:	– define stages/or steps of the project – milestone/s to be achieved for each stage/step – who is responsible – when is it to be done by – resources required for stage/step – how will progress for each stage/step be monitored
Safety risks and hazards may include:	– contact with live parts causing shock and/or burns – faults which could cause fires – fire or explosion where electricity could be the source of ignition in a potentially flammable atmosphere
Working sketches and drawing may include:	– basic freehand isometric/3D sketches – freehand 2D and 3D line drawings – scaled 2D plan with elevations
Safe work practices should include:	– application of relevant WHS/OHS regulations – application PPE – safe operating procedures of workshop tools and equipment – safe work practices in an electrotechnology environment

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	A person who demonstrates competency in this unit must be able to provide evidence of the ability to: – work as part of a team to plan and carry out a basic electrotechnology project in accordance with a prepared action plan and agreed timelines – source and assemble electrotechnology components to build a working model/prototype

- applied safe work practices in a electrotechnology environment at all times

Context of and specific resources for assessment

Skills will be demonstrated in a safe simulated environment that reflects workplace conditions using suitable facilities, equipment and resources. Assessment must ensure access to:

- range of hand and hand held power tools
- range of electrotechnology equipment, resources and components
- reference manuals and component catalogues

Method of assessment

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:

- direct observation of the candidate working as a team member
- written and oral questioning to test underpinning knowledge
- assessment of action plan and any support documentation
- assessment of the final project outcomes

VU22673 - Carry out basic network cabling for extra low voltage (ELV) equipment and devices

Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to run cabling for the connection of extra low voltage (ELV) networking equipment and devices. The unit includes the identification of ELV cabling, cabling skills including runs, connections and terminations, testing of circuits, use of hand tools and following work practices that satisfy electrical and telecommunication principles for safety and functionality. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability Skills	This unit contains Employability Skills.
Application of the Unit	This unit of competency is intended for use in an entry level qualification and applies to a person who is seeking employment such as an apprenticeship in the Electrotechnology industry.

ELEMENT	**PERFORMANCE CRITERIA**
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to connect equipment and devices	1.1 Scope of the work and/or work instruction is clarified with the ***appropriate person***
	1.2 Advice is sought from the appropriate person to ensure the work is coordinated effectively with others
	1.3 ***Network cabling, testing equipment*** and ***tools*** needed to carry out the work are obtained and checked
	1.4 Relevant work health and safety/occupational health and safety (WHS/OHS) procedures for work area are identified
2 Make connections and terminations in-line with work instructions	2.1 Cabling is run according to work instructions without damage or distortion to itself, surrounding environment or services
	2.2 ***Network equipment or ELV devices*** are installed in-line with work practices that satisfy electrical principles for safety and functionality and manufacturer's instructions
	2.3 Cabling connections and terminations are completed in accordance with work instructions and safe work practices

		2.4 Unexpected events or conditions are referred to the appropriate person for advice and directions
3	Complete cabling work task	3.1 Test equipment is connected in accordance with manufacturer's instructions and connections and termination are tested to ensure compliance and safe working order
		3.2 Work area is cleaned and made safe in accordance with established procedure
		3.3 Tools and equipment are cleaned, checked and returned to storage
		3.4 Appropriate person is notified of the completion of the cabling work task in accordance with established procedure

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- apply ELV cabling skills in accordance to job instructions and separation requirements
- connect network equipment and devices using standard cable termination techniques
- connect and use test equipment to test for correct operation of cable connections and terminations
- demonstrate work practices that satisfy electrical principles for safety and functionality

Required knowledge:

- types of ELV cables including but limited to: structured pair; figure 8; co-axial
- relevant WHS/OHS regulations and safe work practices in the electrotechnology industry
- cabling rules, principles and techniques
- networking equipment and devices
- procedures for dealing with unexpected situation when working with ELV cables
- cabling regulations

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Appropriate person may include:

- workplace supervisor
- instructor
- teacher
- trainer

Network cabling may include:

- cat 5e/6 structured pair
- figure 8

	– co-axial RG6 – shielded cables – ribbon cables
Testing equipment may include	– circuit continuity tester – insulation resistance tester – multimeter – voltmeter – LAN tester
Tools may include:	– screwdrivers – pliers – side cutters – crimping tools (e.g. RG6) – cable stripping tools – insulation displacement contact (IDC) termination tool
Network equipment or ELV devices may include:	– computer hardware – printers – POE lighting (Power over Ethernet) – ELV security devices/systems – renewable energy system monitoring equipment – audio and sound equipment – timed watering systems – router – patch panel and patch leads

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	A person who demonstrates competency in this unit must be able to provide evidence of the ability to: – apply ELV cabling skills in accordance to job instructions and separation requirements – connect network equipment and devices using standard cable termination techniques – connect and use test equipment to test for correct operation of cable connections and terminations – exhibit work practices that satisfy electrical principles for safety and functionality
Context of and specific resources for assessment	Skills will be demonstrated in a safe simulated environment that reflects workplace conditions using suitable facilities, equipment and resource. Assessment must ensure access to: – range of cabling, tools and test equipment commonly found in the electrotechnology industry – relevant WHS/OHS procedures and requirements

- equipment operating instructions/manuals

Method of assessment

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:

- direct observation of the candidate performing practical ELV cabling tasks
- written and oral questioning to test underpinning knowledge of ELV network cabling and safe work practices in the electrotechnology industry

VU22674 - Explore applications and operation of the Internet of Things (IoT)

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to recognise the current applications and potential of the Internet of Things (IoT) including its application in the electrotechnology industry. Typical IoT devices are examined and an example IoT system is set up to familiarise the learner with the basic components and wireless technology required for operating the system.

The unit also examines the function of Bluetooth and Wi-Fi technologies, their applications and the difference between the two technologies.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

This unit of competency is intended for use in an entry level qualification and applies to a person who is seeking an introductory knowledge of the real world and potential applications of the Internet of Things (IoT).

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify the function and operation of the IoT	1.1 ***Applications of IoT systems*** are explored and the impact of their connectivity is assessed
	1.2 ***Typical IoT devices*** are identified and their function and application in the system are defined
	1.3 ***Types of wireless technologies for the IoT networks*** are identified and examples of their application are provided
	1.4 Potential areas of vulnerability and security risks associated IoT devices and systems are recognised
2 Set up an example IoT system	2.1 ***Example IoT system*** is determined and approved by ***appropriate person***
	2.2 Physical components and ***operating system software*** for the example IoT system are selected and sourced
	2.3 Operating system software is loaded to a smartphone, tablet or IoT device and its operation is verified
	2.4 Physical components of the system are assembled and programmed to operate in accordance with predetermined requirements

		2.5	Example IoT system is set to operate in accordance with project requirements
		2.6	***Basic troubleshooting methodologies*** are applied to the IoT system to verify functional operation
3	Utilise Bluetooth technology	3.1	Bluetooth technology is defined and its ***applications*** are recognised
		3.2	Bluetooth compatible devices are paired according to manufacturer instructions
		3.3	Operation of the Bluetooth compatible devices is demonstrated
4	Utilise Wi-Fi (WLAN) technology	4.1	Wi-Fi technology is defined and its applications are recognised
		4.2	The difference between Bluetooth and Wi-Fi technologies and their application is recognised and explained
		4.3	***Connecting securely to Wi Fi devices*** is defined and demonstrated
		4.4	Signal level and connectivity to Wi-Fi hot spot is assessed
		4.3	Access to the internet using Wi-Fi technology is demonstrated

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- investigate a range of real world applications of IoT and identify its potential within the electrotechnology industry
- identify typical IoT devices
- set up and operate an simple IoT system
- pair compatible devices using Bluetooth technology
- access the internet using Wi-Fi technology
- recognise the difference in the applications of Bluetooth and Wi-Fi technologies

Required knowledge:

- real world and potential applications of IoT
- IoT devices
- types of wireless technologies used for the IoT
- Bluetooth technology and its applications
- Wi-Fi technology and its applications
- applications of wireless technologies in the electrotechnology industry

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Applications of IoT systems may include:

- smart home
- wearables
- connected cars
- industrial internet
- smart cities
- smart farming
- smart retailing
- energy management
- healthcare

Typical IoT devices may include:

- Rasberry PI
- AWS (Amazon Web Services) IoT Button
- Intel Quark SoCX1000
- Samsung Smarthings
- Google Nest devices
- Amazon Echo
- Arduino

Types of wireless technologies for the IoT networks may include

- Bluetooth
- Wi-Fi hot spots
- WiMAX
- ZigBee

Example IoT system may include:

- smart watering system
- personalised light switch system
- power on/off home appliances system
- other systems

Appropriate person may include:

- supervisor
- teacher
- trainer
- IT personnel

Operating system software may include:

- Google's Brillo
- Microsoft's Windows 10 IoT Series
- Samsung's Artik
- Intel's Edison
- Apple's HomeKit
- IBM Bluemix

Basic troubleshooting methodologies may include:

- checking power connections to verify device has power
- checking physical connections
- turning system off and on
- following suggested manual troubleshooting guidelines

Applications may include:	– smart phones – headsets – printers – computer keyboards/mouse – in-car speaker system – in-home speaker system – television – various data sharing devices
Connecting securely to Wi Fi devices may include:	– Service Set Identifier (SSID) – passwords

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	A person who demonstrates competency in this unit must be able to provide evidence of the ability to: – recognise the applications of the Internet of Things (IoT) and their connectivity benefits – identify IoT devices and their functions – set up a simple example of a IoT system – demonstrate the application of Bluetooth and Wi-Fi technologies
Context of and specific resources for assessment	Skills will be demonstrated in a worksafe simulated environment that reflects workplace conditions using suitable facilities, equipment and resource. Assessment must ensure access to: – electronic components, software and equipment reflecting the technologies covered in this unit – relevant WHS/OHS procedures and requirements – equipment operating instructions/manuals – hand tools and hand held power tools normally used in a electrotechnology work environment
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: – direct observation of the candidate performing specified tasks such as pairing wireless devices, assembling electronic components, uploading software, operating a smartphone using Wi-Fi technology – written and oral questioning to test underpinning knowledge. For example, IoT connectivity applications and security awareness, basic difference and applications of Bluetooth and Wi-Fi technologies.